Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States

Fall 2015 CBMS Survey

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Foreword

Every five years since 1965, the Conference Board of the Mathematical Sciences (CBMS) has sponsored a national survey of undergraduate mathematical and statistical sciences in the nation's two- and four-year colleges and universities. The 2015 CBMS survey, conducted with NSF support, is the eleventh report in this series of now fifty years of data. The CBMS surveys study two-year college mathematics programs, and the undergraduate programs of mathematics departments and statistics departments at four-year colleges and universities. Three different instruments are sent to a stratified random sample of these three populations, and this report presents the estimates computed using the responses to these questionnaires.

This report is organized as follows.

- Chapter 1 gives an overview of the results of the 2015 CBMS survey; tables in this chapter are designated with the label S, for "summary". The tables in this chapter are presented in more detail (e.g. four-year college data is broken down up level of department) in later chapters.

- Chapter 2 reports on the special projects of the 2015 survey; tables in this chapter are designated with the label SP, for "special project". The special projects in 2015 for two- and four-year institutions are the mathematical education of pre-college mathematics/statistics teachers, practices in distance learning courses, academic resources available to undergraduates, and trends in dual enrollments. Special projects for four-year departments include interdisciplinary courses in four-year mathematics departments, requirements in the national majors in mathematics and statistics in four-year departments, availability of upper level classes in four-year mathematics departments and statistics, estimates of post-graduation plans of graduates of four-year mathematics departments and statistics departments, assessment in four-year mathematics departments and statistics departments, divisional graduation credit for advanced placement courses in four-year mathematics and statistics departments, pedagogy and making changes at four-year mathematics and statistics departments, statistics majors and minors at four-year mathematics departments, profiles of other full-time faculty at four-year mathematics and statistics departments.

- Chapter 3 focuses on course enrollments and the numbers of undergraduate degrees awarded by mathematics and statistics departments at four-year colleges and universities, including data on who is teaching courses; tables in this chapter are labeled by E, for "enrollment".

- Chapter 4 concerns the demographics of faculty in mathematics and statistics departments of four-year colleges and universities; tables in this chapter are labeled by F, for "faculty". As explained in this chapter, these data were obtained from the Annual Survey, conducted by the American Mathematical Society.

- Chapter 5 studies courses taught primarily to beginning students in mathematics and statistics departments at four-year colleges and universities; tables in this chapter are labeled by FY, for "first year".

- Chapter 6 focuses on enrollments, course offerings, and instructional practices at two-year colleges; tables in this chapter are labeled with TYE, for "two-year enrollment".

- Chapter 7 presents faculty demographics and special topics at two-year colleges; tables in this chapter are labeled with TYF, for "two-year faculty".

Other important information is included in appendices:

- Appendix I contains the enrollments (both with, and without, distance learning enrollments) for each individual course listed on the four-year mathematics and statistics department questionnaires, along with past enrollments (with distance learning enrollments included). Standard errors for the 2015 course enrollments are also included.

- Appendix II contains details about the survey procedure.
- Appendix III gives the list of responders to the 2015 survey.
- Appendices IV, V, VI, and VII give the actual questionnaires used in the 2015 CBMS survey. The instruments themselves can be useful in interpreting the results of the survey.
- Appendix VIII gives the standard errors for each of the tables. It is important to remember that the survey is based on a sample, and the numbers provided in the tables are estimates that are subject to sampling error.

Throughout this report, we often include the standard error (SE) with the estimate, e.g. "52% (SE 2.2)", meaning that the estimate is 52% and the standard error in this estimate is 2.2. Data from the 2015 survey are compared to similar data from earlier CBMS surveys. The change in an estimate from the estimate in a previous survey is often expressed both as percentage change, and as the number of SEs this change represents (e.g. "grew by about 13% (2 SEs)" means that, if X(2015) is the estimate in 2015 and X(2010) is the estimate in 2010, then (X(2015)-X(2010))/X(2010) = .13 and (X(2015)-X(2010))/SE(X(2015)) = 2).

Throughout this report, enrollments do not include dual enrollments, unless indicated by table caption. Depending upon the caption on the table, enrollments may, or may not, include distance learning enrollments. One can use Appendix I to find enrollments of courses at four-year departments for fall 2015 with, or without, distance learning enrollments included (this is not the case for CBMS surveys previous to the 2010 survey, as past appendices give enrollments only with distance learning enrollments included). One can use the tables in Chapter 6 to find enrollments of courses at two-year departments for fall 2015 with, or without, distance learning enrollments included, depending upon the caption. In the text of this report, whether the enrollments cited include, or do not include, distance learning enrollments is generally determined by the comparable historical data available.

This report refers to earlier CBMS reports (called CBMS2010, CBMS2005, etc.). This report, and the preceding nine CBMS reports (beginning with the 1970 report), are available online at: http://www.ams.org/profession/data/cbms-survey/cbms-survey. Other references can be found in the bibliography at the end of the report.

Chapter 1

Summary of CBMS2015 Report

In the text that follows, the standard error (SE) in many of the estimates is provided along with the estimate (e.g. "52% (SE 2.2)"); the standard errors for all CBMS2015 tables can be found in Appendix VIII. The change in an estimate from the estimate in a previous survey is often expressed both as a percentage change and as the number of SEs that change represents (e.g. "grew by about 13% (2 SEs)").

Highlights of Chapter 1

A. Enrollments

- Between fall 2000 and fall 2015, four-year college and university enrollments grew by about 46%, while estimated enrollments in those institutions' mathematics and statistics departments combined grew by about 38%. See Table S.1.
- Between fall 2000 and fall 2015, public two-year college enrollments grew by about 9%, while enrollments in those institutions' mathematics programs (excluding computer science courses) grew by about 38%. See Table S.1.
- Between fall 2010 and fall 2015, four-year college and university enrollments grew by about 1%, while enrollments in those institutions' mathematics and statistics departments combined grew by about 13% (2 SEs). Estimated fall 2015 enrollments increased over fall 2010 in each of the major course categories at four-year mathematics and statistics departments combined, except in lower-level and upper-level computer science enrollments in mathematics departments, which together declined about 23%; however, each of the computer science enrollment categories was above the estimate obtained in fall 2005. See Tables S.1 and S.2.
- Between fall 2010 and fall 2015, public two-year college enrollments decreased by about 14%. Enrollments in these institutions' mathematics and statistics programs decreased by about 5% (1 SE, excluding dual enrollment). This decrease in mathematics and statistics programs enrollments changed the trend observed over the past CBMS surveys: from 2000 to 2005 enrollments increased by 22%; from 2005 to 2010 enrollments increased by 19%; but from 2010 to 2015 enrollments decreased by 5%. See Tables S.1 and S.2 and TYE.2 in Chapter 6 (which includes dual enrollments).
- Between fall 2010 and fall 2015, the estimated total enrollments in mathematics departments at four-year institutions increased by 12% (1.8 SEs), and the estimated total enrollments in statistics departments increased by 32% (9 SEs). (See Table S.2.)
- Between fall 2010 and fall 2015, the most significant changes in estimated enrollments at four-year mathematical sciences departments were the increases in enrollments in statistics courses, particularly in upper-level statistics courses. In statistics departments, the estimated enrollments in introductory-level statistics courses were up 16% (4.3 SEs) from fall 2010 to fall 2015, and the estimated enrollments in upper-level statistics courses were up 85% (11.5 SEs). In mathematics departments, the estimated enrollments in introductory-level statistics courses were up 10% (1.1 SEs) from fall 2010 to fall 2015, the estimated enrollments in upper-level statistics courses were up 88% (4.7 SEs), and estimated total enrollments in all statistics courses combined in mathematics departments were up 19% (2.1 SEs). See Table S.2.
- Between fall 2010 and fall 2015, in mathematics departments at four-year colleges and universities, estimated enrollments in precollege level mathematics courses increased by 21% (1.7 SEs), in introductory level mathematics courses increased by 16% (1.7 SEs), in calculus-level courses increased by 8% (0.95 SEs), and in advanced-level courses increased by 3% (0.3 SEs). Total enrollments in mathematics courses increased 12% (1.7 SEs). Larger and more significant increases in enrollments from fall 2000 to fall 2015 were observed. See Table S.2.
- In public two-year colleges, the overall mathematics enrollment decrease of 5% from 2010 to 2015 included a 32% (6 SEs) decrease in precollege-level courses. This decrease was balanced with increases of 21% (2 SEs) in introductory-level (including Precalculus) mathematics courses, 10% (1 SE) in calculus-level mathematics (mainstream and non-mainstream), and 104% (2 SEs) in elementary/introductory statistics and probability courses. See Tables S.2 and TYE.4 in Chapter 6.
- Computer science enrollments in mathematics departments of four-year colleges and universities, which dropped by 54% from 2000 to 2005,

increased 35% from 2005 to 2010, and dropped 12% (0.8 SE) from 2010 to 2015. See Table S.2.

B. Bachelors degrees granted

- The estimated total number of mathematical sciences bachelors degrees granted through the nation's four-year mathematics and statistics departments in the 2014-15 academic year was 26,234, up from 21,377 in 2009-10 (a 23% (1.9 SE) increase over 2009-10). This estimate reverses a declining trend observed over the CBMS surveys from 1985-2010; the CBMS 1985 estimate was 27,928. When bachelors degrees in computer science awarded by mathematics departments are removed from the total number of bachelors degrees awarded, the total number, 22,266 degrees, is larger than any estimated number of degrees awarded observed in the CBMS surveys from 1985-2010; the CBMS 1985 estimate was 19,237 degrees awarded in 1984-5. See Table S.3.
- The number of degrees in computer science awarded by mathematics departments in 2014-15 was estimated at 3,968, the largest estimate since the 1990 CBMS survey, when the estimated number of degrees in computer science awarded in mathematical science departments was 5,075. See Table S.3.
- The number of mathematics/statistics education bachelors degrees granted through four-year mathematics and statistics departments decreased by 20% (2.1 SEs) between 2009-10 and 2014-15, and decreased by about 42% when compared with 1999-2000 (when it was the highest estimated number in the last five CBMS studies). See Table S.3.
- The percentage of bachelors degrees awarded to women through U.S. mathematics and statistics departments in 2014-15 was estimated at 42%, about comparable to estimates in recent CBMS surveys: 43% in 1999-2000, 40% in 2004-5, and 43% in 2009-10. When degrees in computer science awarded by mathematics department are excluded, then the estimated percentage of degrees awarded to women through U.S. mathematics and statistics departments was 43% in 2014-15; it was 47% in 1999-2000, 43% in 2004-5, and 45% in 2009-10. See Table S.3.

C. Appointment type of instructors of undergraduate mathematics and statistics sections

- The estimated percentage of sections of calculus-level courses taught in four-year colleges and universities by tenured or tenure-eligible faculty decreased from 61% in fall 2005, to 59% in fall 2010, to 52% (SE 2.2) in fall 2015, and the percentage taught by other full-time faculty increased from 15% in fall 2010 to 24% (SE 1.6) in fall 2015. Further data on the appointment type of the instructor, broken down by the type of class and the format of the class, are given for calculus classes, introductory statistics classes, and computer science classes. See Tables S.4-S.8.
- In public two-year colleges, the percentage of mathematics and statistics sections taught by full-time faculty increased by ten points to 64% (SE 4) in fall 2015 compared with fall 2010. In Mainstream Calculus I and II courses, full-time faculty taught 84% (SE 2) of sections with an average section size of 26 (SE 1) students. In Non-Mainstream Calculus I and II full-time faculty taught 71% (SE 10) of all sections with an average section size of 26 (SE 1) students. Eighty percent (80% with SE 5) of Elementary/Introductory Statistics and Probability courses were taught by full-time faculty and had average section size of 26 (SE 5) students. See Tables S.4-S.7.

D. Pedagogical methods used in teaching undergraduate mathematics and statistics courses

- In public two-year colleges in fall 2015, Mainstream Calculus I courses had common department exams in 88% (SE 3) of sections and used homework management systems in 37% (SE 4) of sections. Slightly lower percentages were reported in Mainstream Calculus II. Non-Mainstream Calculus I reported 9% (with SE 4) using common department exams and 66% (SE 13) of sections using homework management systems. Elementary Statistics courses used common department exams in 39% (SE 14) of sections and homework management systems in 55% (SE 12) of sections. See Tables S.9, S.10, S.11 and Table TYE.10 in Chapter 6.
- The 2015 CBMS survey of four-year mathematics departments and statistics departments concentrated on pedagogy in teaching Introductory Statistics (no calculus prerequisite), for non-majors. Methods of teaching Introductory Statistics in mathematics and statistics departments can be compared using the 2015 survey data, which showed both greater use of real data and more sophisticated technology in courses taught in statistics departments. See Table S.12 and Figures S.12.1 and S.12.2.

E. The number of faculty

- The estimated total size of mathematics faculties (including both full-time and part-time faculty) in four-year colleges and universities increased almost 7% from fall 2010 to fall 2015; most of this growth was due to the increased number of part-time faculty. The estimated number of full-time mathematics faculty in fall 2015 was slightly larger than the fall 2010 estimate, but the 2010 estimate was within 1 SE of the 2015 estimate. From 2000 to 2015, the estimated number of full-time mathematics faculty in four-year departments grew by 14%, while mathematics departments' estimated total course enrollments grew by 36% (by 42% when computer science enrollments are removed) (see Table S.2). In doctoral-level statistics departments, the estimated total number of full-time plus part-time statistics faculty, as well as the estimated number of full-time statistics faculty, both increased 23% (almost 5 SEs) from 2010, and both were up about 50% from 2000. The estimated doctoral-level statistics department enrollments have almost doubled since 2000 (Table S.2). See Table S.13 and Figures S.13.1 and S.13.3.

- The estimated total number of full-time mathematics and statistics faculty (permanent, continuing and other) in two-year colleges was 9,800 (SE 894) in fall 2015. This represented a 10% decrease of full-time mathematics and statistics faculty from 2010 to 2015. During this time, the institutional enrollment in two-year colleges decreased by 14% and mathematics and statistics enrollment decreased by 5%. See Tables S.13, Tables TYE.1 and TYE.2 in Chapter 6, and Table TYF.1 in Chapter 7.
- The estimated number of part-time faculty in mathematics departments in four-year colleges and universities ended a trend of slow decline that was observed over the last two CBMS surveys, and, in fall 2015, increased 27% (more than 5 SEs over the 2010 estimate). The estimated number of part-time faculty in doctoral-level statistics departments increased 22% (1.2 SEs) over the 2010 estimate. See Table S.13 and Figures S.13.2, S.13.3, and S.13.5.
- In fall 2015, the estimated number of part-time mathematics faculty in two-year college mathematics programs was 20,247 and represented 67% of the total number of mathematics faculty, when those paid by third parties (2,359 persons) such as school districts are included (See Table TYF.1 in Chapter 7). When third party payees are omitted, part-time mathematics faculty numbered 17,888 (SE 1,908) and represented 65% of the total number of mathematics faculty in 2015. In fall 2010, part-time faculty represented 68% of the total number of mathematics faculty at two-year colleges. See Table S.13 and Figure S.13.4.
- The estimated number of tenured plus tenure-eligible mathematics faculty in four-year colleges and universities decreased from fall 2010 to fall 2015, as it had from 2005 to 2010, creating a loss of almost 2,000 tenured or tenure-eligible positions over the past 10 years, eliminating gains that had been made prior to 2000. Estimated numbers of other full-time mathematics faculty increased 22% (6 SEs) from fall 2010 to fall 2015; this category of mathematics faculty has more than doubled since 2000. The estimated number of tenured plus tenure-eligible faculty in doctoral and masters-level statistics departments combined increased from fall 2010 to fall 2015, as it did from 2005 to 2010, but not significantly. The estimated number of other full-time faculty in statistics departments increased by 47% (5.9 SEs) from fall 2010 to fall 2015, and, in fall 2015, is more than 2.5 times the estimated number in 2000. See Table S.15.
- There were 8,314 (SE 840) full-time permanent mathematics faculty in public two-year college mathematics programs in the United States in fall 2015, compared with 9,790 in 2010, a 15% decrease (1,476 faculty). In fall 2015, there were 1,487 continuing and other full-time faculty (1,221 continuing with 268 SE and 266 Other with 73 SE). Continuing faculty and other faculty together represented a 37% increase from 2010. See Table S.14 and Table TYF.1 in Chapter 7.

F. Gender and ethnicity in mathematical sciences faculty

- In fall 2015, in four-year college and university mathematics departments, women comprised 31% of all full-time faculty, 22% of all tenured faculty, and 36% of all tenure-eligible faculty; each of these percentages is up one or two percentage points from 2010. In statistics departments, in fall 2015, women were 27% of all full-time faculty, 20% of tenured faculty, and 35% of tenure-eligible faculty, and all of these percentages, except for the percentage of tenure-eligible faculty, are larger than in 2010. In public two-year college mathematics programs, in fall 2015, women comprised 52% of the full-time faculty positions (up two percentage points from 2010), and 54% of the full-time faculty of age less than 40 was female (the same as in 2010). See Table S.15 and Figure S.15.1.
- Very little change in the distribution of ethnicities of mathematics and statistics departments faculty in four-year colleges and universities occurred between fall 2015 and fall 2010. In mathematics departments, the estimated percentage of full-time White male faculty dropped from 56% to 53% (with a corresponding one percentage point gain in the percentage of White full-time female faculty). Statistics departments (masters-level and doctoral-level combined) showed White male full-time faculty dropping from an estimated 49% in fall 2010 to 45% in fall 2015, and the percentage of Asian full-time faculty increasing from 28% to 33% over that time interval. The estimated percentages of Black and Hispanic faculty remain small in

both mathematics and statistics departments. See Tables S.18 and S.19.

- Tables for distribution of ethnicities, percentage of women and faculty under the age of 40 in mathematics programs at two-year colleges can be found in Chapter 7, Tables TYF.10-13. In fall 2015, 23% (2 SEs) of the full-time permanent faculty in mathematics programs were from ethnic minorities, a total of 1,876 (SE 289) faculty. This is an increase of 7% compared with 2010 and an increase of 310 persons. The majority of the ethnic groups represented were Asian/Pacific Islander, Black (non-Hispanic), and Mexican American/Puerto Rican/other Hispanic. Women comprised 52% (8 SEs) and 54% (3 SEs) of Black or African American and White faculty respectively, and 37% (10 SEs) of Mexican American/Puerto Rican/other Hispanic. Percentage of full-time permanent minority faculty under the age of 40 was 26% (SE 3) or 2,045 persons.

G. Age distribution and changes in the mathematical sciences faculty due to deaths and retirements

- Table S.16 shows that the estimated percentage of tenured and tenure-eligible mathematics faculty 65 and older increased from 8% in 2005, to 12% in 2010, to 13% in 2015, and the estimated average age of both tenured men and of tenured women mathematics faculty increased; the estimated average age of both tenure-eligible men and of tenure-eligible women decreased over the same period. In statistics departments (Table S.17), in 2015, the estimated average age of tenured men increased over 2010, but the estimated average age of both tenured, and of tenure-eligible, women decreased from 2010. However, Table S.20 shows that the number of deaths and retirements in 2015 was up over 2010 for both mathematics and statistics departments, and is the largest total number in the past four CBMS surveys. See Tables S.16, S.17, and S.20.
- The age distribution and average age of public two-year college mathematics faculty is given in Table S.16 and Table TYF.16 in Chapter 7. The average age of full-time permanent faculty of 47.7 years (SE 0.5), up one year compared with 2010. It was estimated that 612 (SE 132) faculty were no longer part of the faculty in 2015-2016, compared to 459 were no longer part of the faculty in 2010-2011. Reasons for these departures were not surveyed in 2015. See Table TYF.3 in Chapter 7.

An overview of enrollments (Tables S.1 and S.2)

Table S.1 gives an overall historical view of enrollments in courses taught in mathematics and statistics departments of four-year U.S. colleges and universities, and in mathematics programs of public two-year colleges. The table also presents estimates of institutional enrollments, so that one can compare changes in estimated mathematical sciences course enrollments with overall changes in institutional enrollments. The table presents combined enrollments (including distance learning enrollments, but not dual enrollments) in four-year mathematics and statistics departments in fall 2000, 2005, 2010, and 2015 for mathematics, statistics, and computer science courses, with the fall 2015 estimated enrollment broken down into mathematics department enrollment and statistics department enrollment; the enrollments for mathematics programs in two-year colleges are also presented. This enrollment data in mathematical science courses was obtained from the CBMS surveys from those years. The total enrollment in four-year colleges and universities, and in two-year colleges, came from the National Center for Educational Statistics (NCES) and are based on data that post-secondary education institutions must submit to the Integrated Post-Secondary Educational Data System (IPEDS). The estimates are for full-time and part-time students in public and private four-year colleges and universities, and full-time and part-time students in public two-year colleges. Most national data cited in this report are drawn from the NCES publication *Digest of Education Statistics: 2016*, which is available at https://nces.ed.gov/programs/digest/d16/tables/dt16_303.70.asp?current=yes.

We note that many of the NCES reports contain projections that are updated every two years, and, in updates, projections are replaced by actual enrollments. Therefore, enrollments from NCES data for a given year in CBMS Table S.1 may change in Table S.1 in subsequent CBMS reports, as we replace NCES projected enrollments with NCES actual enrollments. The NCES numbers in Table S.1 in this report are all actual enrollments.

From Table S.1 (which includes distance learning enrollments, but not dual enrollments) we see that between fall 2010 and fall 2015, enrollments in mathematical sciences courses at four-year colleges and universities grew at an estimated rate of 13%, while the growth rate in total undergraduate enrollments in that period was 1%. Taking a longer view, between fall 2000 and fall 2015, four-year college and university enrollments grew by about 46%, while enrollments in those institutions' mathematics and statistics departments grew by an estimated 38%. The mathematical sciences course enrollment growth in four-year departments observed in both the CBMS2010 and 2015 surveys has helped to reverse the decline in four-year mathematical sciences course enrollments, compared to general institutional enrollments, which had been noted in earlier CBMS survey reports; for

TABLE S.1 Enrollment in (1000s) in undergraduate mathematics, statistics, and computer science courses taught in mathematics departments and statistics departments of four-year colleges and universities, and in mathematics programs of two-year colleges. Also NCES data on total fall enrollments in two-year colleges and four-year colleges and universities in fall 2000, 2005, 2010, and 2015. NCES data include both public and private four-year colleges and universities, and include only public two-year colleges. Enrollments include distance-learning enrollments but not dual enrollments.

	Four-Year College & University Mathematics & Statistics Departments						Two-Year College Mathematics Programs[3]			
	Fall				2015 by Dept		Fall			
	2000	2005	2010	2015	Math	Stat	2000	2005	2010	2015
Mathematics	1614	1607	1971	2213	2213	--	1273	1580	1887	1639
Statistics	245	260	371	457	313	144	74	117	137	280
Computer Science	124	59	77[1]	68[1]	68	--[1]	392	--[1]	--[1]	--[1]
Total	1984	1925	2419	2738	2594	144	1386	1697	2024	1918
NCES Total Fall Undergraduate Enrollments[2]	7207	8476	10399	10546			5697	6184	7218	6216

[1] Computer science totals in two-year colleges before 1995 included estimates of computer science courses taught outside of the mathematics program. In 1995 and 2000, only those computer science courses taught in the mathematics program were included. Starting in 2005, no computer science courses were included in the two-year mathematics survey, and starting in 2010, no computer science courses were included in the statistics survey.

[2] Data for 2000, 2005, 2010, and 2015 are from Table 303.70 of the NCES publication *Digest of Education Statistics: 2016.* The full report has not been released, but selected tables are available. These data were downloaded in June 2017 from https://nces.ed.gov/programs/digest/d16/tables/dt16_303.70.asp?current=yes.

[3] Starting in 2005, data on mathematics, statistics, and computer science enrollments in two-year colleges include only public two-year colleges.

example, the estimated mathematical science enrollment in four-year departments in CBMS2005 was actually less than the estimate in 1990, despite an estimated 22% growth in institutional enrollments [CBMS2005, Table S.1, p. 3]. A particularly disturbing trend noted in the 2005 CBMS report was that enrollments in mathematics and statistics four-year departments had actually declined from fall 2000 to fall 2005, while enrollments in four-year colleges and universities rose by 18% (by Table S.1 in this report). so that over the last ten years, mathematical sciences enrollments have been "catching-up" to the growth in institutional enrollments observed over the last fifteen years. Figure S.1.1 displays the growth in enrollments in mathematical sciences courses taught in mathematics and statistics departments of four-year colleges and universities, and in two-year colleges, in fall 1990, 1995, 2000, 2005, 2010, and 2015.

At public two-year college mathematics programs, CBMS survey data present a roughly 46% growth in the mathematics and statistics enrollments in the mathematics departments and programs of the nation's public TYCs in the period 2000 to 2010, followed by a 5% decrease from 2010 to 2015. NCES data in Table S.1 show that total enrollments in the nation's public two-year colleges (TYCs) increased by about 27% between fall 2000 and fall 2010, and then decreased by 14% from 2010 to 2015. It should be noted that Table S.1 does not include dual enrollments. Figure S.1.1 presents a graphical display of increases in mathematical sciences course enrollments in two-year college from 1990 to 1995 and 2000 to 2010, and the decreases from 1995 to 2000 and 2010 to 2015. Additional information and discussion about trends in enrollments in mathematics courses and programs at two-year colleges can be found in Chapter 6, Tables TYE.1 and TYE.2 (includes dual enrollment). It should also be noted that the sample frame in 2005 and following years includes only public two-year colleges.

Table S.2 begins the process of breaking the total mathematical sciences course enrollment down into its component parts. Among four-year college and university mathematics departments, the enrollment course categories used were precollege-level courses, introductory-level courses, calculus-level courses,

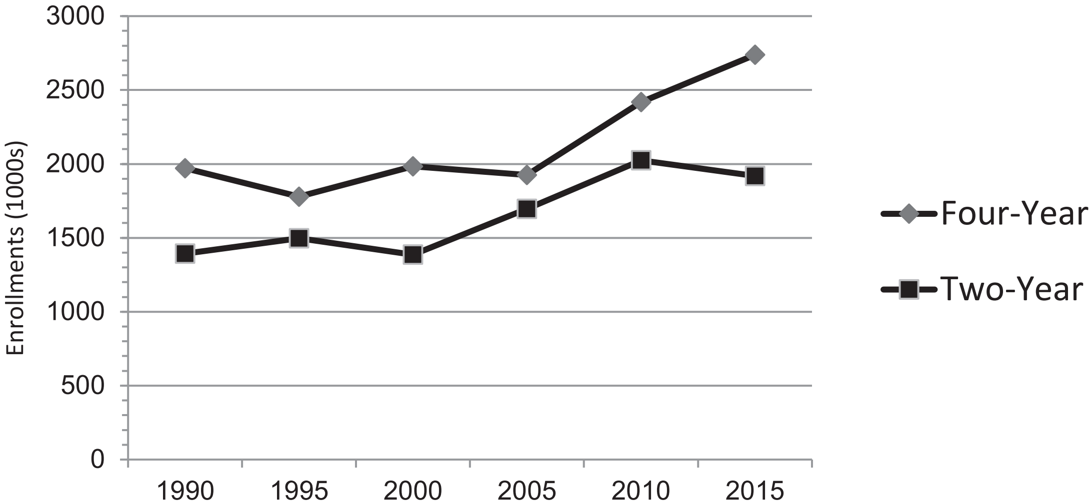

FIGURE S.1.1 Combined enrollment (in 1000s) in undergraduate mathematics, statistics, and computer science courses at four-year colleges and universities within mathematics departments and statistics departments, and within mathematics programs of two-year colleges: Fall 1990, 1995, 2000, 2005, 2010, and 2015. Data beginning in 2005 include only public two-year colleges.

Note: Before 1995, two-year enrollment totals included computer science enrollments taught outside of the mathematics program. In 1995 and 2000, only computer science courses taught within the mathematics program of two-year colleges were counted. Starting in 2005, no computer science courses were included in the CBMS survey of two-year mathematics programs, and starting in 2010, no computer science data were included in the survey of statistics departments.

and advanced-level courses. In the 2010 and 2015 CBMS surveys the precollege courses (e.g. arithmetic, pre-algebra, elementary algebra, intermediate algebra) were treated as one block, and not itemized, as they had been in previous CBMS surveys. The intermediate-level course list was essentially unchanged in 2015 from the previous 2010 CBMS survey, and included courses in liberal arts mathematics, mathematics for K-8 mathematics teachers, and a cluster of courses with names such as College Algebra, Precalculus, and Trigonometry. The calculus-level courses listed in the 2015 survey included, as in previous CBMS surveys, linear algebra, differential equations, discrete mathematics, and various calculus courses; from the individual course enrollments, which are included in Appendix I, we see that calculus courses accounted for 76% of the non-distance learning enrollments in calculus-level courses. We note that Tables S.1 and S.2 include distance learning enrollments; Appendix I contains enrollments in four-year mathematics and statistics department courses both with, and without, distance learning enrollments. Statistics course enrollments, offered in either mathematics or statistics departments, were broken into introductory-level and upper-level enrollments, and computer science course enrollments were broken into three levels; some changes were made in the list and titles of the statistics courses in the 2015 survey, and changes made to the list of computer science courses were based on the course recommendations in the Association for Computer Machinery report, *Computer Science Curricular 2013*, available at http://www.acm.org/education/CS2013-final-report.pdf. Beginning in 2010, enrollments in computer science courses offered through statistics departments were not gathered in the CBMS survey, but they were gathered, as was done previously, from mathematics departments at four-year institutions in 2015.

Table S.2 also shows enrollments and trends in various course categories in public two-year college mathematics programs and discussed in the bullets above and in Chapter 6. Direct comparisons between courses-categories in two-year and four-year departments are problematic because the course-categories (which can be seen by looking at the actual questionnaires that are reproduced in Appendix IV) sometimes contain different courses (e.g. linear algebra and differential equations are not calculus-level courses in the two-year college instrument).

In four-year college and university mathematics departments, the estimated total of all enrollments in courses taught in mathematics departments rose from 2,310,000 in fall 2010 to 2,594,000 (SE 157,000) in fall 2015, according to Table S.2. All cate-

TABLE S.2 Total enrollment (in 1000s), including distance-learning enrollment, by course level in undergraduate mathematics, statistics, and computer science courses taught in mathematics and statistics departments at four-year colleges and universities, and in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

	Mathematics Departments				Statistics Departments				Two-Year College Mathematics Programs			
Course level	2000	2005	2010	2015	2000	2005	2010	2015	2000	2005	2010	2015
Mathematics courses												
Precollege level	219	201	209	253	--	--	--	--	763	965	1150	782
Introductory level (including Precalculus)	723	706	863	1000	--	--	--	--	274	321	368	445
Calculus level	570	587	748	807	--	--	--	--	106	108	138	152
Advanced level	102	112	150	154	--	--	--	--	0	0	0	0
Other (2-year)	--	--	--	--	--	--	--	--	130	187	231	259
Total Mathematics courses	1614	1607	1971	2213	--	--	--	--	1273	1580	1887	1639
Probability and Statistics courses												
Introductory level	136	148	231	253	54	54	81	94	74	117	137	280
Upper level	35	34	32	60	20	24	27	50	0	0	0	0
Total Probability and Statistics courses	171	182	262	313	74	78	108	144	74	117	137	280
Computer Science courses [1]												
Lower level	90	44	56	45	1	2	--	--	39	--	--	--
Middle level	17	8	12	16	0	0	--	--	0	--	--	--
Upper level	16	5	10	6	0	0	--	--	0	--	--	--
Total Computer Science courses [1]	123	57	77	68	1	2	--	--	39	--	--	--
Grand Total	1908	1845	2310	2594	75	80	108	144	1386	1697	2024	1918

Note: Round-off may make column totals seem inaccurate.

[1] Beginning in 1995, computer science enrollment included only courses taught in mathematics programs. Beginning in 2005, computer science courses were no longer included in the two-year college survey. Beginning in 2010, computer science courses were no longer included in the statistics survey.

gories of courses, except lower-level and upper-level computer science courses, showed increased estimated enrollments in fall 2015 over fall 2010, and all categories of courses, except computer science courses, had estimated enrollments in fall 2015 that were larger than those in fall 2000. Enrollments in courses in mathematics (excluding statistics and computer science) increased by 12% (1.7 SEs) from fall 2010 to fall 2015. Figure S.2.1 presents a bar graph showing the estimated enrollments in mathematics courses, broken down by course-category, from 1990-2015. The mathematics course-category, for four-year mathematics departments, that had the largest estimated enrollment growth from fall 2010 to fall 2015 was the category precollege-level courses, which increased 21% (1.7 SEs), from an estimated enrollment of roughly 209,000 in 2010 to an estimated enrollment of 253,000 (with SE 26,000) in 2015. The next largest growth in estimated enrollment in fall 2015 over fall 2010 occurred in introductory-level courses, up 16% (1.7 SEs), followed by an 8% (1 SE) growth in enrollment in calculus-level courses (which rose 37% in 2015 over 2005), and only a 3% (0.3 SEs) increase in enrollment in advanced-level mathematics courses (which rose 38% in 2015 over 2005). In the 2010 CBMS survey data, the advanced-level courses showed the largest growth from 2005 to 2010, while the precollege-level courses showed the smallest growth, so it appears that at least some of the variation in enrollments in mathematics courses that we see from 2010 to 2015 may be explained by standard error, though the general trend seems to be increasing enrollments. The estimated total number of enrollments in mathematics courses in four-year college and university mathematics departments increased by about 37% (4.3 SEs) over the fifteen-year period of 2000-2015.

Table S.2 shows that the total enrollment in all mathematics and statistics courses taught in public two-year mathematics programs increased by 38% over the fifteen-year period of 2000-2015 (excluding dual enrollment). This fifteen-year period included a steady increase from 2000 to 2010, followed by a 5% decrease, from 2010 to 2015. The estimated total of enrollments in courses taught in mathematics departments decreased from 2,024,000 in fall 2010 to 1,918,000 (SE 115,000) in fall 2015. Despite the decrease in fall 2015, the total course enrollments in public two-year college mathematics programs were approximately 43% of the total mathematics and statistics enrollments of all the combined mathematical sciences programs (i.e. of the two-year mathematics programs and four-year mathematics departments combined, but not including statistics departments).

Mathematics programs at public two-year colleges also had uneven enrollment growth in categories of courses and individual courses. Notable changes occurred within Precollege-level courses with a

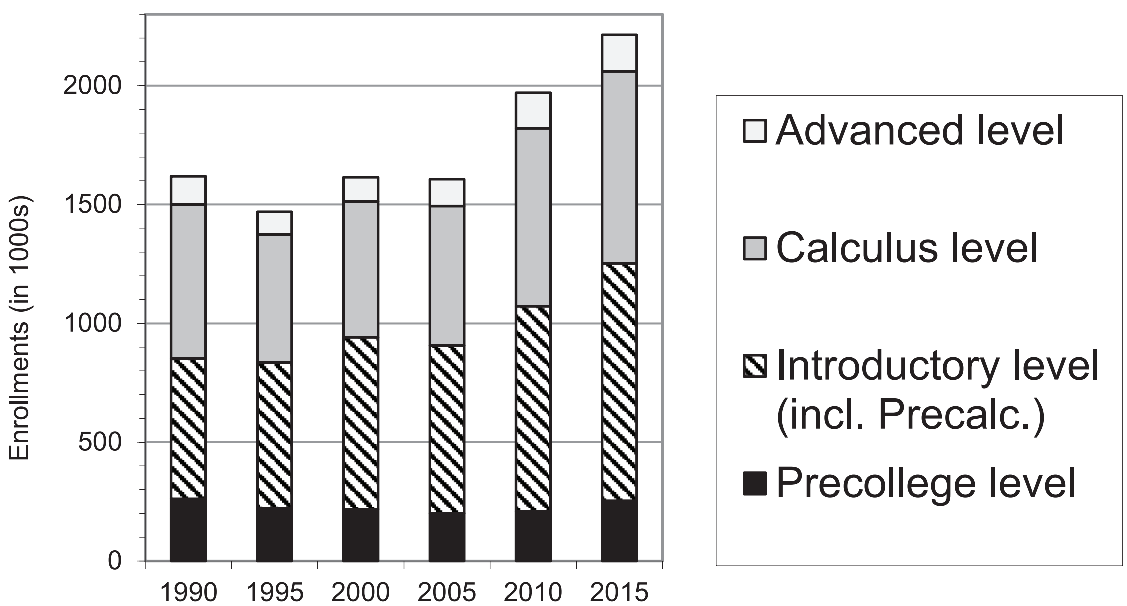

FIGURE S.2.1 Enrollments (in 1000s) in undergraduate mathematics courses in mathematics departments of four-year colleges and universities by level of course in fall of 1990, 1995, 2000, 2005, 2010, and 2015.

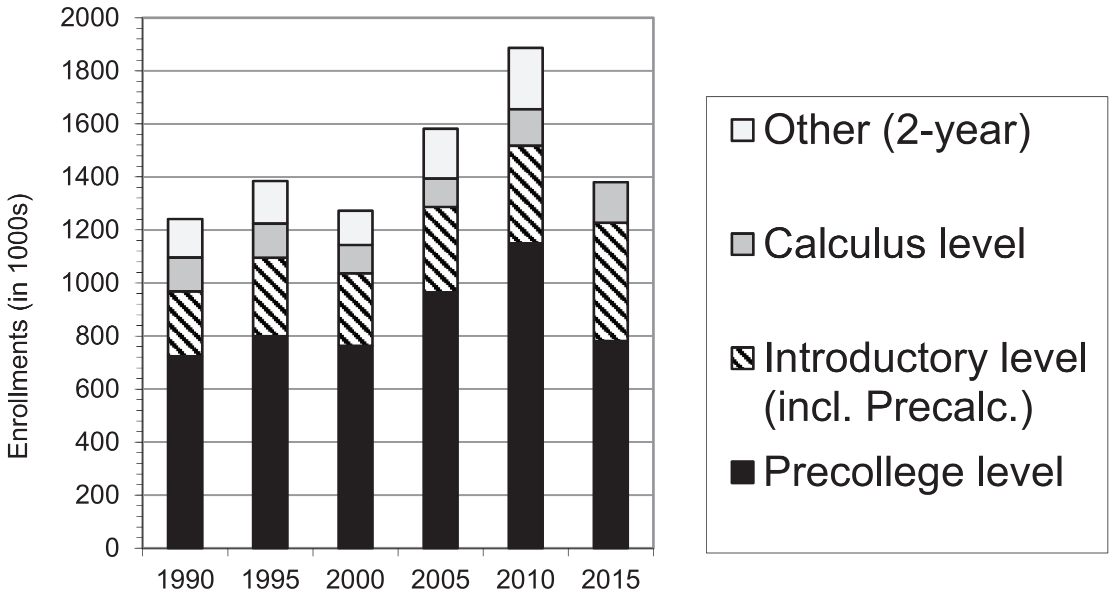

FIGURE S.2.2 Enrollments (in 1000s) in undergraduate mathematics courses in two-year college mathematics programs by level of course in the fall of 1990, 1995, 2000, 2005, 2010, and 2015.

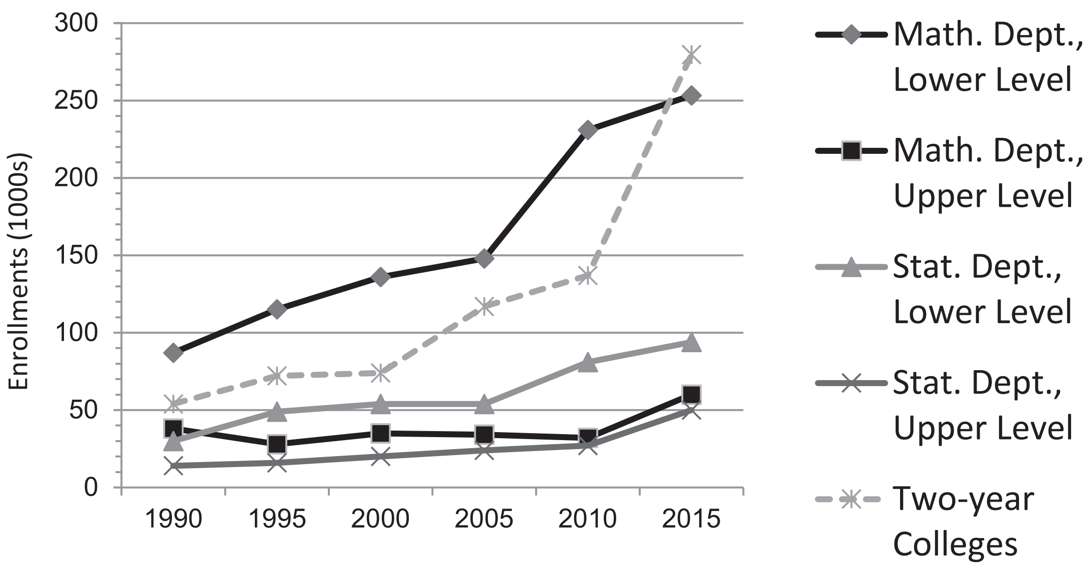

FIGURE S.2.3 Enrollments (in 1000s) in statistics courses in two-year college mathematics programs, and in mathematics departments and in statistics departments of four-year colleges and universities in fall 1990, 1995, 2000, 2005, 2010, and 2015.

decrease in estimated enrollment from 1,150,000 in fall 2010 to 782,000 (SE 65,000) in fall 2015 of 32%, following a 19% increase from 2005 to 2010. Within Precollege courses in fall 2015, enrollments in Arithmetic and Basic Mathematics decreased 52% (5 SEs) between 2010 and 2015, decreased 44% (6 SEs) in Pre-algebra, decreased 35% (6 SEs) in Elementary Algebra and decreased 13% (2 SEs) in Intermediate Algebra.

The largest growth in enrollments at public two-year colleges from fall 2010 to fall 2015 occurred in elementary statistics and probability courses, up 104% in 2015 to 280,000 students (SE 60,000), compared with 16% growth from fall 2005 to fall 2010. The next largest enrollment growth occurred in the category of introductory-level mathematics (including College Algebra, Trigonometry, and Precalculus/Elementary Functions), up 21% in 2015 to 445,000 students (SE 39,000) over 2010, compared with a 15% increase from fall 2005 to fall 2010. Within Precalculus-level courses in fall 2015, enrollments in College Algebra increased 27% (2 SEs) between 2010 and 2015, increased 28% (1 SE) in College Algebra & Trigonometry (combined), and increased 35% (2 SEs) in Precalculus/Elementary Functions/Analytic Geometry. A 10% enrollment increase occurred in the category of Calculus-level (Mainstream and Non-Mainstream) courses from fall 2010 to fall 2015 to 152,000 students (SE 15,000), after a 28% increase in fall 2010 over fall 2005. Also

TABLE S.3 Combined total of all bachelors degrees in mathematics and statistics departments at four-year colleges and universities between July 1 and June 30 in 1994-95, 1999-2000, 2004-2005, 2009-10 and 2014-15 by selected majors and gender.

Major	94-95	99-00	04-05	09-10	14-15
Mathematics (except as reported below)	12456	10759	12316	12468	12794
Mathematics Education	4829	4991	3369	3614	2880
Statistics (except Actuarial Science)	1031	502	527	856	1509
Actuarial Mathematics	620	425	499	849	2354
All Joint Majors (combined) [1]	--	--	--	1222	1821
Joint Mathematics & Computer Science	453	876	719	--	--
Joint Mathematics & Statistics	188	196	203	--	--
Joint Math/Stat & Business or Economics	na	na	214	--	--
Other (includes Operations Research prior to 2010) [2]	577	1550	985	231	907
Total Mathematics, Statistics & Joint degrees	20154	19299	18833	19241	22266
Number of women	9061	9017	8192	8692	9643
Computer Science degrees	2741	3315	2603	2137	3968
Number of women	532	808	465	394	1302
Total degrees	22895	22614	21437	21377	26234
Number of women	9593	9825	8656	9086	10946

Note: Round-off may make column totals seem inaccurate.

[1] Beginning in 2010, the survey asked for the total number of all joint majors.

[2] Prior to 2010, Operations Research was a separate category. Beginning in 2010, Operations Research is included in Other Mathematics.

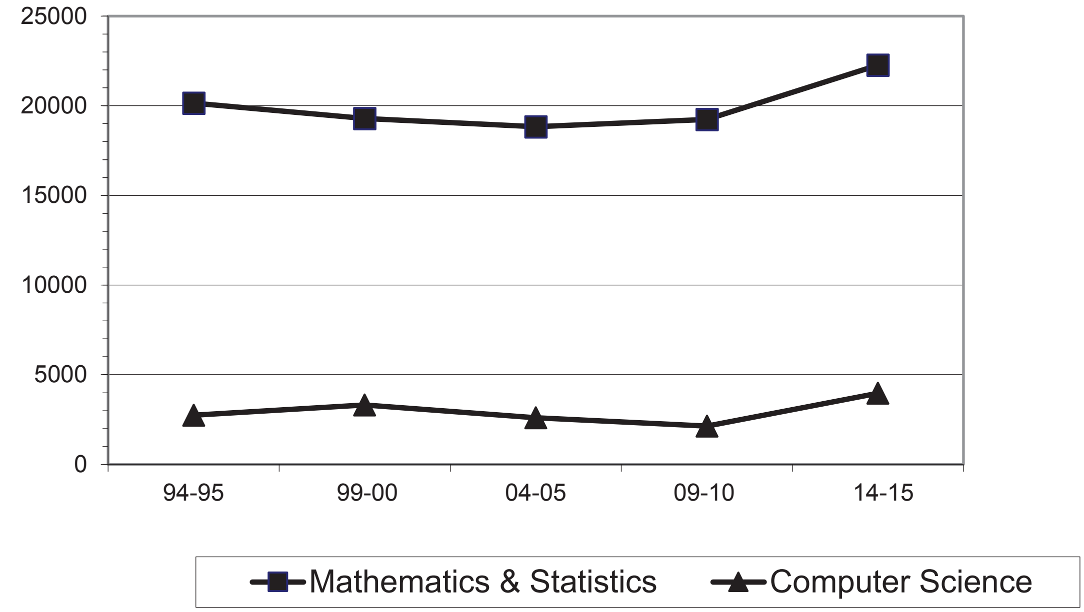

FIGURE S.3.1 Number of bachelors degrees in mathematics and statistics, and in computer science, granted through mathematics and statistics departments in academic years 1994-1995, 1999-2000, 2004-2005, 2009-2010 and 2014-2015.

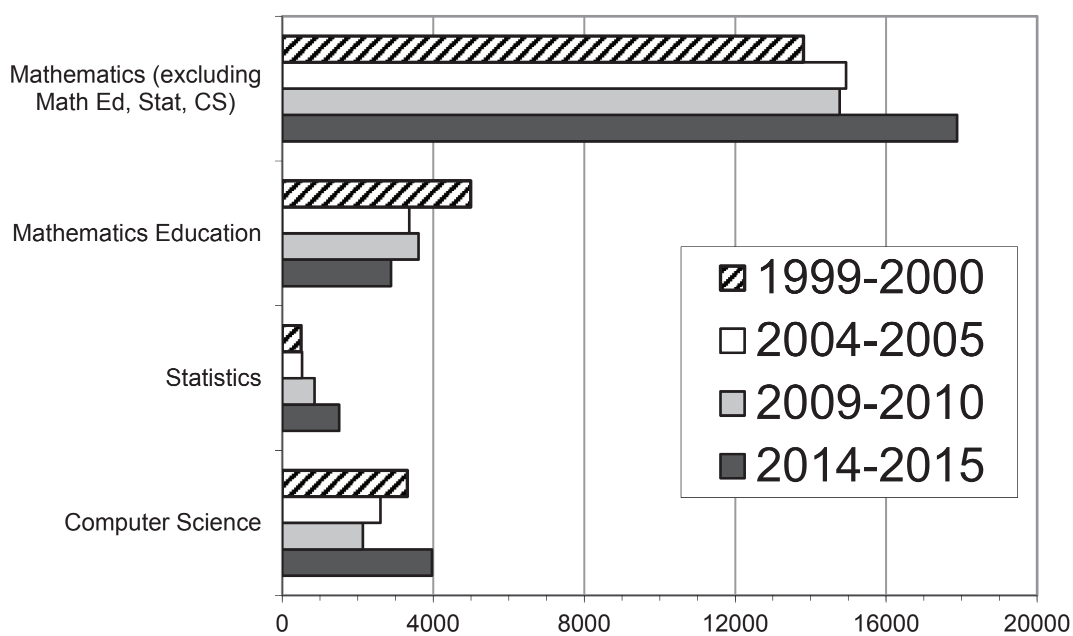

FIGURE S.3.2 Number of bachelors degrees awarded by mathematics and statistics departments (combined) at four-year colleges and universities between July 1 and June 30 in 1999-2000, 2004-2005, 2009-2010 and 2014-2015.

see Tables TYE.3, TYE.3.1, TYE.3.2, TYE.4 and discussions in Chapter 6.

Between 2010 and 2015 the nation's undergraduate statistics courses continued a trend of long-term enrollment growth in courses taught in mathematics departments of four-year and two-year colleges, as well as in statistics departments of four-year institutions; Figure S.2.3 displays the growth in both lower and upper-level statistics course enrollments for two-year colleges, four-year mathematics departments, and four-year statistics departments from 1990-2015. By Table S.2, of the estimated 627,000 enrollments in Elementary/Introductory Statistics at four and two-year departments, 45% occurred at two-year mathematics programs, 40% at four-year mathematics programs, and 15% at statistics departments.

Table S.2 shows that the estimated total enrollments in statistics departments were 144,000 (SE 4,000) in fall 2015 and 108,000 in fall 2010, a 33% (9 SEs) increase over fall 2010. In fall 2015, the estimated total enrollments in statistics courses offered in mathematics departments were 313,000 (SE 24,000), and, hence, four-year mathematics departments were responsible for slightly more than two-thirds of the estimated total statistics enrollments (at lower and upper-levels combined) in four-year mathematics and statistics departments combined.

Statistics enrollments showed large gains in both mathematics and statistics four-year departments, particularly in upper-level courses, from fall 2010 to fall 2015. In mathematics departments, Table S.2 shows that the estimated introductory statistics enrollments in fall 2015 were 253,000 enrollments, up 10% (1.1 SEs) from fall 2010, and the estimated upper-level statistics enrollments were up 88% (4.7 SEs). In statistics departments, the estimated introductory statistics enrollments in fall 2015 were up 16% (4.3 SEs) over fall 2010, and upper-level statistics enrollments were up 85% (11.5 SEs). The 2010 CBMS survey showed large gains from 2005 to 2010 in introductory statistics enrollments, and modest gains in upper-level enrollments; perhaps the increased interest in beginning statistics courses has generated interest in the upper-level statistics courses.

Statistics and Probability course enrollment experienced growth at two-year colleges between 2010 and 2015. For the first time, the CBMS survey estimated enrollments in Elementary Statistics classes taught in two-year colleges slightly exceeded the enrollments in Introductory Statistics taught in mathematics departments (not including statistics departments) of four-year colleges and universities. Statistics and Probability enrollments in courses taught in mathematics programs at two-year colleges were up 104% in 2015 over 2010 (280,000 students, SE 60,000), compared with an increase of 17% in 2010 over 2005, and they nearly quadrupled from 2000 to 2015. When the number of students taking introductory statistics in four-year colleges' mathematics and statistics departments is combined, 347,000 students were enrolled in fall 2015 in four-year institutions, compared to 280,000 students at two-year colleges enrolled in Elementary Statistics. Enrollments in Elementary Statistics courses at two-year colleges were eighty-one percent (81%) of the enrollments in introductory level statistics courses at four-year mathematics and statistics departments combined.

Computer science enrollments have been declining within mathematics departments at four-year and two-year institutions, as well as in statistics departments; in fall 2015, enrollments in computer science were estimated to contribute 68,000 enrollments toward the 2,594,000 total enrollments in four-year mathematics department. Estimated computer science enrollments in four-year mathematics departments, declined by a little more than 50% from fall 2000 to fall 2005, were up 35% from fall 2005 to fall 2010, and in fall 2015 declined to about half of the fall 2000 estimate. The CBMS surveys ceased collecting computer science enrollments in two-year college mathematics programs with the 2005 survey, and in statistics departments of four-year institutions with the 2010 survey. Although well below the levels of the previous decade, enrollments in computer science courses offered in mathematics departments are still a significant source of mathematical sciences enrollments, particularly in bachelors-level departments, where they are primarily offered. Although the CBMS 2015 survey showed enrollments in computer science courses offered in mathematics departments were down, we will see later in this chapter that the estimated number of undergraduate computer science degrees awarded by mathematics departments in 2014-15 increased over the estimated number awarded 2009-10.

Tables with finer breakdowns of enrollments in four-year mathematics and statistics departments (including breakdown by the level (bachelors, masters, doctoral) of the department) are found in Chapters 3 and 5, and individual course enrollments are presented in Appendix I. Additional details on mathematics and statistics course enrollments in two-year colleges are found in Chapter 6.

Academic year enrollments

CBMS surveys follow the NCES pattern and focus on only fall enrollments. However, CBMS surveys also have asked four-year mathematics and statistics departments to provide the enrollment for the previous 2014-15 academic year, and for the fall term 2014. Using this data, the ratio of full-year enrollment to fall enrollment can be estimated. In 1990, 1995, 2000, 2005, 2010, and 2015 these ratios in four-year mathematics departments were, respectively, 2, 2, 1.85 (SE 0.03), 1.75 (SE 0.03), 1.8 (SE 0.04), 1.74 (SE 0.11); in fall 2015, in statistics departments the ratio was 1.92 (SE 0.03). As noted in the CBMS 2005 survey, this decline in the ratio is likely due both to the decline in the quarter system (as shown in Table S.3 of CBMS2005 - this data was not gathered in 2010 or 2015), and to the fact that fall semesters tend to have larger enrollments than spring semesters. However, some courses may have larger enrollments in the winter/spring term than in the fall term, and the 2015 CBMS survey asked four-year mathematics departments to provide Calculus II winter/spring 2015 enrollments; not including distance-learning enrollments, in Calculus II, four-year mathematics departments had an estimated 125,126 (SE 10,654) enrollments in fall 2015, and 147,056 (SE 14,312) enrollments in winter/spring 2015.

Bachelors degrees in the mathematical sciences (Table S.3)

Table S.3 presents the total number of bachelors degrees awarded through the nation's four-year mathematics and statistics departments (combined) in the academic years 1994-95, 1999-2000, 2004-5, 2009-10, and 2014-15. The survey instructions specify that double majors should be included in the count of degrees awarded. The degrees awarded are categorized as degrees in mathematics, mathematics education, statistics, computer science, actuarial mathematics, joint majors, or "other". Surveys of four-year mathematics departments conducted before 2010 contained the additional option of a major in operations research, and the numbers of operations research majors from those previous years have been added to the "other" category in Table S.3; furthermore, prior surveys broke down the category of joint majors into different subcategories, while the 2010 and 2015 surveys considered all joint majors as one category. Beginning in 2010 computer science degrees are counted only in mathematics departments. Table E.1.A in Chapter 3 gives the estimated numbers of bachelors degrees awarded by mathematics departments, and Table E.1.B gives the estimated numbers of bachelors degrees awarded by statistics departments; both tables give further breakdowns of the degrees awarded, including by the level (bachelors, masters, or doctoral) of the department awarding the undergraduate degree.

Table S.3 shows that the estimated total number of mathematical sciences bachelors degrees granted through the nation's four-year mathematics and statistics departments in the 2014-15 academic year was 26,234 degrees (SE 2,587), up from 21,377 degrees in 2009-10 (a 23% and 1.9 SEs increase over 2009-10), and above the estimated 21,437 degrees awarded in 2004-5. The six previous CBMS surveys (see Table S.3 for the surveys of 1995, 2000, 2005, and 2010, and Table SE.4 in CBMS2000 p. 14 for 1985 and 1990) reported a declining trend in the total number of bachelors degrees awarded by 4-year mathematics and statistics departments combined, and, that over the 25 years, 1985-2010, the estimated number of degrees awarded in the previous academic year had decreased by 13% (see Figure S.3.1 and CBMS2000 Table SE.4 p. 14). The 2015 estimate, while higher than any of the estimates in the last five CBMS surveys, is below the 1985 estimate of 27,928 (which included an estimated 8,691 degrees in computer science awarded by mathematical sciences departments), and, if the apparent increase is not due to statistical error, the CBMS2015 data indicate a reversal in the declining trend in the number of bachelors degrees awarded the previous academic year. An increase in the number of degrees awarded in 2014-15 might have been fueled by the increases in estimated enrollments observed in the CBMS surveys of 2010 and 2015. In the past CBMS survey reports cited above, the declining number of bachelors degrees in computer science awarded by mathematics departments was cited as the major reason for the decline in the estimated number of bachelors degrees awarded, for, when computer science degrees were removed from the count, the estimated number of degrees awarded by mathematics and statistics departments appeared relatively constant: 19,237 in 1984-85 (the first-year computer science degrees were tabulated), 19,380 degrees in 1989-90 and 19,241 degrees in 2009-10 (see Table S.3 and SE.4 in CBMS2000). However, first, the number of computer science degrees awarded by mathematics departments over the preceding academic year, 2014-2015, is the largest number recorded in the last five CBMS surveys (see Table S.3), and it is the largest number since the 1990 survey, which estimated that 5,075 degrees in computer science were awarded by mathematical sciences departments in 1989-90 (see Figures S.3.1 and S.3.2, and Table SE.4 in CBMS2000 p. 14). Second, when we remove the estimated 3,968 computer science degrees from the estimated CBMS2015 total number of bachelors degrees awarded, the estimated total is 22,266 degrees awarded in 2014-15, larger than any estimated number of degrees awarded (with computer science degrees removed) reported in the CBMS surveys from 1985-2010. The standard error in this 2015 CBMS survey estimate of 22,266 degrees awarded in mathematics, statistics, actuarial mathematics, joint degrees, and "other" combined, in 2014-5, is about 2,008 degrees.

Table S.3 and Figure S.3.2 show the breakdown of bachelors degrees awarded into the different categories of majors, over the last four CBMS surveys. The estimated number of bachelors degrees in mathematics education has been declining; the 2014-15 estimate is 42% (6 SEs) less than the 1999-2000 estimate, and is the smallest estimate over the five surveys in Table S.3. The estimated number of bachelors degrees awarded in statistics has increased 76% (6.7 SEs) since 2009-10, and the estimated number of bachelors degrees awarded in actuarial mathematics has increased even more, more than doubling since 2009-10. The number of bachelors degrees awarded in computer science, while small, and mainly confined to bachelors-level mathematics departments, is still a significant number; e.g. in 2014-15 it was about the same as the sum of bachelors degrees awarded in statistics and degrees awarded in actuarial mathematics in mathematics and statistics departments combined.

The 2014-2015 Taulbee Survey, an annual survey of U.S. and Canadian doctoral-level computer science, computer engineering, and information departments, published by the *Computing Research Association*, in its Table B.1 reports that 13,514 undergraduate degrees in computer science were awarded by U.S. doctoral-level computer science departments in 2014-15 (compared with 7,836 undergraduate degrees in 2009-10); 17,401 computer science degrees were awarded by U.S. doctoral-level computer science departments when degrees in computer engineering and information are added (compared with 11,204 in 2009-10). Table B.2 of that report shows that of the 14,834 undergraduate degrees in computer science that were awarded by U.S. and Canadian doctoral-level departments of computer science, computer engineering and information in 2014-15, and for whom the gender is known, 15.7% of the degree recipients were women (16.3% when computer engineering and information systems degrees are added) [*Computing Research Association*, Taulbee Survey Report, 2014-15, is available at: http://cra.org/resources/taulbee/]. The Taulbee statistics on bachelors degrees awarded by only U.S. doctoral-level computer science departments can be compared to CBMS data on computer science bachelors degrees awarded by mathematics departments. The 3,868 degrees in computer science awarded by mathematics departments in 2014-15 represent 29% of the 13,514 undergraduate degrees in computer science awarded by U.S. doctoral-level computer science departments in that same time period, so are a significant contribution to the nation's computer scientists. Moreover, women comprised 33% of the computer science bachelors degrees awarded from mathematics departments in 2014-15, as opposed to about 16% of bachelors degrees awarded to women as reported for doctoral-level computer science, engineering and information departments in 2014-15. The Taulbee survey also reports big gains in enrollments in computer science courses, that were not observed in the CBMS 2015 data. When, in Chapter 3, Table E.1.A, the computer science degrees produced by mathematics departments are broken down by the level of department awarding the degree, it will be evident that, in 2014-15, the computer science degrees given in mathematics departments were awarded most frequently by the bachelors-level mathematics departments.

The CBMS 2015 survey defined a "joint major" as "a student who completes a single major in your department that integrates courses from mathematics and some other program or department, and typically requires fewer credit hours than is the sum of the credit hours required by the separate majors". "Double majors", students who complete two separate majors, were counted in the CBMS survey according to the category of mathematics or statistics major they complete. The CBMS 2010 and 2015 surveys grouped all joint mathematics majors into one category of "joint majors", rather than breaking them down into possible kinds of joint majors, which had been the CBMS survey practice before 2010. In 2014-2015, the estimated number of degrees awarded in the category of joint majors was up about 50% from 2009-10. The category of degrees in "other" was small in 2014-15, but almost four times higher than the number of degrees awarded in 2009-10; one can only speculate about what "other" might include - possibly operations research or some other kind of degree in statistics.

Table S.3 also shows that the percentage of bachelors degrees awarded to women through U.S. mathematic and statistics departments combined has remained relatively constant; it was estimated at 43% in 1999-2000, 40% in 2004-5, 43% in 2009-10, and 42% in 2014-15. When degrees in computer science degrees awarded by mathematics department are excluded, then the estimated percentage of bachelors degrees awarded to women through U.S. mathematics and statistics departments was 47% in 1990-2000, 44% in 2004-5, 45% in 2009-10, and 43% in 2014-15. Tables E.1.A and E.1.B in Chapter 3 show that these percentages vary across levels of mathematics and statistics departments.

NCES also provides data on the numbers of bachelors degrees awarded; these data come from the IPEDS data submitted by a university office, while the CBMS survey data and the Annual Survey data come from the department chairs. The NCES, Annual survey, and the CBMS estimates of number of degrees awarded are not identical. Unlike the Annual survey and CBMS data, the NCES data do not always include double majors or mathematics education majors, and the NCES data may not include computer science majors given in a mathematics department in the totals of mathematics degrees awarded. NCES data is census data, while Annual Survey and CBMS data

TABLE S.4 Percentage of fall 2015 sections (excluding distance-learning sections) in courses of various types taught in mathematics and statistics departments of colleges and universities by various types of instructors, and percentage of sections taught by full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2015, with data for fall 2010 from CBMS2010 Table S.5, p. 15, and data for fall 2005 from CBMS2005 Table S.6, p. 15. Also total enrollments (in 1000s).

	Percentage of sections taught by					
Four-Year Colleges & Universities	Tenured/ tenure-eligible[1] %	Other full-time %	Part-time %	Graduate teaching assistants %	Unknown %	Total enrollment in 1000s
Mathematics Department courses						
Mathematics courses						
Precollege level 2015	nc	nc	nc	nc	nc	244
Precollege level 2010	18	20	44	9	9	201
Precollege level 2005	9	25	46	14	5	199
Introductory level 2015	nc	nc	nc	nc	nc	954
Introductory level 2010	32	22	27	8	10	834
Introductory level 2005	31	25	28	10	6	695
Calculus level 2015	52	24	10	7	7	790
Calculus level 2010	59	15	12	7	8	743
Calculus level 2005	61	17	9	7	6	583
Upper level 2015	70				30	154
Upper level 2010	78*				23*	150
Statistics courses						
Introductory level 2015	41	21	25	4	8	235
Introductory level 2010	48	14	22	4	12	218
Introductory level 2005	49	16	28	3	3	145
Upper level 2015 sections	53				47	60
Upper level 2010 sections	77*				23*	32
Computer Science courses						
Lower level 2015	46	20	14	0	21	44
Lower level 2010	50	17	29	1	3	52
Lower level 2005	63	12	17	1	8	43
Statistics Department Courses						
Introductory level 2015	14	25	10	31	20	90
Introductory level 2010	33	17	12	15	23	77
Introductory level 2005	25	21	13	20	21	53
Upper level 2015	55				45	50
Upper level 2010	79*				21*	27
Two-Year College Mathematics Programs	Full-time[2]		Part-time			
All 2015 sections	64		36			1693
All 2010 sections	54		46			1836
All 2005 sections	56		44			1616

[1] Before 2010, the category was "tenured/tenure-eligible"; the word "permanent" was added in 2010. In 2015, the word "permanent" was deleted.

[2] "Full-time" includes full-time permanent, full-time continuing, and other full-time faculty at two-year colleges. For a detailed explanation of these terms, see page 1 in Chapter 7.

* Beginning in 2005, the CBMS survey asked departments to specify the number of upper-division sections and the number taught by tenured and tenure-eligible faculty. The deficit from 100% is reported as "unknown."

Some rows do not sum to 100% due to round-off. Note: zero means less than one-half of one percent.

nc = Not collected in 2015

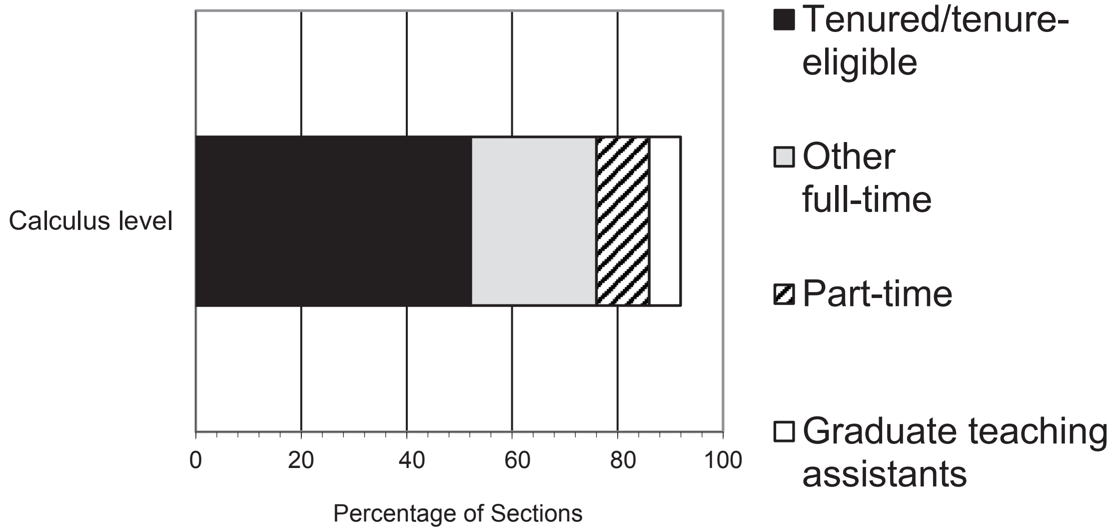

FIGURE S.4.1 Percentage of sections in calculus-level mathematics courses in mathematics departments at four-year colleges and universities by type of instructor in fall 2015. Deficits from 100% represent unknown instructors.

are estimates based upon a stratified random sample. The data on number of bachelors degrees awarded from these three reports is compared and discussed in Chapter 3.

Appointment type of instructors in undergraduate mathematics and statistics sections (Tables S.4 through S.8)

CBMS2015 Tables S.4 through S.8 provide information about who is teaching undergraduate mathematics and statistics sections in four-year and two-year colleges and universities. For the CBMS 2015 survey, faculty at four-year institutions were broken into four categories: tenured and tenure-eligible (TTE), other full-time faculty (OFT) who are full-time but not TTE, part-time (PT) faculty, and graduate teaching assistants (GTAs); in the statistics survey, the category of OFT faculty was broken down by whether the instructor had a doctorate. A course was to be reported as being taught by a GTA if and only if the GTA was the "instructor of record" for the course. GTAs who ran discussion or recitation sections as part of a lecture/recitation course were not included in this category. For two-year colleges, full-time faculty were broken into three categories: full-time permanent faculty (usually tenured), full-time continuing faculty (usually non-tenured), and other temporary full-time faculty. A fourth category includes part-time faculty. Tables S.4-S.8 are broken down further, by courses and by the level of the department, in tables in Chapters 3, 5, 6, and 7.

In CBMS surveys of four-year departments, prior to 2010 the TTE category was labeled "tenured/tenure-eligible" on the survey questionnaire, and in the 2010 survey the word "permanent" was an added description, and the instructions for the questionnaire told departments at institutions that did not recognize tenure (estimated at 7.9% (SE 2.5) of all four-year mathematics departments in the CBMS 2015 survey) to place permanent faculty in the TTE category. In the 2010 survey, the label "permanent" was added to the description of the TTE category on the questionnaire, and this change may have led some respondents to add to the TTE category other instructors that should have been classified as OFT instructors, namely those instructors at institutions that do recognize tenure, who have teaching positions that are regarded as permanent, although these faculty do not have tenure and are not eligible for tenure. The survey instructions did not define "permanent" beyond the situation where the institution does not recognize tenure, and it seems quite possible that some departments interpreted "permanent faculty" to have this additional meaning, and some of the data in 2010 suggested that this was the case. Hence, the word "permanent" was deleted from the TTE description on the 2015 instrument (returning to the description used in 2005 and previously), and this change may explain some of the decrease in the estimated numbers of TTE faculty (and increase in OFT faculty) in Tables S.4-S.8 in four-year departments observed from 2010 to 2015.

The 2015 CBMS survey followed the practice established in the 2005 survey of presenting findings in terms of percentages of "sections" offered in four-year institutions (in CBMS2000 and earlier, the data were presented in terms of percentages of enrollments). In

TABLE S.5 Percentage of fall 2015 sections in Mainstream Calculus I and II (not including distance-learning and dual enrollment sections) taught by various kinds of instructors in mathematics departments at four-year colleges and universities by size of sections with fall 2005 and 2010 data from CBMS2010 Table S.6, p. 18. Percentage of sections taught by full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2015, 2010, and 2005. Also total enrollments (in 1000s) and average section sizes.

	Percentage of sections taught by						
Four-Year Colleges & Universities	Tenured/ tenure-eligible[1] %	Other full-time %	Part-time %	Graduate teaching assistants %	Un-known %	Enroll-ment in 1000s	Average section size
Mainstream Calculus I							
Lecture with separate recitation	39	33	15	5	9	145	63
Sections that meet as a class	57	18	10	8	7	108	27
Other sections	26	38	15	21	0	2	22
Course total 2015	50	24	12	7	8	255	40
Course total 2010	53	18	15	7	8	234	35
Course total 2005	63	17	7	8	5	201	32
Mainstream Calculus II							
Lecture with separate recitation	49	34	8	4	5	72	61
Sections that meet as a class	56	22	6	7	9	52	26
Other sections	58	17	0	25	0	1	23
Course total 2015	54	26	7	6	7	125	39
Course total 2010	59	14	12	7	8	128	36
Course total 2005	66	15	6	8	5	85	33
Total Mainstream Calculus I & II 2015	51	6	8	5	7	381	40
Total Mainstream Calculus I & II 2010	55	16	14	7	8	362	35
Total Mainstream Calculus I & II 2005	64	16	7	8	5	286	32
Two-Year Colleges	Full-time[2] %		Part-time %				
Mainstream Calculus I 2015	82		18			62	26
Mainstream Calculus I 2010	90		10			63	20
Mainstream Calculus I 2005	88		12			49	22
Mainstream Calculus II 2015	88		12			32	26
Mainstream Calculus II 2010	86		14			29	24
Mainstream Calculus II 2005	87		13			19	18
Total Mainstream Calculus I & II 2015	84		16			94	26
Total Mainstream Calculus I & II 2010	89		11			93	21
Total Mainstream Calculus I & II 2005	87		13			68	21

Percentage sums across rows may differ from 100% due to round-off.

[1] Before 2010, the category was "tenured/tenure-eligible"; the word "permanent" was added in 2010. In 2015, the word "permanent" was deleted.

[2] “Full-time” includes full-time permanent, full-time continuing, and other full-time faculty at two-year colleges. For a detailed explanation of these terms, see page 1 in Chapter 7.

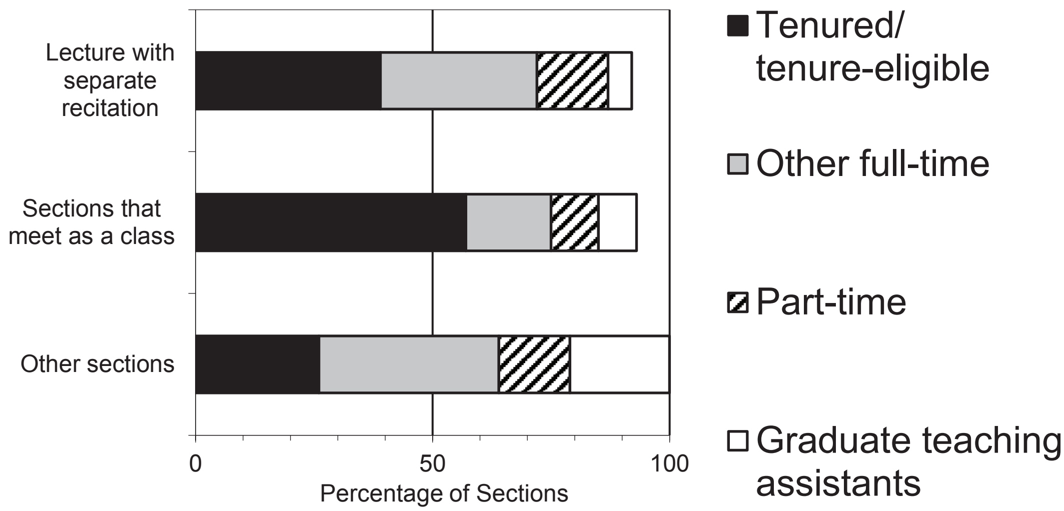

FIGURE S.5.1 Percentage of sections in Mainstream Calculus I taught by tenured/tenure-eligible, other full-time, part-time, and graduate teaching assistants in mathematics departments at four-year colleges and universities by type of sections in fall 2015. Deficits from 100% represent unknown instructors.

analyzing the 2010 survey data, it seemed that the notion of "section" varied somewhat among different departments, particularly for lower-level classes that were taught with a laboratory component. A further, and possibly related, problem experienced in the 2015 surveys was the inconsistent numbers of faculty and sections reported by some departments; this problem had occurred in past surveys, and was resolved by creating the category of "unknown" instructors. The 2015 survey defined more clearly what constitutes a "section", and provided a place to enter enrollments that were not taught in a lecture/recitation or an individual section format. Further, the 2015 survey collected data on the appointment type of the instructor for only calculus-level mathematics classes, introductory statistics classes, and computer science classes; no data on the appointment type of the instructor in precollege or introductory-level mathematics classes was collected. In advanced-level mathematics and statistics classes, the survey gathered the number of sections with a TTE instructor, and listed the rest as "other".

Table S.4 gives a macroscopic view of the faculty who taught calculus-level, introductory statistics, and computer-science courses in mathematics and statistics departments of four-year colleges and universities, and all courses combined in the mathematics programs at two-year colleges in the fall of 2015, as well as comparison data from CBMS2005 and 2010. Estimated fall 2015 total enrollments (without distance learning enrollments) for each of these course categories are also given. In Chapter 3, Tables E.5 and E.6 break down some of the data on four-year departments in Table S.4 by the level (bachelors, masters, doctoral) of the mathematics and statistics department, revealing important trends in the data. Table S.4 shows a general pattern of decreasing percentages of sections taught by TTE faculty, and increasing percentages taught by OFT and PT faculty. As one example, the estimated percentage of sections of calculus-level courses taught in four-year mathematics departments by TTE faculty decreased from 61% in fall 2005, to 59% in fall 2010, to 52% (SE 2) in fall 2015, and the percentage taught by OFT faculty increased from 15% in fall 2010 to 24% (SE 2) in fall 2015. Figure S.4.1 shows the percentages of sections of calculus-level courses taught by each category of faculty in fall 2015. It is interesting to note that the percentage of sections of introductory-level statistics taught by TTE four-year mathematics faculty, in fall 2015, was estimated at 41% (SE 2), while the percentage of sections of introductory-level statistics taught by TTE faculty in statistics departments statistics was estimated at 14% (SE 1); moreover, Table S.4 data estimate that, in fall 2015, 31% (SE 2) of introductory-level statistics sections in statistics departments were taught by GTAs, while only 7% (SE 1) of calculus-level mathematics sections were taught by GTAs. Differences in the appointment type of instructors in introductory-level statistics taught in four-year mathematics departments and statistics departments are partially due to the fact that, in fall 2015, introductory-level statistics course enrollment in mathematics departments occurred primarily in the bachelors-level departments.

TABLE S.6 Percentage of sections in Non-Mainstream Calculus I and II, III, etc. taught by various kinds of instructors in mathematics departments at four-year colleges and universities by size of sections, and percentage of sections taught by full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2015. Also total enrollments (in 1000s) and average section sizes. Distance-learning and dual enrollment sections are not included. (Data in parentheses show percentage of sections in 2005 and 2010.) Comparable table in CBMS2010 is Table S.7, p. 20.

	Percentage of sections taught by						
Four-Year Colleges & Universities	Tenured/ tenure-eligible[1] %	Other full-time %	Part-time %	Graduate teaching assistants %	Un-known %	Enroll-ment in 1000s	Average section size
Non-Mainstream Calculus I							
Lecture with separate recitation	29	47	17	2	6	30	84
Sections that meet as a class	28	24	20	20	8	60	34
Other sections	0	56	0	44	0	2	61
Course total 2015	28	29	19	17	7	91	42
(2005, 2010)	(35,31)	(23,24)	(21,23)	(13,12)	(9,11)	(108,99)	(37,42)
Non-Mainstream Calculus II, III, etc. [2]							
Course total 2015	32	19	36	6	7	16	37
(2005, 2010)	(33,34)	(26,15)	(23,17)	(17,11)	(1,22)	(10,22)	(46,29)
Total Non-Mnstrm Calculus I & II, III, etc.	29	27	22	15	7	106	42
(2005, 2010)	(35,31)	(23,22)	(21,21)	(13,12)	(8,14)	(118,121)	(38,39)
Two-Year Colleges	Full-time [3] %		Part-time %				
Non-Mainstream Calculus I	71		29			23	26
(2005, 2010)	(73,75)		(27,25)			(20,19)	(23,21)
Non-Mainstream Calculus II	100		0			0	26
(2005, 2010)	(66,50)		(34,50)			(1,2)	(21,27)
Total Non-Mnstrm Calculus I & II	71		29			23	26
(2005, 2010)	(72,73)		(28,27)			(21,21)	(23,21)

[1] Before 2010, the category was "tenured/tenure-eligible"; the word "permanent" was added in 2010. In 2015, the word "permanent" was deleted.

[2] The 2010 survey asked for "Non-Mainstream Cal I, II, and III, etc". – the data here are our best estimate for Calculus II, III, etc. Previous surveys asked only for Non-Mainstream Calculus II.

[3] "Full-time" includes full-time permanent, full-time continuing, and other full-time faculty at two-year colleges. For a detailed explanation of these terms, see page 1 in Chapter 7.

Sums of percentages across rows may differ from 100% due to round-off.

TABLE S.7 Percentage of sections in introductory probability and statistics courses taught by various types of instructors in mathematics departments at four-year colleges and universities by size of sections, and percentage of sections taught by full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2015; comparable data for (2005, 2010) when available. Also total enrollments (in 1000s) and average section sizes. Distance-learning and dual enrollments are not included. (Data in parentheses show percentage of sections in 2005 and 2010.) Comparable table in CBMS2010 is Table S.8, p. 21.

	Percentage of sections taught by						
Four-Year Colleges & Universities Mathematics Departments	Tenured/ tenure-eligible[1] %	Other full-time %	Part-time %	Graduate teaching assistants %	Un-known %	Enroll-ment in 1000s	Average section size
Introductory Statistics (F1) [3] (no calculus prerequisite) [2]							
Lecture with separate recitation	41	28	14	1	16	42	47
Sections that meet as a class	38	22	28	4	8	146	29
Other sections	29	63	9	0	0	0	9
Course total (F1)	38	23	26	4	9	188	32
(2005, 2010)	(51,46)	(16,15)	(27,24)	(3,4)	(4,12)	(122,174)	(31,31)
Introductory Statistics (F2) (calculus prerequisite) (not for majors)							
Lecture with separate recitation	56	8	33	2	2	10	46
Sections that meet as a class	64	13	15	3	5	24	29
Other sections	100	0	0	0	0	0	33
Course total (F2) (2010)	63 (61)	12 (16)	18 (10)	2 (7)	5 (6)	34 (23)	33 (24)
Statistics for Pre-service Teachers (F3,F4)							
Course total (F3, F4)	39	10	11	42	0	1	16
Other intoductory level Statistics courses (F5)							
Course total (F5)	33	22	34	0	10	11	33
Total All Intro. Statistics courses							
Course total (F1+F2+F3+F4+F5)	41	21	25	4	8	235	32
Two-Year Colleges	Full-time [4] %		Part-time %				
Total All Introductory Probability and Statistics Courses	80		20			247	26
(2005, 2010)	(65,61)		(35,39)			(101,114)	(26,28)

[1] Before 2010, the category was "tenured/tenure-eligible"; the word "permanent" was added in 2010. In 2015, the word "permanent" was deleted.

[2] This course was called "Elementary Statistics" in previous CBMS surveys.

[3] F1 is the statistics course number on the four-year mathematics survey form.

[4] "Full-time" includes full-time permanent, full-time continuing, and other full-time faculty at two-year colleges. For a detailed explanation of these terms, see page 1 in Chapter 7.

Sums of percentages across rows may differ from 100% due to round-off.

Note: 0 means less than one half of 1%.

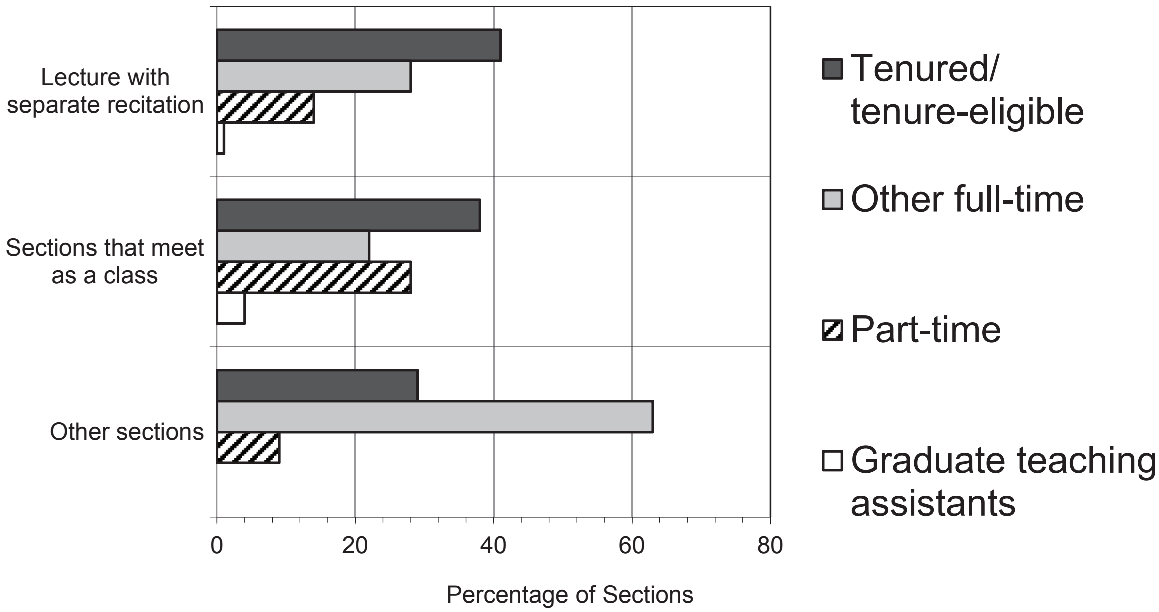

FIGURE S.7.1 Percentage of sections in Introductory Statistics (no Calculus prerequisite) taught by tenured/tenure-eligible, other full-time, part-time, and graduate teaching assistants in mathematics departments at four-year colleges and universities by type of sections in fall 2015. Deficits from 100% represent unknown instructors.

Calculus courses are important for the mathematics major, as well as for many other STEM majors, and hence CBMS surveys have paid particular attention to calculus courses. The 2015 survey made the same simplifying assumptions about calculus courses that were made in recent CBMS surveys. First, the CBMS survey divided all calculus courses into two pieces: "Mainstream Calculus" and "Non-Mainstream Calculus". "Mainstream Calculus" consists of the calculus courses that are prerequisites for upper-level mathematics courses, as well as courses required in the physical sciences and in engineering, while "Non-Mainstream Calculus" is all of the other calculus courses (often with titles such as "Calculus for Business and Social Science" or "Calculus for the Life Sciences").

Table S.5 presents the estimated percentages of sections taught by faculty of the various appointment types, for Mainstream Calculus I and II, in fall 2015, and includes the comparable data from 2010, for courses offered in four-year mathematics departments, and in public two-year college mathematics programs. Table S.6 provides this same data for Non-Mainstream Calculus. Table S.7 provides the data for introductory statistics courses, broken down by course, offered in four-year and two-year mathematics departments, and in statistics departments, and Table S.8 provides data for statistics courses for non-majors/minors offered in statistics departments. Tables S.5-S.8 also present total (non-distance learning) enrollments and average section size. Data on computer science courses is provided in Chapter 3, Tables E.7 and E.8. Further detail on the appointment type of sections of courses taken by beginning students at four-year colleges and universities is given in Chapter 5, Tables FY.1, FY.2, FY.3, and FY.4.

In public two-year colleges, the percentage of mathematics and statistics sections taught by full-time faculty increased by ten points to 64% (4 SEs) in fall 2015 compared with fall 2010. Chapter 6, Table TYE.9 presents the number of sections and percentage of sections in specific courses taught on campus (excluding distance learning and dual enrollment) by part-time faculty in public two-year colleges in fall 2015.

There has been some concern in previous CBMS studies, as well as in studies made by the American Mathematical Society [LM], about the apparently growing use of part-time instructors in four-year mathematics departments. When faculty demographics are discussed later in this chapter, we will note that from fall 2010 to 2015 the number of part-time faculty in four-year mathematics departments increased 27%, and increased 22% in statistics departments (see Table S.13). No clear pattern on the changing use of PT faculty in 2015 emerges from the tables described in this section, except, perhaps, the decreasing use of part-time faculty in lower-level computer science courses, where that estimated percentage dropped from 29% in fall 2010 to 14% (SE 3) in fall 2015 (Table

TABLE S.8 Percentage of sections in introductory statistics for non-majors/minors taught by various kinds of instructors in statistics departments at four-year colleges and universities by size of sections in fall 2015. Also, total enrollments (in 1000s) and average section sizes. Distance-learning enrollments are not included. Comparable table in CBMS2010 is Table S.9, p. 24.

	Percentage of sections taught by						
Statistics Departments	Tenured/ tenure-eligible [1] %	Other full-time %	Part-time %	Graduate teaching assistants %	Un-known %	Enroll-ment in 1000s	Average section size
Introductory Statistics (no calculus prerequisite) [3] (E1) [4]							
Lecture with separate recitation	6	20	7	36	31	40	60
Sections that meet as a class	25	30	12	28	5	25	62
Other sections	0	6	42	52	0	1	21
Course total	13	23	10	33	21	66	59
(2005, 2010) [2]	(26.29)	(21,18)	(16,14)	(22,16)	(15,24)	(42,56)	(63,47)
Introductory Statistics (calculus prerequisite) (for non-majors) (E2)							
Lecture with separate recitation	14	31	11	14	30	11	72
Sections that meet as a class	34	34	7	22	2	7	59
Other sections	5	36	0	60	0	1	26
Course total	20	33	8	24	15	20	60
(2010)	(43)	(15)	(9)	(11)	(23)	(16)	(37)
Statistics for Pre-service Teachers (E3,E4)							
Course total (E3, E4)	43	57	0	0	0	0	18
Other intoductory level Statistics courses (E5)							
Course total (E5)	6	24	6	32	31	4	103
Total All Intro. courses							
Course total (E1+E2+E3+E4+E5)	**14**	**25**	**10**	**31**	**20**	**90**	**60**

[1] Beginning in 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously.

[2] Previous CBMS surveys gathered data for a course described as Probability and Statistics (no calculus prerequisite). Beginning in 2010, this description was replaced with Introductory Statistics (calculus prerequisite) (for non-majors).

[3] In previous CBMS surveys, this course was called "Elementary Statistics".

[4] E1 is the statistics course number on the four-year statistics survey form.

Sums of percentages across rows may differ from 100% due to round-off.

S.4); we also noted from Table S.2 a drop in enrollment in those courses. It is interesting to note that, in fall 2015, by Table S.4, the percentage of sections of introductory level statistics taught by PT instructors in four-year statistics departments was less than half that in mathematics departments, a trend that held in 2005 as well (in 2010 the percentage was slightly more than half). In past CBMS surveys, the greatest use of part-time faculty occurred in precollege and introductory-level courses, the categories whose enrollments showed the most increase from fall 2010 to fall 2015 (Table S.2); however, data on the appointment type of the instructor in those sections were not collected in the CBMS survey in 2015.

The 2015 CBMS surveys of four-year mathematical sciences departments made the assumption that calculus (and also introductory statistics) courses are generally taught either in large lecture sections that are broken into smaller recitation, discussion, or laboratory sections (typically with a graduate teaching assistant leading these sections), or in “individual classes” that always meet with the same instructor and students. Knowing that there are other possible arrangements (e.g. laboratories where students work in a self-paced manner), the 2015 survey also included the category "other" to include neither of the above descriptions. The CBMS four-year questionnaires asked departments for enrollments, number of sections, and ranks of instructors for each of these three typical modes of instruction. Previous CBMS surveys broke the individual classes into "small" and "large" classes, and had no category "other". The differing trichotomies make comparisons between the 2010 and 2015 data on sections somewhat problematic.

Table S.5 presents the estimated percentages of the various appointment type of instructors for Mainstream Calculus I and II sections, for each of the three kinds of section structures: large lecture/recitation sections, sections that meet as a class, and other, in mathematics departments of four-year colleges and universities in fall 2015. This table also gives the estimated total (non-distance learning) enrollment and estimated average section size for each of these three kinds of sections of calculus courses in four-year mathematics departments. It presents some comparison data from the 2005 and 2010 CBMS surveys. Chapter 5, Table FY.1, breaks these percentages down by the level of department, revealing further trends in Mainstream Calculus instruction. Figure S.5.1 displays the percentages of the various ranks of instructors for the three kinds of sections of Mainstream Calculus I in four-year mathematics departments. Table S.5 gives further data: the percentage of sections of Mainstream Calculus I and II taught by full-time faculty in public two-year colleges, as well as the total enrollments and the average section sizes. Table S.6 gives the analogous percentages for Non-Mainstream Calculus I and II, and Chapter 5, Table FY.2 breaks these percentages down by the level of department for four-year mathematics departments.

From Table S.5 (and Table S.6 in CBMS2010) we see that the percentage of sections of Mainstream Calculus I taught by TTE faculty decreased from 63% in 2005, to 53% in 2010, to 50% (SE 3) in 2015, and the percentage of sections taught by OFT faculty rose, from 17% in 2005, to 18% in 2010, to 24% (SE 2) in 2015. In fall 2015, the type of section with the largest percentage of sections taught by TTE faculty was the one that meets as a class. The average section size of Mainstream Calculus I sections increased from 32 students in 2005, to 35 students in 2010, to 40 (SE 2) in 2015. Looking at the three different kinds of sections of Mainstream Calculus I, we see that enrollments in the lecture/recitation format are the largest, and the total enrollment in "other" sections is quite small (2,000, with SE 1,800), and in "other" sections there is the greatest use of OFT, PT, and GTAs. Notice that Mainstream Calculus I estimated enrollment increased from 201,000 in 2005, to 234,000 in 2010, to 255,000 in 2015, an increase of 27% (2.4 SEs) in 2015 over 2005. Similar trends occurred in Mainstream Calculus II, where the estimated percentage of sections taught by TTE faculty decreased from 66% in 2005, to 59% in 2010, to 54% (SE 3) in 2015, and the percentage of sections taught by OFT faculty increased, from 15% in 2005, to 14% in 2010, to 26% (SE 2) in 2015. The total estimated

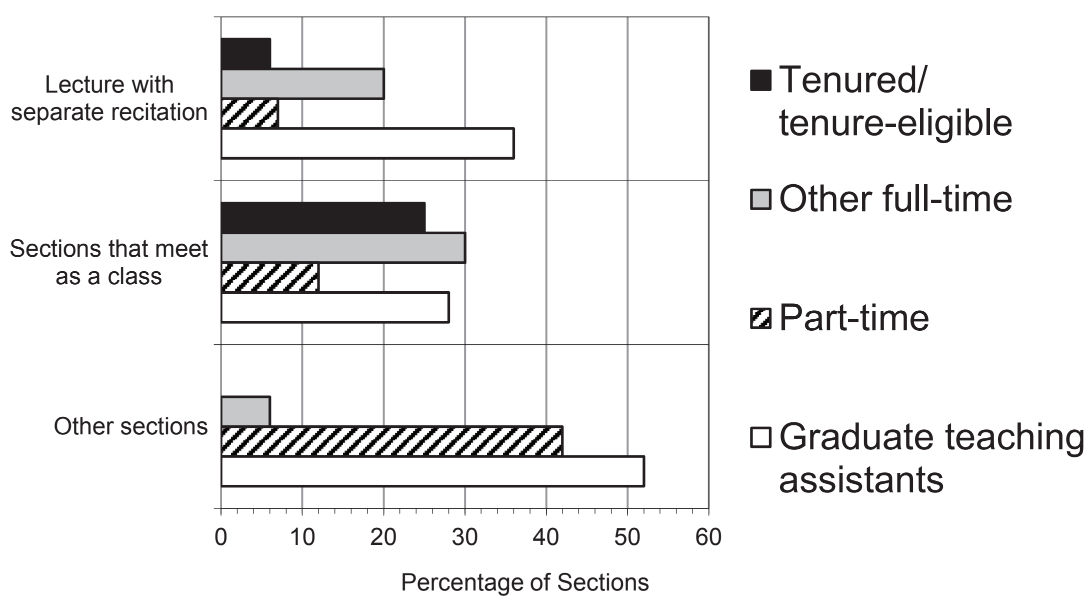

FIGURE S.8.1 Percentage of sections in Introductory Statistics (no Calculus prerequisite) taught by tenured/tenure-eligible/permanent faculty, other full-time faculty, part-time faculty, and graduate teaching assistants in statistics departments at four-year colleges and universities by type of sections in fall 2010.

TABLE S.9 Percentage of sections of Mainstream Calculus I and II taught using various instructional methods in mathematics programs in public two-year college mathematics programs in fall 2015. Also total enrollments (in 1000s) and average section sizes. Distance-learning and dual enrollment sections are not included.

	Percentage of sections taught using			
Two-Year Colleges	Common Department exams %	Homework Management system %	Enrollment in 1000s	Average section size
Mainstream Calculus I	88	37	62	26
Mainstream Calculus II	85	34	32	26
Total Mainstream Calculus I & II	86	34	94	26

enrollment in Mainstream Calculus II increased from an estimated 85,000 in 2005 to an estimated 128,000 in 2010, and then decreased (but not significantly) to 125,000 (SE 10,000) in 2015, and enrollment in each of the three formats of Mainstream Calculus II class were almost exactly half of the enrollment in the corresponding type in Mainstream Calculus I. Since the estimated number of TTE faculty was down, and the number of OFT faculty was up, in 2015 over 2010 (Table S.15), it is not surprising that a smaller percentage of Mainstream Calculus sections were taught by TTE faculty, and that Mainstream Calculus average section sizes rose.

In public two-year colleges, Table S.5 displays a total of 94,000 students enrolled in Mainstream Calculus I and II. Tables TYE.3 and TYE.12 in Chapter 6, present an additional 6,000 students (total 100,000 students, SE 11,000) enrolled in a distance-learning format. The percentage of sections of Mainstream Calculus I taught by full-time faculty decreased to 82% (SE 3) in 2015 from 90% in 2010, and the average section size increased to 26 (SE 1) students in 2015 from 20 students in 2010. In Mainstream Calculus II at two-year colleges, the percentage of sections taught by full-time faculty increased to 88% (SE 3) in 2015 from 86% in 2010, and the average section size increased to 26 (SE 1) students in 2015 from 24 students in 2010. Also see Tables TYE.8 and TYE.9 in Chapter 6.

Table S.6 presents the analogous data for Non-Mainstream Calculus I, II and above. First note that at four-year mathematics departments the estimated percentage of TTE faculty teaching Non-Mainstream Calculus I in fall 2015 was 28% (SE 3), a little more than half the estimated percentage of TTE faculty teaching Mainstream Calculus I, and the estimated percentage of GTAs teaching Non-Mainstream Calculus I was 17% (SE 3), compared to 7% for Mainstream Calculus I. In 2015, Non-Mainstream Calculus I had larger enrollments in the format where sections meet as a class, than in the lecture/recitation format, a reverse of enrollment pattern for Mainstream Calculus I. For Non-Mainstream Calculus II and above, the CBMS questionnaire asked only about the course enrollment, without distinguishing the three possible section formats that were used for the other calculus sections.

Table S.6 displays 23,000 students in Non-Mainstream Calculus I in 2015 in public two-year college mathematics programs. Tables TYE.3 and TYE.12 in Chapter 6, present an additional 3,000 students (total 26,000 students, SE 7,000) enrolled in a distance learning format. The average section size was up five students to 26 (SE 1) students from 2010 to 2015, and the percentage of sections taught by full-time faculty was down four points to 71% (SE 10) in 2015. Non-Mainstream Calculus II estimated enrollment decreased to less than 500 students in 2015, compared to 2,000 students in 2010. Average class size was 26 students, and the percentage of full-time faculty teaching it was 100% in 2015 compared to 50% in 2010.

Introductory statistics courses are becoming important courses in mathematics and statistics departments. Their enrollments have been growing, and there is increased interest in who is teaching them, and how they are taught. We consider first the data in Table S.7, regarding the courses taught in mathematics departments in four-year colleges and universities, and in two-year college mathematics programs; next, in Table S.8, we consider the data regarding introductory statistics courses taught in statistics departments.

The 2015 CBMS survey included five introductory-level statistics courses taught in mathematics departments of four-year colleges and universities, all for non-majors/minors: one course (question number

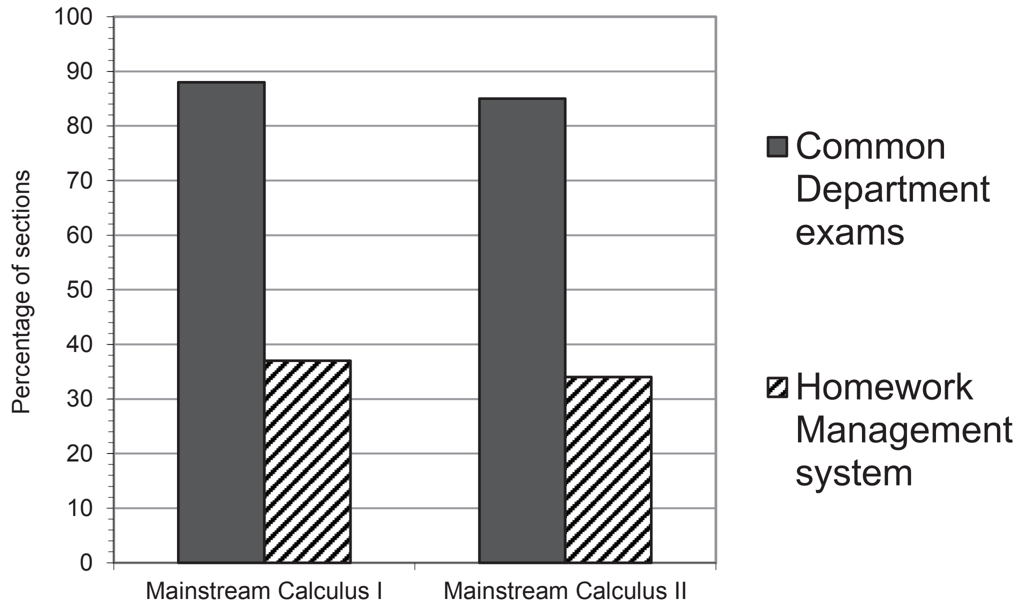

FIGURE S.9.1 Percentage of sections of Mainstream Calculus I and Mainstream Calculus II taught using various instructional methods in mathematics programs at public two-year colleges in fall 2015.

(F1) on mathematics survey, and (E1) on statistics survey) called "Introductory Statistics" (no calculus prerequisite) and another course called "Introductory Statistics" (calculus prerequisite - but still for non-majors/minors) (labelled (F2), (E2), respectively); enrollments in both courses were broken down by the section format structure used in gathering calculus course data. In addition, there were two courses for pre-service teachers ((F3), (F4) and (E3), (E4), respectively), and a course labelled "other" ((F5), (E5), respectively). Only courses (F1), (F2) were identical to the introductory courses described on the CBMS 2010 survey of four-year mathematics departments; the list of introductory courses on the statistics questionnaire in 2015 was the same list as in 2010. In fall 2015, Table S.7 shows that Introductory Statistics without calculus, in mathematics departments (course (F1)), had an estimated total (non-distance learning) enrollment of 174,000 in fall 2010, up 43% from fall 2005; the 2015 estimate is 188,000 (SE 15,000) (up 8% (0.9 SEs) from 2010). This enrollment places estimated Introductory Statistics (no calculus prerequisite) enrollments almost midway between Mainstream Calculus I enrollments of 255,000 and Mainstream Calculus II enrollments of 125,000, as it was in the 2010 CBMS survey. The Introductory Statistics for non/major/minors, with a calculus prerequisite (course (F2)), was an addition to the list of statistics courses in the CBMS 2010 survey, and its appearance reflected the fact that many non-majors/minors have studied calculus. As shown in Table S.7, the introductory statistics course with a calculus prerequisite enrolled an additional roughly 34,000 students in fall 2015, up from 23,000 students in fall 2010, and, with "other introductory probability and statistics courses", the total of all introductory probability and statistics enrollment in four-year mathematics departments in fall 2015 was 235,000 (SE 18,630), up from 218,000 in fall 2010. Table S.7 is broken down further by the level of the four-year mathematics department in Chapter 5, Table FY.3.

Table S.7 and Figure S.7.1 show that in four-year mathematics departments in fall 2015, 41% (SE 2) of the sections of all the introductory probability and statistics courses combined were taught by TTE faculty, and 25% (SE 2) of the sections were taught by PT faculty, and 21% (SE 2) by OFT faculty; the average section size was 32 (SE 0.89). The introductory statistics course with a calculus prerequisite (course (F2)) had a larger percentage (63%) of instructors who were TTE faculty than the course without a calculus prerequisite (course (F1)); only 18% of the instructors in the course with a calculus prerequisite (F2) were part-time faculty.

Table S.7 also shows that mathematics programs at public two-year colleges enrolled approximately 247,000 students in elementary statistics and probability courses. Table TYE.12 presents an additional 33,000 students enrolled in distance learning format (total 280,000 students, SE 70,000). At two-year mathematics programs, the two courses in elementary statistics (one including probability and one without probability) saw an increase of 117% in the combined enrollment in 2015 compared with 2010 (not including distance learning or dual enrollment), following a 13% increase from 2005 to 2010. Eighty percent (80% with SE 5) of the sections were taught by full-time faculty (up from 61% in 2010), and the average section size was 26 (SE 5) students (down from 28 in 2010). Also see Tables TYE.3, TYE.8, TYE.8.1, and TYE.12 in Chapter 6.

Table S.8 and Figure S.8.1 present the data for introductory-level courses for non-majors/minors offered in statistics departments, analogous to the data for mathematics departments presented in Table S.7 and Figure S.7.1. As with these courses in four-year mathematics departments, both courses were broken down into the three formats of sections: lecture/recitation sections, sections that meet as a class, and "other" sections. In fall 2015 (respectively, 2010) in statistics departments, the introductory course with a calculus prerequisite (E2) enrolled an estimated 20,000 students with SE 1,000 (respectively 16,000 students), compared to 66,000 with SE 2,000 (respectively 56,000) in the course without a calculus prerequisite (E1). In fall 2015, more than half of the students enrolled in the introductory course with a calculus prerequisite (E2) were enrolled in a section with the lecture/recitation format (this is the case for 61% of the students in the introductory course without a calculus prerequisite (E1)). The average section size for the sections that meet as a class were of comparable size to those in the lecture/recitation format; for example, in the Introductory Statistics with no calculus prerequisite, the average section size in the lecture/recitation format was 60 (SE 4), and in the "meets as a class" format the average section size was 62 (SE 3). Further comparisons between the two introductory courses are as one would expect for a course with a prerequisite, compared to one without a prerequisite. In the course without a calculus prerequisite (E1), in fall 2015, the percentage of sections taught by TTE faculty was estimated at only 13%, less than half the estimated percentage in 2010, and, in 2015, a higher percentage of sections were taught by both OFT faculty and GTAs than in 2010. Chapter 5, Table FY.4 breaks the data in Table S.8 down further by the level of department.

Pedagogical methods used in introductory courses Tables S.9-S.12

Past CBMS surveys have contained questions regarding how introductory courses are taught. The 2010 survey of four-year mathematics departments asked about pedagogy only in College Algebra and in Introductory Statistics with no calculus prerequisite, while the survey of statistics departments asked only about Introductory Statistics with no calculus prerequisite (using the same questions as the four-year mathematics survey, so that these responses could be compared). The 2010 survey asked similar questions about College Algebra on the four-year and two-year surveys, so some comparisons between two-year and four-year mathematics departments could be made. In 2010, the two-year college survey asked fewer questions about a limited set of reform methods than in previous CBMS surveys. With a few small changes, the CBMS 2015 survey of four-year mathematics and statistics departments repeated the questions about Introductory Statistics that were asked in 2010, and the survey of public two-year colleges revised the questions asked in 2010 about methods used to teach Mainstream Calculus, Non-Mainstream Calculus, and Elementary Statistics to include data regarding common department exams and homework management systems. Questions about how College Algebra was taught were not repeated in the 2015 survey.

Tables S.9, S.10, and S.11 present data on instructional practices in Mainstream Calculus, Non-Mainstream Calculus, and Elementary Statistics courses taught in mathematics programs at public two-year colleges, presenting the percentages of sections taught using homework management systems and common department exams. In public two-year colleges in fall 2015, Mainstream Calculus I courses used homework management systems in 37% (SE 4) of sections and had common department exams in 88% (SE 3) of sections. Similar percentages were reported for Calculus II. Non-Mainstream Calculus data reported 66% (SE 13) of sections using homework management systems and a small percentage (9% with SE 4) using common department exams. Statistics courses used homework management systems in 55% (SE 12) of sections and had common department exams in 39% (SE 14) of sections. The corresponding Figures S.9.1, S.10.1, and S.11.1 display this data in bar graphs. Percentages of on-campus sections of specific mathematics courses at public two-year colleges using these methods can be found in Table TYE.10 of Chapter 6.

Introductory-level statistics course enrollments showed tremendous growth from 2005 to 2015. At four-year mathematics departments and statistics departments combined, the estimated enrollments in introductory-level statistics courses grew by 54% from 2005 to 2010; smaller growth, an estimated 11% increase, was observed from 2010-2015 in the introductory-level courses (Table S.2). At two-year colleges, estimated enrollments in Elementary Statistics increased 17% from 2005 to 2010 and more than 100% from 2010 to 2015. With the growth in introductory statistics course enrollments, there has been considerable interest in the pedagogy used in teaching these course (see for example [CAUSE], [Moore], and [GAISE]). The 2010 CBMS survey developed a set of questions designed to measure the impact in four-year mathematics and statistics departments of these and other reports regarding teaching Introductory

TABLE S.10 Percentage of sections of Non-Mainstream Calculus I taught using various instructional methods in mathematics programs at public two-year colleges in fall 2015. Also total enrollments (in 1000s) and average section sizes. Distance-learning and dual enrollment sections are not included.

	Percentage of sections taught using			
Two-Year Colleges	Common Department exams %	Homework Management system %	Enrollment in 1000s	Average section size
Non-Mainstream Calculus I	9	66	23	26

Note: 0 means less than one half of 1%.

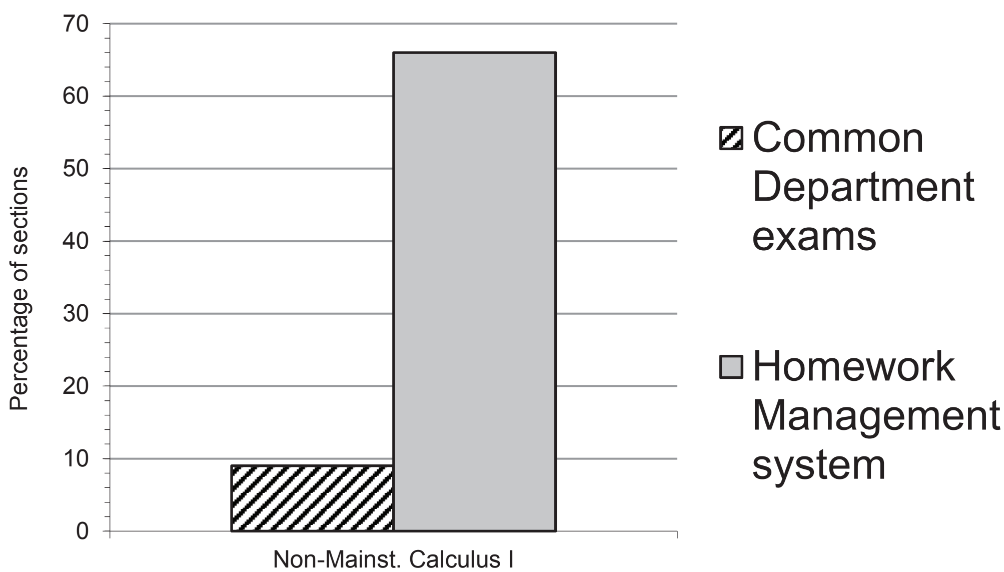

FIGURE S.10.1 Percentage of sections of Non-Mainstream Calculus I taught using various instructional methods in mathematics programs at public two-year colleges in fall 2015.

Statistics in four-year colleges and universities, and these questions were repeated in the 2015 survey.

Table S.12 summarizes the responses of four-year mathematics and statistics departments to questions about the department's introductory statistics course(s) (with no calculus prerequisite) for non-majors (courses (F1) and (E1)); these responses can be compared to Table S.13.A in CBMS2010, p. 29. In fall 2015, 78% (SE 4) of mathematics departments and 92% (SE 2) of statistics departments offered an (F1) (respectively (E1)) course, compared to 84% and 88%, respectively, in 2010. Departments were asked the number of different kinds of these courses they offered in fall 2015; for all mathematics departments combined, an estimated 72% (SE 5) offered only one such course, while for statistics departments, the choice receiving the most responses was "more than 3" (30% (SE 3)), and it is not surprising that statistics departments offer more flavors of such a course than mathematics departments. Departments were asked to estimate the percentage of class sessions in which real data is used in most sections of its Introductory Statistics course: departments could choose between the percentage intervals: 0-20%, 21-40%, 41-60%, 61-80%, and 81-100%; the response chosen most often by mathematics departments was 0-20% (chosen by

TABLE S.11 Percentage of sections of Elementary Statistics at mathematics programs at public two-year colleges taught using various instructional methods in fall 2015. Also total enrollment (in 1000s) and average section sizes. Distance learning and dual enrollments are not included.

	Percentage of sections taught using			
Two-Year Colleges	Common Department exams %	Homework Management system %	Enrollment in 1000s	Average section size
Elementary Statistics	39	55	221	25

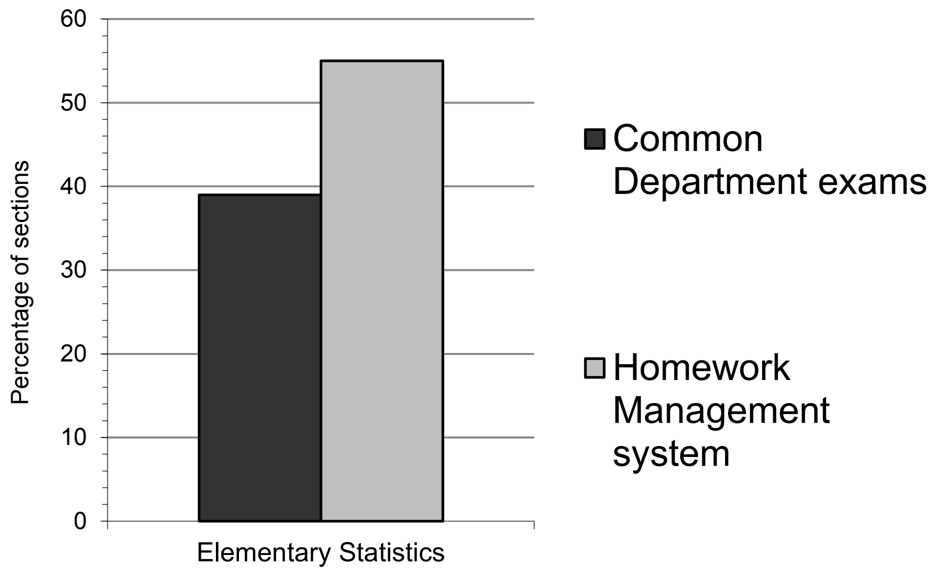

FIGURE S.11.1 Percentage of sections in Elementary Statistics (no Calculus prerequisite) taught using various instructional methods in two-year colleges in fall 2015.

28% (SE 6)), while in statistics departments, 81-100% was chosen most often (by 35% (SE 3)); Table S.12 and Figure S.12.1 displays the distributions of the percentages of departments that chose each of these intervals. The graphs for mathematics departments' responses were skewed toward the lower percentages, while the graphs for the statistics departments' responses were skewed toward the higher percentages, indicating that these courses taught in statistics departments were more likely to put emphasis on the use of real data than these courses taught in mathematics departments; the graphs have very similar shapes to those obtained in 2010 [CBMS2010, Figure S.13.A.1, p. 31]. A second question asked departments to estimate the percentage of class sessions in which in-class demonstrations and/or in-class problem solving activities or discussions took place, and presented the same percentage intervals as responses. The results are given in Table S.12 and displayed in Figure S.12.2. For this question on in-class demonstrations/problem-solving activities, the distribution for mathematics departments was roughly bell-shaped, while the distribution for statistics department had the largest percentages of responses in the 81-100% interval; these distributions can be compared to those obtained in 2010 [CBMS2010, Figure S.13.A.2, p. 31]. The third question asked departments about the use of the following kinds of technology in most sections of its introductory statistics courses: graphing calculators, statistical packages, educational software, applets, spreadsheets, web-based resources (including data sources, online texts, and data analysis routines) and classroom response systems (e.g. clickers), online textbooks, and online videos (the last two options were added to the 2015 survey). The percentages of mathematics and statistics departments using each of these kinds of technology is given in Table S.12. The data show that less sophisticated technology, like graphing

TABLE S.12 Percentages of mathematics and statistics departments at four-year colleges and universities that use various practices to teach Introductory Statistics with no calculus prerequisite (for non-majors/minors) in the majority of the sections in fall 2015. This table can be compared to Table S.13 (A) in CBMS2010, p. 29.

	% of Math Depts.	% of Stat Depts.
Offer introductory statistics course with no calculus prerequisite	78	92
Number of different kinds of introductory statistics courses for non-majors:		
1	72	23
2	24	26
3	3	22
More than 3	1	30
Percentage of class sessions in which real data is used is:		
0-20%	28	15
21-40%	23	14
41-60%	19	15
61-80%	12	21
81-100%	19	35
Percentage of class sessions in which in-class demonstrations or problem solving activities take place is:		
0-20%	19	13
21-40%	22	23
41-60%	23	21
61-80%	17	5
81-100%	19	39
Majority of sections use the following kinds of technology:		
Graphing calculators	67	47
Statistical packages	48	68
Educational software	50	53
Applets	24	41
Spreadsheets	68	55
Web-based resources	50	68
Classroom response systems	6	50
Online textbooks	41	50
Online videos	31	35
Percentage of departments where the majority of sections require assessments beyond homework, exams, and quizzes	39	32

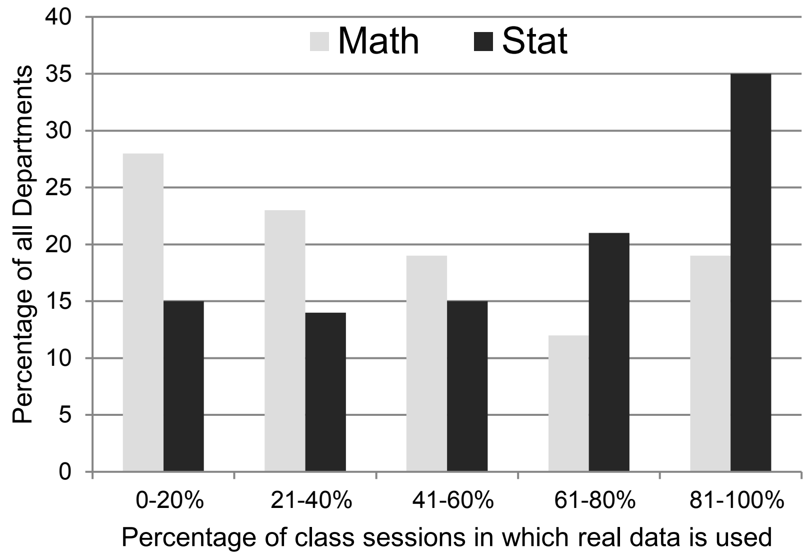

FIGURE S.12.1 Percentage of departments reporting the use of real data in the course *Introductory Statistics with no calculus prerequisite* by percentage of class sessions in which real data is used and by type of department. This figure can be compared to CBMS 2010 Figure S.13.A.1, p. 31.

calculators and spreadsheets, were more popular in Introductory Statistics taught in mathematics departments than in statistics departments, but all the other kinds of technology (particularly statistical packages, applets, classroom response systems) were said to be used in higher percentages of statistics departments', rather than in mathematics departments', Introductory Statistics courses. The final question on teaching Introductory Statistics asked each department about the percentage of sections of the course that required assessments beyond homework, tests and quizzes (assessments such as projects, oral presentations or written reports); here the percentages across all levels of mathematics departments combined, and all levels of statistics departments combined, were about the same, and may, again be compared to the 2010 survey results, where mathematics departments reported 45% of sections and statistics departments 36%. The responses to these questions are broken down by the type of department in Chapter 5, Tables FY.5 (for introductory statistics courses taught in mathematics departments) and FY.6 (for introductory statistics courses taught in statistics departments).

Further data regarding instruction in Introductory Statistics in four-year mathematics and statistics departments are presented in Chapter 5; Table FY.7 contains data on topics covered in such courses, Table FY.8 contains data on the statistical education of the course instructor of courses taught in mathematics departments, and Table FY.9 contains estimates of enrollments in such courses in departments outside of the mathematical sciences in the respondent's institution.

For the first time, CBMS2015 asked questions about the implementation of mathematics "Pathways" in two-year colleges. Pathways was defined to be "a redesign of a mathematics sequence that provides students with an alternative course or sequence to/through developmental mathematics and to/through a college-level mathematics or statistics course." In fall 2015, mathematics Pathways courses and course sequences could be found in many two- and four-year colleges, and information about Pathways programs and courses were deemed as an important topic to be surveyed in two-year colleges in CBMS2015. In fall 2015, 58% (SE 5.1) of two-year colleges reported having implemented a Pathways course sequence, enrolling a total of 192,000 students. Colleges sometimes implemented multiple Pathways courses including Foundations (51%), Quantitative Reasoning/Literacy (59%), Statistics (63%) and Other (32%). See Tables

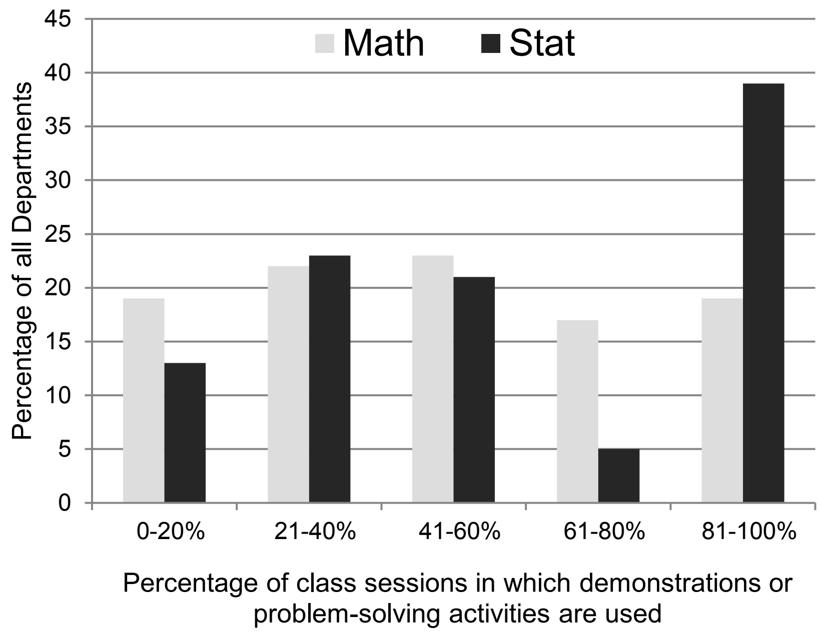

FIGURE S.12.2 Percentage of departments reporting in-class demonstrations or problem solving activities in the course *Introductory Statistics with no calculus prerequisite* by percentage of class sessions in which this activity takes place and by type of department. This figure can be compared to CBMS2010 Figure S.13.A.2, p. 31.

TYE.11 and TYE.11.1 and the discussion before TYE.11 in Chapter 6.

Demographics of the mathematical sciences faculty

The remaining tables in this chapter present a snapshot of faculty demographics in mathematics and statistics departments of four-year colleges and universities, as well as in the mathematics programs of two-year colleges during fall 2015. Further details about faculty in mathematics and statistics departments of four-year colleges and universities appear in Chapter 4, while additional information about faculty in mathematics programs of public two-year colleges is given in Chapter 7.

Source of demographic data

The demographic data on mathematics and statistics department faculty in four-year colleges and universities contained in the CBMS2015 report were not collected using the same survey instrument as the other data, nor was the same random sample of institutions used. The demographic data were collected as part of the Annual Survey, a stratified randomized survey conducted each year by the American Mathematical Society and overseen by the Joint Data Committee of five professional societies: the American Mathematical Society, the American Statistical Association, the Institute of Mathematical Statistics, the Mathematical Association of American, and the Society for Industrial and Applied Mathematics. Reports on the Annual Survey are published each year in several issues of the *Notices of the American Mathematical Society*, and online at http://www.ams.org/profession/data/annual-survey/annual-survey. Beginning with the survey in 2005, the demographic data for the CBMS survey were collected as part of the Annual Survey; sampled departments were asked additional demographic questions that do not normally appear on the Annual Survey, but are a part of the CBMS surveys.

In comparing data from the CBMS surveys to the data published in the Annual Surveys, one must keep in mind several differences between the two surveys. The Annual Surveys do not include postdoctoral appointments as a part of “other full-time faculty” (OFT), while CBMS surveys do - i.e. CBMS survey tables list “other full-time faculty” (and these numbers include postdoctoral appointments), but they also break out the number of other full-time faculty who are postdoctoral appointments. The CBMS surveys of “statistics departments” include only statistics departments that offer an undergraduate program in statistics, while the Annual Surveys go to all departments of statistics and biostatistics that award a Ph.D. However, the data for statistics depart-

TABLE S.13 Number of full-time and part-time faculty in mathematics departments at four-year colleges and universities, in doctoral statistics departments at universities, and in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015. (Two-year college data since 2005 include only public two-year colleges.) This table can be compared to CBMS2010 Table S.14, p. 33.

	2000	2005	2010	2015
Four-Year Colleges & Universities				
Mathematics Departments				
Full-time faculty	19779	21885	22293	22532
Part-time faculty	7301	6536	6050	7682
Statistics Departments (PhD)				
Full-time faculty	808	946	1004	1237
Part-time faculty	102	112	105	128
Two-Year College Mathematics Programs				
Full-time faculty	7921	9403	10873	9800
Part-time faculty[1]	14887	18227	23453	17888

[1] Paid by two-year colleges. In fall 2000, there were an additional 776 part-time faculty in two-year colleges who were paid by a third party (e.g. by a school district for a dual-enrollment course). In 2005, the number paid by a third party was 1915, in 2010 the number paid by a third party was 2323, and in 2015 the number paid by a third party was 2359.

ments that do not have an undergraduate program in statistics are not included in the tables that appear in this report. The 2005 Annual Survey did not include masters-level statistics departments, but the 2010 and 2015 surveys included these departments; hence comparisons to 2005 are made using only doctoral statistics programs, though the 2010 and 2015 data for masters-level statistics programs are presented in some tables. The Annual Surveys use stratified random samples of bachelors-level programs, but a census of doctoral and masters-levels programs. The demographic data for mathematics faculty at public two-year colleges were collected from the CBMS survey instruments and samples, as two-year colleges are not a part of the Annual Survey.

The number of mathematical sciences faculty (Table S.13)

Table S.13 presents the number of faculty in mathematics and doctoral-level statistics departments of four-year colleges and universities, and in public two-year college mathematics programs, broken down into full-time faculty and part-time faculty in fall 2000, 2005, 2010, and 2015. Figure S.13.1 displays a graph of the numbers of full-time faculty at the three kinds of departments for each of the four years, while Figure S.13.2 shows the same information for the numbers of part-time mathematics faculty in two-year and four-year institutions. Figures S.13.3, S.13.4, and S.13.5 display bar graphs of the numbers of full-time and part-time faculty for mathematics departments at four-year institutions, mathematics programs at two-year colleges, and doctoral-level statistics departments, respectively. Further details on the estimated numbers of full and part-time faculty in four-year colleges and universities are presented in Chapter 4, Table F.1, and for two-year colleges in Chapter 7, Table TYF.1.

Table S.13 and Figure S.13.3 indicate that the estimated total number of full-time plus part-time mathematics faculty at four-year institutions has been increasing slightly from fall 2000 to fall 2015, and grew almost 7% from fall 2010 to fall 2015; most of this growth was due to the increased number of part-time faculty. The estimated number of full-time mathematics faculty in fall 2015 was slightly larger than the fall 2010 estimate, but the 2010 estimate was within 1 SE of the 2015 estimate (Figure S.13.1 displays the estimated number of full-time faculty from 2000-2015). From 2000 to 2015, by Table S.13 the estimated number of full-time mathematics faculty in four-year departments grew by 14%, while Table S.2

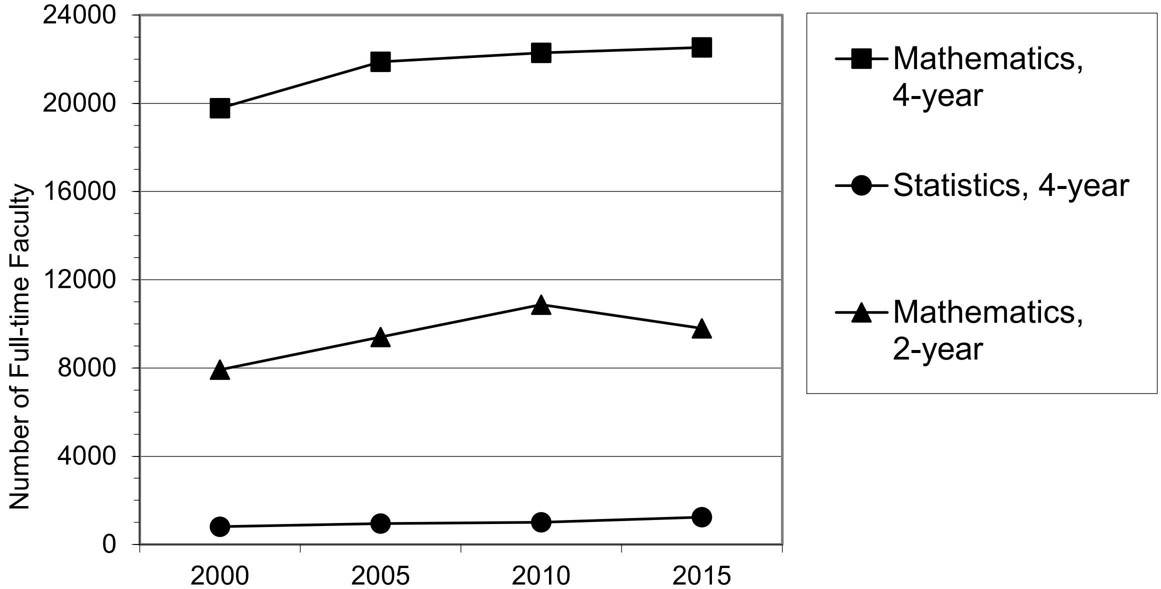

FIGURE S.13.1 Number of full-time faculty in mathematics departments of four-year colleges and universities, in doctoral statistics departments, and in mathematics programs at public two-year colleges in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.1, p. 34.

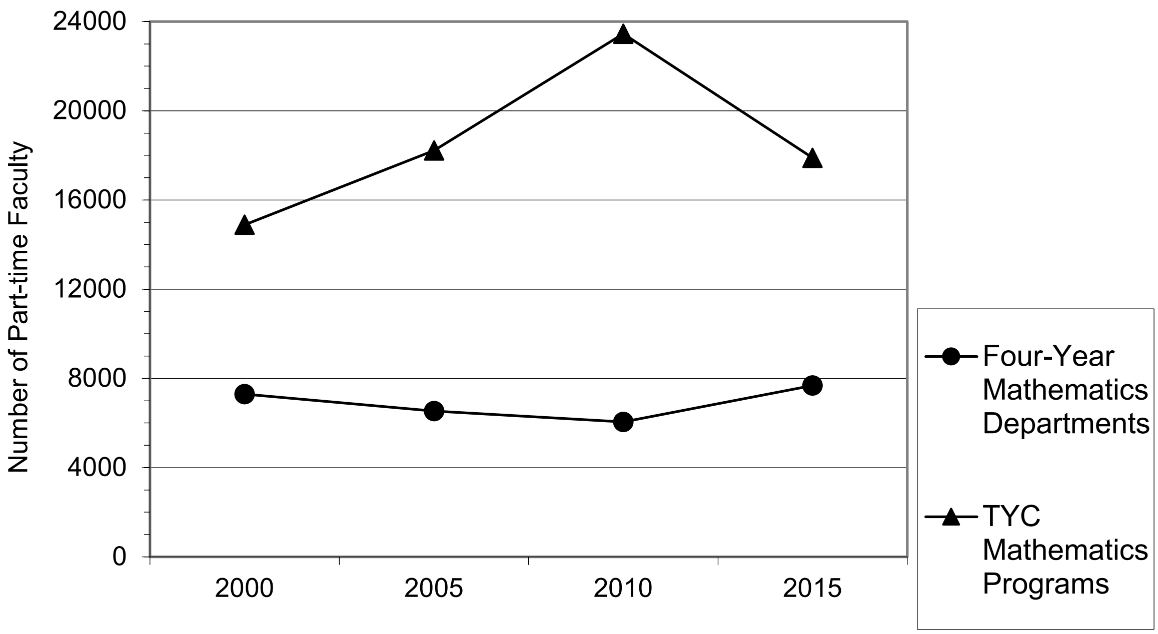

FIGURE S.13.2 Number of part-time faculty in mathematics departments at four-year colleges and universities and in mathematics programs at two-year colleges (TYCs) in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.2, p. 34.

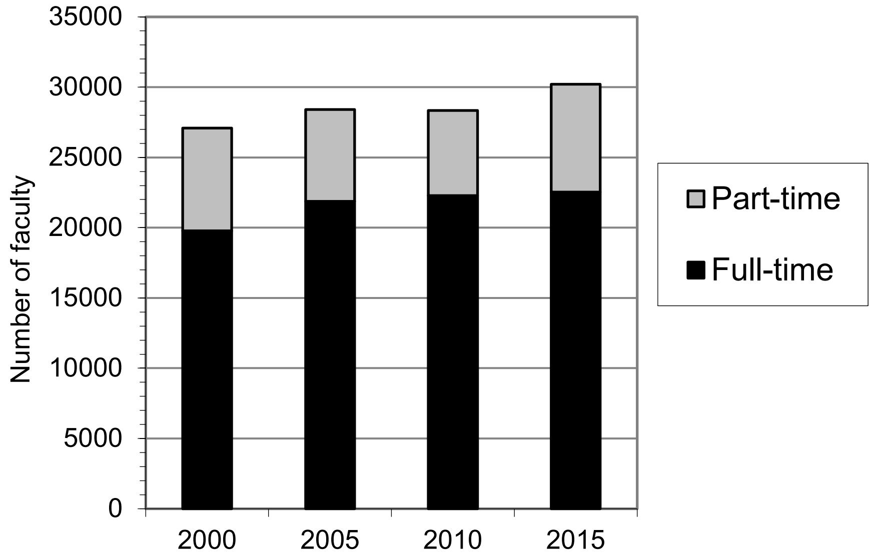

FIGURE S.13.3 Number of full-time and part-time faculty in mathematics departments of four-year colleges and universities in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.3, p. 35.

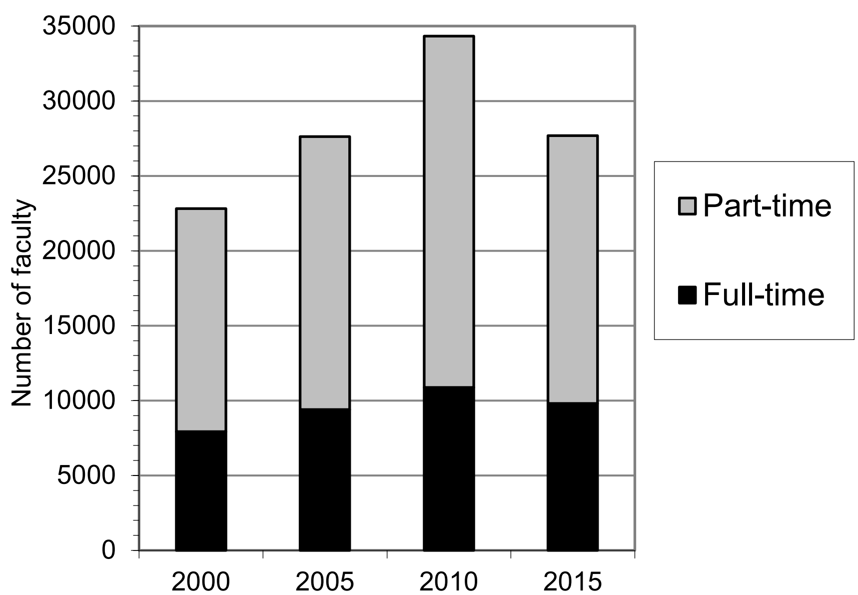

FIGURE S.13.4 Number of full-time and part-time faculty in mathematics programs at public two-year colleges in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.4, p. 35.

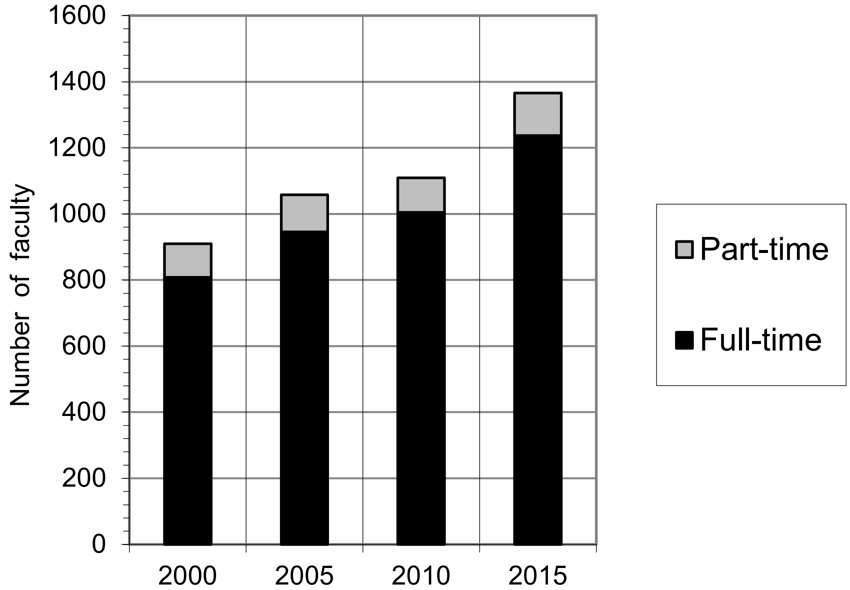

FIGURE S.13.5 Number of full-time and part-time faculty in doctoral statistics departments in fall 2000, 2005, 2010, and 2015. This figure can be compared to CBMS2010 Figure S.14.5, p. 36.

shows that mathematics departments' estimated total course enrollments grew by 36% (by 42% if computer science enrollments are removed) over this same time interval, indicating that the growth in full-time faculty has not kept pace with the growth in their mathematical science course enrollments. Table S.13 and Figures S.13.2 and S.13.3 show that the estimated number of part-time mathematics faculty in four-year institutions, which had been slowly declining since fall 2000, increased 27% (more than 5 SEs over the 2010 estimate) from fall 2010 to fall 2015, and the estimated number of part-time mathematics faculty in fall 2015 was larger than the estimated number in fall 2000.

In doctoral-level statistics departments, Table S.13 and Figure S.13.5 show that the estimated total number of full-time plus part-time faculty has been growing over the past 15 years, and, in fall 2015, the estimated number of full-time plus part-time, as well as the estimated number of full-time faculty, both increased 23% (almost 5 SEs) from 2010, and are up about 50% from 2000. The estimated doctoral-level statistics department enrollments have doubled since 2000, according to Table E.2 (includes distance learning enrollments), outpacing the rate of growth of statistics department full-time faculty. The estimated number of part-time faculty in doctoral-level statistics departments has remained relatively constant over the last 15 years; it increased 22% (1.2 SEs) from fall 2010 to fall 2015. We note that masters-level statistics departments were not included in the CBMS2005 survey; since Table S.13 makes comparisons to 2005, only doctoral-level statistics department faculty are included in this table. The tables that follow make comparisons only to the CBMS2010 survey, so they include data from both masters-level and doctoral-level statistics departments.

Table S.13 shows that in two-year college mathematics programs, the estimated number of full-time permanent, continuing and other faculty decreased by 10% (1.2 SEs) from fall 2010 to fall 2015 to a total of 9800 (SE 893) persons (a decrease of 1,073 persons), following a 16% increase from 2005 to 2010. From 2000 to 2015, the overall change in the estimated number of full-time two-year college faculty increased 24%. These changes in faculty numbers mirrored the changes in mathematics and statistics enrollments during these periods. Two-year college mathematics program enrollments rose 38% from 2000 to 2015, according to Table S.1, including a 5% decrease from 2010 to 2015. Excluding dual enrollment, mathematics and statistics enrollment increased from 2000 to 2005 by 22%, increased from 2005 to 2010 by 19%, and decreased from 2010 to 2015 by 5% (1 SE). These recent changes are consistent with the 14% decrease in institutional enrollment in two-year colleges from fall 2010 to fall 2015 and discussed in Chapter 6.

Table S.13 and Figures S.13.2 and S.13.3 show that the estimated number of part-time mathematics faculty in two-year institutions, which had been increasing from fall 2000 to fall 2010, decreased 24% (3 SEs) from fall 2010 to fall 2015. The estimated number of part-time mathematics faculty in fall 2015 was less than the estimated number in fall 2010 by

TABLE S.14 Number of full-time faculty who are tenured and tenure-eligible (TTE), postdocs, and other full-time (OFT) in mathematics and statistics departments of four-year colleges and universities, and in mathematics programs at two-year colleges, in fall 2010 and fall 2015. (Postdocs are included in the other full-time category.)

Four-Year Colleges and Universities	Fall 2010				Fall 2015			
Mathematics Departments	Total	TTE	Other full-time	Postdoc	Total	TTE	Other full-time	Postdoc
Full-time faculty	22293	16364	5929	1025	22532	15270	7261	1317
Having doctoral degree	18249	15646	2603	1024	18743	14869	3874	1317
Having other degree	4044	717	3326	1	3789	401	3387	
Statistics Departments [2]								
Full-time faculty	1266	994	272	86	1432	1031	401	116
Having doctoral degree	1192	988	204	86	1373	1031	342	116
Having other degree	74	6	69	0	59	0	59	
Total Math & Stat Depts	23559	17357	6201	1111	23964	16302	7662	1433
Two-Year College Mathematics	Total full-time faculty	Full-time permanent	Other full-time		Total full-time faculty	Full-time permanent	Other full-time[1]	
Full-time faculty	10873	9790	1083		9800	8314	1487	
Grand Total	34170	26943	7227	1111	33764	24616	9149	1433

Note: Round-off may make marginal totals seem inaccurate.

[1]Other full-time in this table in 2015 includes Full-time continuing faculty and Other full-time faculty from Table TYF.1.

[2]This table includes masters-level statistics departments. The comparable table in CBMS2010, Table S.15, p. 37, does not.

TABLE S.15 Gender among full-time faculty in mathematics and statistics departments of four-year colleges and universities by type of appointment, and among permanent full-time faculty in mathematics programs at two-year colleges in fall 2010 and fall 2015. Also gender among doctoral and masters degree recipients. (Postdocs are included in the other full-time category.)

Four-Year Colleges and Universities	Fall 2010					Fall 2015				
Mathematics Departments	Total	Tenured	Tenure-eligible	Other full-time	Postdoc	Total	Tenured	Tenure-eligible	Other full-time	Postdoc
Full-time faculty	22293	12747	3617	5929	1025	22532	11979	3291	7261	1317
Number of women	6416	2740	1227	2449	233	6981	2688	1171	3122	288
	(29%)	(21%)	(34%)	(41%)	(23%)	(31%)	(22%)	(36%)	(43%)	(22%)
Statistics Departments										
Full-time faculty	1266	727	267	272	86	1432	772	260	401	116
Number of women	327	117	102	108	24	392	153	90	149	22
	(26%)	(16%)	(38%)	(40%)	(28%)	(27%)	(20%)	(35%)	(37%)	(19%)
	July 1, 2005 - June 30, 2010					July 1, 2010 - June 30, 2015				
Number of PhD's from US Math & Stat Depts[1]	7259					9121				
Number of women among new PhDs[1]	2349 (32%)					2854 (31%)				
Two-Year College Mathematics Programs	Total full-time	Full-time age < 40				Total full-time	Full-time age < 40			
Full-time permanent faculty	9790	3244				8314	2045			
Number of women	4924	1764				4345	1107			
	(50%)	(54%)				(52%)	(54%)			
Masters degrees in mathematics and statistics granted in the U.S. in 2013-14[2]						7273				
Number of women among new masters recipients[2]						3017	(41%)			

[1] Report Tables 323.40 and 323.50 from Digest of Education Statistics 2015, National Center for Education Statistics, https://nces.ed.gov/programs/digest/current_tables.asp.

[2] This table includes masters-level statistics departments. The comparable table in CBMS2010, Table S.16, p. 38, does not.

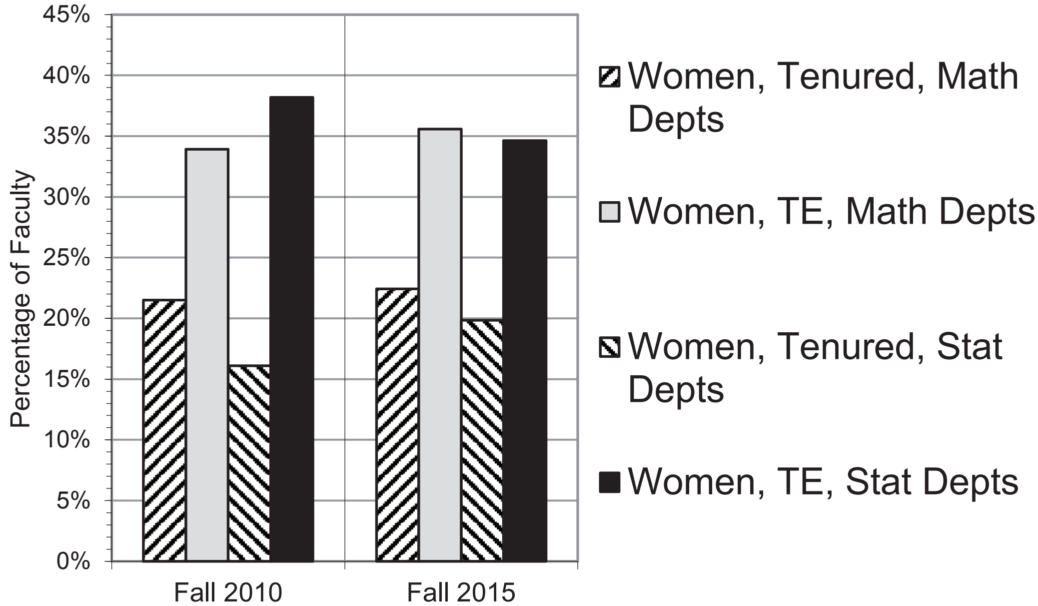

FIGURE S.15.1 Percentage of women in tenured and in tenure-eligible (TE) categories in mathematics departments of four-year colleges and universities and statistics departments in fall 2010 and 2015.

5565 persons. Table TYF.1 in Chapter 7 includes part-time faculty paid by third parties, such as school districts, for dual enrollment courses. The estimated total number of part-time faculty in two-year college mathematics programs was 20,247 and represented 67% of the total number of two-year college faculty, when those paid by third parties (2,359 persons) are included. When third party payees are omitted, part-time faculty represented 65% of the total number of faculty, also down three points from 2010.

The 2010 CBMS survey reported that the total number mathematics faculty (full-time plus part-time) at two-year departments was larger than at four-year departments. That trend did not continue from 2010 to 2015, where estimated total of all four-year college mathematics and statistics faculty increased by 2,127 persons (7%) compared to estimated total of all two-year college mathematics and statistics faculty decreased by 6,638 persons (19%).

Appointment type and degree status of full-time faculty (Tables S.14 and S.15)

Table S.14 gives the estimated numbers of full-time faculty in the mathematics and (masters-level and doctoral-level combined) statistics departments of four-year colleges and universities in fall 2010 and fall 2015, broken down by their appointment type (tenured or tenure-eligible (TTE), other full-time (OFT), postdoc) and the highest degree obtained by the faculty member (doctoral degree or other degree), along with two-year college faculty estimates. In this table (as in the other faculty tables in this, and the past, CBMS surveys), the category of other full-time four-year faculty includes postdoctoral appointments, but the number of postdocs is also broken out of the number of other full-time faculty, so that trends in the growing category of postdoc faculty can be observed. In this table, the category of "other full-time" for two-year colleges includes full-time continuing faculty and other full-time faculty discussed in Chapter 7.

In fall 2015, the estimated number of full-time faculty at two-year college mathematics programs is presented in Chapter 7 using the categories of "full-time permanent," "full-time temporary" and "other full-time" faculty. Full-time faculty who are employed in a non-tenure track position and may be continuing, are called "full-time continuing" faculty in this document. In addition, two-year colleges often have another classification for "other" non-tenure track full-time faculty. Data about this third classification of positions was collected for the first time in CBMS2015. This group is referred to as "other full-time" faculty in this document. Full-time "permanent" faculty are distinguished from "continuing" or "other" full-time faculty who are often meeting a short-term institutional need. Full-time faculty members teach full course assignments, distinguishing them from part-time or adjunct faculty. Table S.14 displays an estimated 9,800 (SE 894) full-time two-year college

TABLE S.16 Percentage of all tenured and tenure-eligible faculty in mathematics departments of four-year colleges and universities in various age groups, and average age, by gender in fall 2015. Percentage full-time permanent faculty in mathematics programs at public two-year colleges, by age, and average ages in fall 2015. This table can be compared to CBMS2010 Table S.17, p. 40.

Four-Year College & University Mathematics Departments	Percentage of tenured/tenure-eligible faculty										Average age 2005	Average age 2010	Average age 2015
	<30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	>69			
	%	%	%	%	%	%	%	%	%	%			
Tenured men	0	1	4	7	9	10	9	10	6	6	53.7	54.6	54.9
Tenured women	0	1	2	3	3	3	2	2	1	0	50.2	50.7	51.0
Tenure-eligible men	1	6	4	2	0	0	0	0	0	0	38.9	36.9	36.3
Tenure-eligible women	1	3	2	1	0	0	0	0	0	0	38.6	37.8	37.0
Total tenured & tenure-eligible faculty	2	10	12	13	12	14	11	12	7	6			
	Percentage of permanent full-time faculty												
Two-Year College Mathematics Program	<30	30-34	35-39	40-44	45-49	50-54	55-59	>59					
Full-time permanent faculty	4	6	14	14	18	16	13	15			47.8	46.8	47.7

Note: 0 means less than half of 1%. Round-off may cause some marginal totals to appear inaccurate.

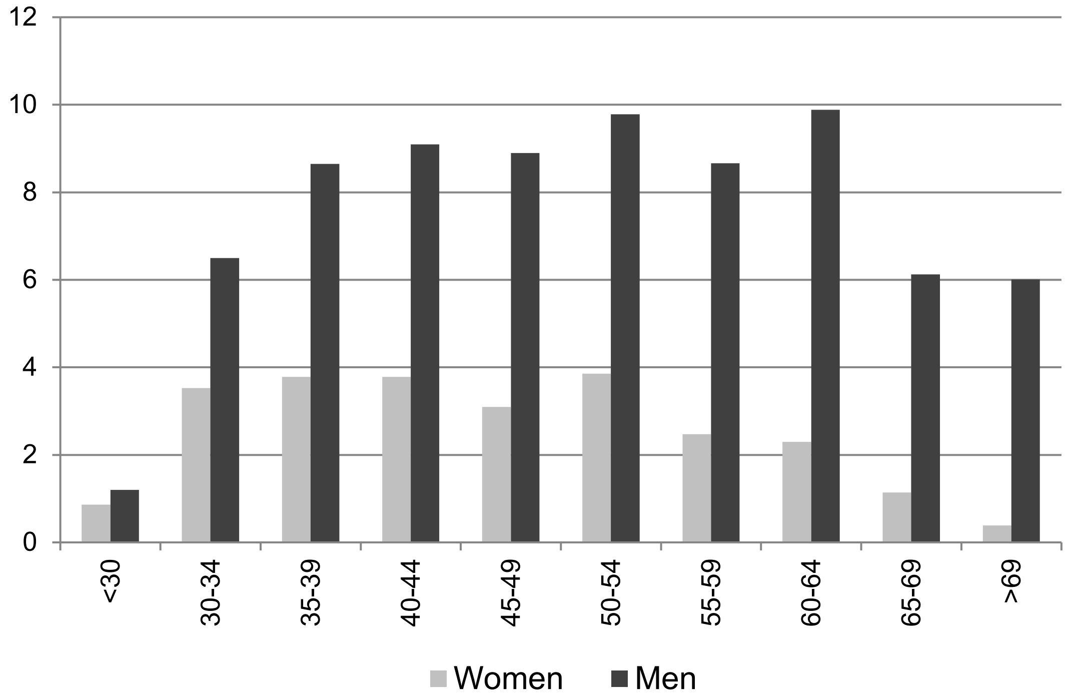

FIGURE S.16.1 Percentage of all tenured and tenure-eligible (TTE) faculty in mathematics departments at four-year colleges and universities belonging to various age groups, by gender, in fall 2015. This figure can be compared to CBMS2010 Figure S.17.1, p. 41.

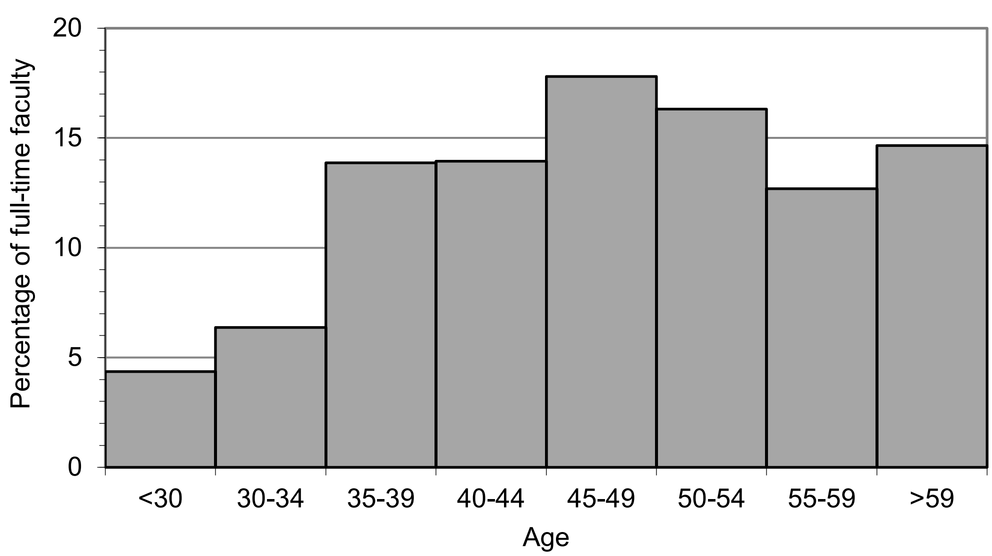

FIGURE S.16.2 Percentage of permanent full-time faculty in various age groups in mathematics programs at public two-year colleges in fall 2015. This figure can be compared to CBMS2010 Figure S.17.2, p. 41.

faculty: 8,314 (SE 841) full-time permanent faculty and 1,487 (SE 273) other full-time faculty (including 1,221 continuing full-time faculty and 266 other full-time faculty). Table TYF.1 in Chapter 7.

Table S.15 considers only full-time faculty, and it breaks the TTE faculty at four-year departments into tenured and tenure-eligible faculty, and also presents the number of female faculty in each category; this table also presents the numbers of full-time faculty in public two-year college mathematics programs, broken down by gender, and displays the numbers of those full-time permanent faculty under the age of 40. More detail on faculty at four-year mathematics and statistics departments can be found in Chapter 4, Table F.1, and on faculty in public two-year colleges in Tables TYF.1 and TYF.9 in Chapter 7.

Table S.14 and the corresponding table in the 2010 CBMS survey report [CBMS2010 Table S.15 p. 37], show that the estimated number of tenured plus tenure-eligible mathematics faculty in four-year colleges and universities decreased over the past 10 years: from 17,256 in 2005, to 16,364 in 2010, to 15,270 in 2015, a loss of almost 2,000 tenured or tenure-eligible positions over 10 years, eliminating the gains that had been made since fall 2000, when the estimated number of tenured plus tenure-eligible faculty was 16,245 [CBMS2005, Table S.15, p. 35]. From Table S.15 we see that, from fall 2010 to fall 2015, the estimated number of tenured faculty mathematics decreased by 768 faculty, and the estimated number of tenure-eligible mathematics faculty decreased by 326 faculty, producing a 6% (4.2 SEs) decrease in the total number of tenured faculty and a 9% (4.1 SEs) decrease in the number of tenure-eligible faculty. The category "other full-time faculty" is defined to be "all full-time faculty, in four-year mathematical science departments, who are not tenured or tenure-eligible, faculty with renewable positions, postdoctoral faculty, and visiting faculty"; this category includes non-tenure-eligible faculty with renewable appointments. "Postdoctoral appointments" are defined as "temporary positions primarily intended to provide an opportunity to extend graduate training or to further research experience", and these positions occur primarily (but not exclusively) in doctoral-level departments. The most consistent trend in the CBMS2015 data on faculty in mathematical science departments at four-year colleges and universities is the growth in the estimated numbers of other full-time faculty. Table S.15 shows that the estimated number of other full-time mathematics faculty, from fall 2010 to fall 2015, increased by 1,332 faculty to 7,261 faculty (a 22% increase (6 SEs) from fall 2010); this estimate includes an increase of 292 postdocs (a 28% (4.8 SEs) increase from 2010). Comparing Table S.15 to CBMS2005 Table S.17, p. 38, we see that the estimated number of other full-time mathematics faculty has more than doubled in the past 15 years. The estimated number of mathematics postdocs increased 61% from 2005 (when this data was first collected) to 2015. Table S.14 shows that, in fall 2015, of the 5,944 other full-time mathematics faculty who are not postdocs, less than half 2,557 (43%) have a Ph.D. (this percentage is up from 32% in fall 2010). The decline in tenure-stream mathematics appointments, accompanied with the rise in non-tenure eligible and part-time appointments, is a concern that merits further study.

In doctoral and masters-level statistics departments combined, Table S.14 shows that the estimated number of tenured faculty plus tenure-eligible faculty grew by 4% (0.95 SEs) to 1,031, from fall 2010 to fall 2015. Table S.15 shows that, from 2010 to 2015, the estimated number of tenured statistics faculty increased by 6% (1.4 SEs), and the number of tenure-eligible statistics faculty decreased by 3% (0.5 SEs), not significant changes. In fall 2000, the estimated number of tenured statistics faculty was 710 [CBMS2000, Table SF.8, p. 21]. and in fall 2015 it was 772 (Table S.15). In fall 2000, the estimated number of tenure-eligible statistics faculty was 161 [CBMS2000, Table SF.8, p. 21], and in fall 2015 it was 260. Hence, statistics departments have seen modest growth in tenured appointments, and larger growth in tenure-eligible appointments (the largest such growth between 2005 and 2010). The most significant change in the estimated numbers of faculty in statistics departments is the number of other full-time statistics faculty (including postdocs), which increased by 129 faculty (a 47% (5.9 SEs) increase), and the estimated number of postdocs, which increased by 30 postdocs, an increase of 35% (2 SEs), from fall 2010 to fall 2015. The CBMS2000 survey estimate of other full-time statistics faculty was 151 [CBMS2000 Table SF.8, p.21], and the 2015 estimate was 401; hence the estimated number of other full-time appointments in statistics departments in fall 2015 was more than 2.5 times the estimate in fall 2000.

Table S.14 shows that the estimated number of all full-time (full-time permanent, continuing and other) mathematics faculty at public two-year colleges decreased from 10,873 in 2010 to 9,800 in 2015, a 10% (2 SEs) decrease of 1,073 persons. This is viewed in light of a 16% increase from 2005 to 2010. The estimated number of full-time permanent mathematics faculty decreased by 15%. The estimated number of full-time "other" mathematics faculty increased by 37%, a total of 404 persons (in Table S.14 "other full-time" includes full-time continuing and other full-time faculty). There were 8,314 (SE 840) full-time permanent mathematics faculty in public two-year college mathematics programs in the United States in fall 2015, compared with 9,790 in 2010, a 15% decrease (1476 faculty). In fall 2015, there were

TABLE S.17 Percentage of tenured and tenure-eligible faculty belonging to various age groups in doctoral and masters statistics departments (combined) at universities by gender, and average ages in fall 2015. Also average ages for doctoral statistics departments in fall 2010. This table can be compared to CBMS2010 Table S.18, p. 43.

All Statistics Departments	Percentage of tenured/tenure-eligible faculty										Average age 2005[1]	Average age 2010	Average age 2015
	<30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	>69			
	%	%	%	%	%	%	%	%	%	%			
Tenured men	0	1	5	7	7	8	9	9	7	7	52.7	53.9	55.3
Tenured women	0	1	2	3	3	2	1	1	1	0	45.6	48.4	47.9
Tenure-eligible men	3	8	4	3	0	0	0	0	0	0	33.7	34.8	34.6
Tenure-eligible women	1	5	2	0	0	0	0	0	0	0	33.2	35.6	34.5
Total tenured & tenure-eligible faculty	**4**	**15**	**13**	**13**	**11**	**10**	**10**	**10**	**7**	**7**			

Note: 0 means less than half of 1%. Round-off may cause some marginal totals to appear inaccurate.

[1]Average ages for fall 2005 and fall 2010 from CBMS2010 S.18, p. 43.

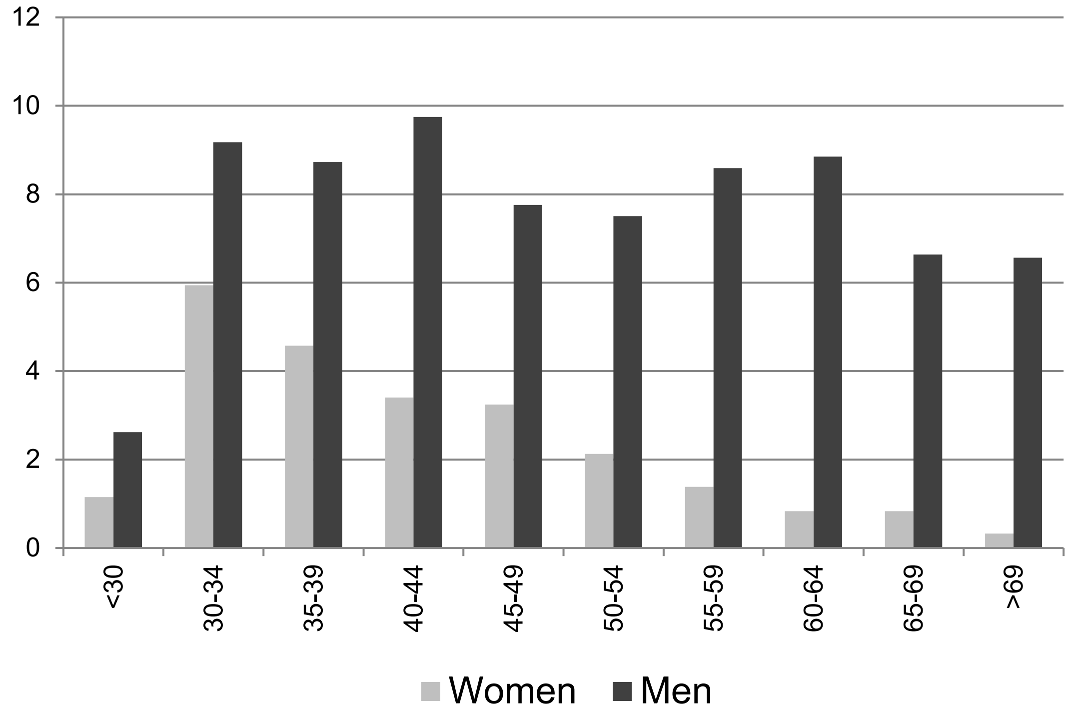

FIGURE S.17.1 Percentage of tenured and tenure-eligible faculty in various age groups, by gender, in doctoral and masters statistics departments (combined) in fall 2015. This figure can be compared to CBMS2010 Figure S.18.1, p. 43.

1,487 continuing and other full-time faculty (1,221 continuing with SE 268, and 266 Other with SE 73).

In fall 2015, a masters degree was the terminal degree for 80% of the full-time permanent mathematics faculty members at two-year colleges, down three percentage point from the 2010 estimate. An additional 15% of full-time faculty held doctorates, and 5% held bachelors degrees. Of the total full-time permanent faculty, 73% held degrees in mathematics, 13% in mathematics education, and 3% in statistics. See Tables TYF.4 and TYF.5 in Chapter 7. Among part-time faculty in fall 2015, 7% held a doctorate (up two points from 2010), 76% held a masters degree (up three points from 2010) and 17% (down five points from 2010) had a bachelors degree as their highest degree. A bachelors degree is generally allowed by accrediting agencies for those who teach precollege (remedial) courses or highly specialized technical courses. See Table TYF.6 in Chapter 7.

Gender, age, and ethnicity among the mathematical science faculty (Tables S.15 to S.20)

According to the data from the Annual Surveys, the percentage of women receiving Ph.D. degrees in the mathematical sciences has remained close to 30% each year over the last fifteen years. Table S.15 shows that 31% of the new Ph.D.s that were awarded by mathematics and statistics departments between July 1, 2010-June 30, 2015 went to women. The Annual Surveys and the CBMS surveys have shown a gradual increase in the percentage of women faculty. Table S.15, which breaks down the numbers of mathematical science faculty by gender, shows that this trend of increases in the percentages of women faculty continued from 2010 to 2015.

Table S.15 estimates that, in fall 2015, at all four-year mathematics departments combined, women comprised 31% of all full-time faculty, 22% of all tenured faculty, and 36% of all tenure-eligible faculty; each of these percentages is up one or two percentage points from the 2010 estimates, even with the declining numbers of tenured and tenure-eligible mathematics faculty. In statistics departments, in fall 2015, women were an estimated 27% of all full-time faculty, 20% of tenured faculty (up from 16% in 2010), and 35% of tenure-eligible faculty, all except tenure-eligible up from 2010. The Annual Surveys have shown larger percentages of Ph.D.s awarded to women in statistics than in mathematics. Figure S.15.1 displays the estimated percentages of tenured and of tenure-eligible faculty that are women, in fall 2010 and in fall 2015, for mathematics departments and for statistics departments. In 2015, mathematics departments had larger estimated percentages of tenured and tenure-eligible women, and, in 2010, statistics departments had larger estimated percentages of tenure-eligible women; in 2015 the differences between the percentages of women in mathematics and statistics were narrowing.

The percentage of women full-time faculty varies among the levels of the department. Chapter 4, Tables F.1, F.2, and F.3 provide more detail on numbers of women faculty at four-year departments. From Chapter 4, Table F.1 we see that in 2010 women comprised an estimated 11% of the tenured faculty at doctoral-level mathematics departments, and by 2015 this percentage had risen to 14%. At bachelors-level mathematics departments, in 2010 women comprised an estimated 30% of the tenured and tenure-eligible faculty, and by 2015 this percentage had risen to 31%; however, in fall 2015, the estimated percentage of tenured-women at bachelors-level mathematics departments was more than double the percentage at doctoral-level four-year mathematics departments.

Table S.15 shows that in public two-year college mathematics programs in fall 2015, women comprised 52% of the 8,314 full-time permanent faculty positions (4,345 persons with SE 574), up two points from 2010. Fifty-four percent (54%) of the 2,045 (SE 292) full-time faculty of age less than 40 were female (the same as in 2010). More data on women faculty at two-year colleges is contained in Chapter 7 in Tables TYF.8, TYF.9, and TYF.17.

Table S.16 gives the estimated distribution of ages among full-time mathematics faculty at four-year colleges and universities, in fall 2015, broken down by tenured or tenure-eligible status, and by gender. The estimated average age of tenured men in four-year mathematics departments has been rising; it was 52.4 in 2000 [CBMS2000 Table SF.9, p. 23], and, by Table S.16, 53.7 in 2005, 54.6 in 2010 and 54.9 in 2015. The estimated average age of tenured women has also been rising; it was 49.6 in 2000, 50.2 in 2005, 50.7 in 2010, and 51.0 in 2015. In fall 2015, the estimated average age of tenured men appeared to be approximately 4 years greater than that of tenured women in mathematics departments. For both men and women, the estimated average ages of tenure-eligible mathematics faculty declined over the three surveys 2005, 2010, and 2015. The distribution of ages of tenured and tenure-eligible (combined) mathematics faculty in 2015 is quite similar to that in 2010, except for the increase in the percentage of mathematics faculty 65 and older, which has been increasing: from 8% in 2005, to 12% in 2010, to 13% in 2015. It appears that some senior faculty have been retiring later than in previous years. Figure S.16.1 shows the distribution of ages of male and female tenured and tenure-eligible (combined) mathematics faculty; one notes that the distribution of ages is shifted more toward lower ages for female faculty than for male faculty. Table S.16 is

TABLE S.18 Percentage of gender and of racial/ethnic groups among all tenured, tenure-eligible, postdoctoral, and other full-time faculty in mathematics departments of four-year colleges and universities in fall 2015. This table can be compared to CBMS2010 Table S.19, p. 44.

Mathematics Departments	Asian %	Black, not Hispanic %	Mexican American/ Puerto Rican/ other Hispanic %	White, not Hispanic %	AIAN & NHPI [1] %	Unknown %
Tenured Men	6	1	1	32	0	1
Tenured Women	2	0	0	9	0	0
Tenure-eligible men	2	0	0	7	0	0
Tenure-eligible women	1	0	0	4	0	0
Postdoctoral men	1	0	0	3	0	0
Postdoctoral women	0	0	0	1	0	0
Full-time men not included above	1	0	1	11	0	1
Full-time women not included above	1	0	0	10	0	0
Total full-time men	11	2	2	53	0	2
Total full-time women	4	1	1	24	0	1

[1] Includes the federal categories *American Indian or Alaskan Native* (AIAN) and *Native Hawaiian or Other Pacific Islander* (NHPI).

Note: 0 means less than half of 1% and this may cause apparent column sum inconsistencies.

broken down by the level of the department in Chapter 4, Table F.4, and Figures F.1, F.2, and F.3.

Table S.16 also gives the distribution of ages among permanent mathematics faculty at public two-year college mathematics programs. The estimated average age of a permanent mathematics faculty member in fall 2015 was 47.7 (SE 0.5), up from 46.8 in 2010. TYF.16 in Chapter 6 displays a historical picture of the percentage and estimated number of full-time permanent faculty at two-year colleges. From 2005 to 2010, the overall increase was evident in all age groups, except for ages 50-54 years and 55-59 years. From 2010 to 2015, the estimated number of faculty decreased in each category except in ages 45-49 years and 50-54 years, with the largest increase evident in ages 50-54 years. Figure S.16.2, as well as Table TYF.16 and TYF.16.1 in Chapter 6, display this distribution of ages.

Table S.17 gives the estimated distribution of ages among full-time doctoral and masters-level statistics faculty (combined), broken down by tenured or tenure-eligible status, and by gender. The estimated average age of tenured men rose over each of the three surveys, and both averages for women are slightly lower in 2015 than in 2010, but higher than in 2005. The estimated percentage of statistics faculty aged 65 or higher in fall 2015 is 14%, higher than in 2010. The estimated distribution of ages for tenured and tenure-eligible women in statistics departments are displayed in Figure S.17.1, and, even to a greater extent than for mathematics faculty, the estimated distribution of ages for women is skewed toward lower ages than for men, again reflecting the recent growth in tenured and tenure-eligible women statistics faculty.

Tables S.18 and S.19 give percentages of faculty for various racial/ethnic groups in mathematics and statistics departments at four-year colleges and universities. Annual Surveys follow the federal pattern for racial and ethnic classifications of faculty. However, in the text of this report some of the more cumbersome federal classifications will be shortened. For example, “Mexican-American/Puerto Rican/other Hispanic” will be abbreviated to “Hispanic”. Similarly, the federal classifications “Black, not Hispanic” and “White, not Hispanic” will be shortened to “Black” and “White”, respectively, and “American Indian or Alaskan Native/ Native Hawaiian or Other Pacific Islander” will be shortened to “AIAN&NHPI”.

Table S.18 gives the estimated percentages of gender and of racial/ethnic groups for tenured, tenure-eligible, postdoctoral, and other full-time four-year mathematics faculty. Comparing Table S.18 in CBMS2015 to Table S.19 in CBMS2010, the estimated percentages of the various racial/ethnic and gender groups look quite similar, with the most noticeable difference a decrease from 2010 to 2015 in the percentage of White male faculty and increases in White women and Asian faculty. The percentages of Black faculty, and of Hispanic faculty, remain small.

Table S.19 shows these estimated percentages of racial/ethnic groups for all statistics faculty combined. Comparing Table S.20 in CBMS2010 and Table S.19 in CBMS2015, the estimated percentage of White male faculty decreased from 2010 to 2015 by four percentage points, and the estimated percentage of Asian men and Asian women faculty have increased (two percentage points and three percentage points, respectively). The percentages of Black faculty, and of Hispanic faculty, remain small. In Chapter 4, Table F.5, breaks the numbers in Tables S.18 and S.19 down by the level of the mathematics department, and all levels of statistics departments combined.

Ethnic and gender breakdowns for part-time mathematics and statistics faculty at four-year colleges and universities, broken down by the level of the department for mathematics departments, are given in Chapter 4, Table F.6.

The distribution of mathematics program faculty in public two-year colleges among various ethnic groups is studied in Chapter 7. In fall 2015, twenty-three percent (23% with SE 2) of full-time permanent faculty members in mathematics programs were ethnic minorities, up seven points compared with 2010. However, the total number of ethnic minority faculty totaled 1,876 (SE 289) faculty, an increase of 310 persons from 2010. The majority of the faculty represented in the ethnic minority groups were Asian/Pacific Islander or Black (non-Hispanic) or Mexican American/Puerto Rican/other Hispanic. See Tables TYF.10, TYF.11, and TYF.12 in Chapter 7. Among the 451 (SE 83) newly-hired full-time permanent faculty in fall 2015, 9% were ethnic minorities (Asian/Pacific Islander, Black, and Hispanic), down nine percentage points and 55% (SE 7) were women, up eight points from 2010. See Tables TYF.18-20 in Chapter 7.

Table S.20 gives the estimated number of deaths and retirements in four-year mathematical sciences departments from the past four CBMS surveys, broken down by the level of the mathematics department. The data show a larger number of deaths and retirements among mathematics departments at each level of department in 2015 than in any of the previous three CBMS surveys.

TABLE S.19 Percentage of gender and of racial/ethnic groups among all tenured, tenure-eligible, postdoctoral, and other full-time faculty in doctoral and masters statistics departments (combined) at universities in fall 2015. This table can be compared to CBMS2010 Table S.20, p. 45.

All Statistics Departments	Asian %	Black, not Hispanic %	Mexican American/ Puerto Rican/ other Hispanic %	White, not Hispanic %	AIAN & NHPI [1] %	Unknown %
Tenured Men	13	0	1	28	0	1
Tenured Women	5	0	0	5	0	0
Tenure-eligible men	5	0	0	6	0	0
Tenure-eligible women	3	0	0	3	0	0
Postdoctoral men	3	0	1	3	0	0
Postdoctoral women	1	0	0	1	0	0
Full-time men not included above	1	0	0	9	0	1
Full-time women not included above	2	0	0	6	0	0
Total full-time men	22	1	2	45	0	2
Total full-time women	11	0	1	15	0	1

[1] Includes the federal categories *American Indian or Alaskan Native* (AIAN) and *Native Hawaiian or Other Pacific Islander* (NHPI).

Note: 0 means less than half of 1%; round-off causes apparent column sum inconsistencies.

TABLE S.20 Number of deaths and retirements of full-time faculty from mathematics departments and from doctoral statistics departments by type of department. Numbers reported prior to 2004-2005 for mathematics departments are of Tenured and Tenure-track faculty. (Data prior to 2004-2005 for statistics departments includes both masters and doctoral statistics departments.) This table can be compared to CBMS2010 Table S.21, p. 46.

Four-Year College & University	1999-2000	2004-2005	2009-2010	2014-2015	Number of tenured/ tenure-eligible faculty 2015
Mathematics Departments					
Univ (PhD)	174	139	146	182	5594
Univ (MA)	165	140	91	128	2983
Coll (BA)	123	219	123	251	6693
Total deaths and retirements in all Mathematics Departments	462	499	360	561	15270
Doctoral Statistics Departments: Total deaths and retirements	16	14	15	29	869

Chapter 2

CBMS2015 Special Projects

Each CBMS survey accepts proposals for special projects from various professional society committees. Special projects chosen for one CBMS survey might, or might not, be continued in the next CBMS survey. This chapter presents data from the special projects of CBMS2015 for two-year and four-year mathematics departments:

- The mathematical education of teachers of pre-college mathematics/statistics (Tables SP.1-SP.7)
- Percentage of departments offering distance learning courses, and practices in distance learning courses (Tables SP.8-SP.11)
- Academic resources and special opportunities available to undergraduates (Tables SP.12-SP.14)
- Interdisciplinary courses in four-year mathematics departments (Tables SP.15)
- Dual enrollment courses in mathematics and statistics (Tables SP.16 and SP.17)
- Requirements in the majors in mathematics and statistics in four-year departments (Tables SP.18 and SP.19)
- Availability of upper level classes in four-year mathematics and statistics departments (Tables SP.20 and SP.21)
- Estimates of post-graduation plans of graduates of four-year mathematics departments and statistics departments (Table SP.22)
- Assessment in four-year mathematics departments and statistics departments (Table SP.23)
- Divisional graduation credit for advanced placement courses in four-year mathematics and statistics departments (Table SP.24)
- Pedagogy and making changes at four-year mathematics and statistics departments (Tables SP.25-27)
- Statistics majors and minors at four-year mathematics departments (Table SP.28)
- Profiles of other full-time faculty at four-year mathematics and statistics departments (Tables SP.29-31)

When there is comparable data in CBMS2010, the appropriate comparison table will be given in the caption, if the 2010 data is not included in the table. Also note that further discussion of selected special project issues at two-year colleges is given in the section "Topics of Special Interest for Mathematics Programs at Two-Year Colleges", located at the end of Chapter 6.

Terminology: Recall that in CBMS2015, the term "mathematics department" includes departments of mathematics, applied mathematics, mathematical sciences, and departments of mathematics and statistics. These departments may offer a broad spectrum of courses in mathematics education, actuarial science, and operations research, as well as mathematics, applied mathematics and statistics. Computer science courses are sometimes also offered by mathematics departments. The term "statistics department" refers to graduate departments of statistics or biostatistics that offer undergraduate statistics courses. Courses and majors from separate departments of computer science, actuarial science, operations research, etc. are not included in CBMS2015. Departments are classified by the highest degree they offered; for example, "masters-level department" refers to a department that offers a masters degree, but not a doctoral degree.

In the text that follows, the standard error (SE) in many of the estimates is provided along with the estimate (e.g. "estimated 77% (with SE 3.5)"); the standard errors for all CBMS2015 tables can be found in Appendix VIII. The change in an estimate from the estimate in a previous survey is often expressed both as percentage change and as the number of SEs that change represents (e.g. "increased 22% (1.2 SEs)").

TABLE SP.1 Percentage of mathematics departments whose institutions offer certification programs for some or all grades K-8, and also for secondary teachers, by type of department in fall 2015. (Data for K-8 from fall 2000, 2005, 2010 when available, in parentheses.)

	Percentage whose institutions have a certification program for:				
	K-5	6-8	K-8*	Secondary (9-12)	
Mathematics Departments					
Univ (PhD)	52	47	(72,78,62)	75	(79)
Univ (MA)	63	64	(87,92,90)	92	(96)
Coll (BA)	52	50	(85,88,70)	75	(80)
Total Math Depts	53	51	(84,87,72)	77	(82)

*Prior to 2015, CBMS asked about certification for pre-service K-8 teachers, while CBMS 2015 separated K-5 from 6-8. If the results for the two questions on CBMS 2015 are combined, then 63 percent of total mathematics departments responded that they had a program for certification for K-5 and/or 6-8 teachers.

Tables (SP.1-SP.7): The Mathematical Education of Teachers of Pre-College Mathematics and Statistics

Percentages of Four-year Mathematics Departments whose Institutions have Elementary and Secondary Teacher Certification Programs

Table SP.1 shows that, in fall 2015, roughly 63% of all four-year mathematics departments combined reported belonging to an institution that offered a teacher certification program for some or all grades K-8; this compares to an estimated 72% in 2010, 87% in 2005 and 84% in 2000. In 2015, for the first time, departments were asked whether they had a K-5 certification program and/or a 6-8 grades certification program, and there were about equal numbers of departments in each category (an estimated 53% had a K-5 program and 51% had a 6-8 grades program, with SEs of about 3.5 in each case). Table SP.1 breaks these percentages down by the level of department, the masters-level departments having the largest percentage of K-8 teacher certification programs in each of the four CBMS surveys 2000, 2005, 2010, and 2015. Table SP.1 also shows that, in fall 2015, a larger percentage, an estimated 77% (with SE 3.5) of four-year mathematics departments (compared with 82% in fall 2010), belonged to an institution that offered a secondary teacher certification program; again, the percentage was largest for the masters-level departments (92%). It appears that the percentage of four-year mathematics departments whose institutions offer elementary certification, and the percentage offering secondary certification, have declined slightly over 2010.

Teacher Preparation Programs at Two-year Colleges

Table SP.2 updates data regarding public two-year colleges offering programs for pre- and in-service teachers to complete their entire mathematics certification requirements at the two-year college for fall 2015, including historical data for 2010 and 2005. The three types of students mentioned in Table SP.2 are: undergraduates without a bachelors degree ("pre-service teachers"); in-service teachers who already hold certification in some other discipline; and "career switchers" who leave a first career to enter a second career in pre-college teaching. Each category displays decreases from 2010 to 2015 in the percentage of mathematical programs in two-year colleges offering organized teacher preparation programs.

Table SP.2 also shows that two-year institutions were more involved in the preparation of elementary teachers than middle school or secondary teachers. Secondary teachers may take their lower-division mathematical requirements at a two-year institution and those enrollments might not be reflected in this data. In fall 2015, the estimated percentage of public two-year college mathematics programs with a complete certification program at the elementary level was 28% (SE 5), at the middle school level was 14% (SE 3), and at the secondary level was 7% (SE 3). In fall 2010, these estimated percentages were 41% of the colleges having programs at the elementary level, 24% at the middle school level, and 13% at the secondary level.

Table SP.3 presents data on various activities or options related to certification programs at two-year colleges in fall 2015: an estimated 35% (SE 6) of mathematics programs assign a faculty member to coordinate K-8 teacher education in mathematics,

TABLE SP.2 Percentage of mathematical programs at public two-year colleges (TYCs) having organized programs that allow various types of pre- and in-service teachers to complete their entire mathematics course or licensure requirements in fall 2015. (Fall 2005, 2010 data in parentheses.)

	Percentage of TYCs with an organized program in which students can complete their entire mathematics course or licensure requirements	
Pre-service elementary teachers	28	(30,41)
Pre-service middle school teachers	14	(19,24)
Pre-service secondary teachers	7	(3,13)
In-service elementary teachers	12	(12,25)
In-service middle school teachers	6	(15,12)
In-service secondary teachers	4	(2,10)
Career-switchers aiming for elementary teaching	16	(19,30)
Career-switchers aiming for middle school teaching	13	(14,17)
Career-switchers aiming for secondary teaching	5	(6,13)

55% (SE 5) offered a special mathematics course for K-8 teachers, 9% (SE 5) offer a mathematics pedagogy course in their mathematics program, and 6% (SE 2) report that a mathematics pedagogy class is offered outside of the mathematics program. Historical data for 2010 and 2005 are displayed in SP.3.

Further discussion of teacher education programs in two-year colleges is contained at the end of Chapter 6: Topics of Special Interest for Mathematics Programs in Two-Year Colleges. Among the items noted there, in the past ten years, from fall 2000 to fall 2010, the estimated enrollment in the courses in mathematics for elementary school teachers in two-year colleges had doubled (see Tables TYE.3 and TYE.3.2 in Chapter 6), but decreased 45% (5 SEs) from 2010 to 2015.

Four-year Mathematics Departments: Numbers of Mathematics Credits Required for Certification of Pre-service K-8 Teachers

A new question on the 2015 survey inquired about the number of semester hours in four-year mathematics departments required for certification of pre-service elementary (grades K-5) and middle grade (grades 6-8) mathematics teachers. Table SP.4 contains data, broken down by the level of department, on the number of semester hours in the mathematics department, and the number of semester hours in “fundamental ideas in mathematics appropriate for elementary mathematics teachers” that are required for K-5 teacher certification. Table SP.5 summarizes the analogous data required for grades 6-8 teacher certification.

Previous CBMS surveys asked for slightly different data. In CBMS2010, Table SP.5, p. 51, gave the distribution of the number of mathematics courses (rather than semester hours) required for “early” grade (K-5) certification (if the institution makes a distinction between kinds of K-8 certification, or all K-8 certification if no distinction is made) among the various levels of departments. That table showed that, in fall 2010, most commonly two mathematics courses were required, and the average number of required

TABLE SP.3 Percentage of public two-year colleges (TYCs) that are involved with teacher preparation in various ways in fall 2015. (Data from fall 2005, 2010 in parentheses when available.) This table can be compared to Table SP.4 CBMS 2010.

	Percentage of TYCs
Assign a mathematics faculty member to coordinate K–8 teacher education in mathematics	35 (38,36)
Offer a special mathematics course for preservice K–8 teachers[1]	55 (11,7)
Offer a special mathematics course for preservice secondary teachers[2]	19 (na)
Offer mathematics pedagogy courses in the mathematics department	9 (9,5)
Offer mathematics pedagogy courses outside of the mathematics department	6 (10,9)

[1]In 2010, this question specifically excluded four courses listed in the detailed course matrix.
[2]Did not collect in 2010.

mathematics courses, across all levels of mathematics departments combined, was 2.7 courses. In fall 2015, Table SP.4 shows that among departments at institutions with K-5 teacher certification programs, the interval of semester hours chosen by the highest estimated percentage of departments, across all level of departments combined, was "more than 12 required hours" (chosen by an estimated 34% of departments with elementary certification programs, with SE 3.2); in masters-level departments, the 4-6 semester hour interval was chosen most frequently. This data would suggest that, in fall 2015, more semester hours in mathematics generally are required for pre-service elementary teacher certification than in fall 2010. The interval of hours required for K-5 certification in fundamental ideals of mathematics that was chosen by the largest estimated percentage of departments with an elementary education certification program, in fall 2015, was 4-6 hours; the distribution of semester hours required in fundamental ideas in mathematics was relatively uniform for each of the three levels of mathematics departments.

Four-year Mathematics Departments: Courses in Secondary Certification Programs

Table SP.6 gives the estimated percentages, in fall 2015, of four-year mathematics departments that required courses in specified core areas for secondary mathematics certification (grades 9-12), departments where courses in these core areas were not required, but were generally taken by pre-service secondary teachers, and departments that offered courses specially designed for pre-service secondary teachers in these core areas. In fall 2015, as in fall 2010, the three courses most likely to be required across all levels of departments combined were geometry, statistics, and modern algebra. At all three levels of departments, geometry was required by more than an estimated 85% of departments (with the SE of all departments combined 3). At the bachelors- and masters-level departments, modern algebra was required by at least 80% of departments (with SEs at bachelors-level of 4 and at masters-level of 6). At the doctoral- and masters-level departments, advanced calculus/analysis was required by more than 60% of departments (with SE at doctoral-level of 9 and at masters-level of 6). At masters and bachelors-level departments, statistics was required by more than 80% of departments (with SEs at masters-level of 6 and at bachelors-level of 4). Doctoral-level departments generally were more likely to offer special courses for secondary pre-service teachers than other levels of departments, with special geometry courses offered by 53% (SE 10) of the doctoral-level departments. Table SP.9, p. 54, of the CBMS 2010 report presented comparable data from the 2010 CBMS survey.

Statistics Departments: Courses for Pre-service Teachers

For the first time, in 2015, the statistics questionnaire inquired about pre-service secondary (grades 9-12) teacher education in statistics. Statistics depart-

TABLE SP.4 Among all four-year colleges and universities with a K-5 certification program, the percentage of mathematics departments requiring various numbers of mathematics semester hours for certification, by type of department, in fall 2015. (Table can be compared to Table SP.5 in CBMS2005 and CBMS2010, but the previous surveys asked for the number of courses. Also, the earlier surveys looked at K-8 and at "early" grades, while 2015 asked separately about K-5 and 6-8.)

	Percentage of departments with K-5 certification programs that require various numbers of mathematics courses for certification			
Number of semester hours in mathematics department required for K-5 certification	Univ (PhD) %	Univ (MA) %	Coll (BA) %	All Math %
0 required	8	0	2	2
1-3 required	9	0	6	6
4-6 required	20	37	19	22
7-9 required	22	26	23	23
10-12 required	17	13	11	12
More than 12 required	24	24	38	34
Number of semester hours in fundamental ideas of mathematics required for K-5 certification	Univ (PhD) %	Univ (MA) %	Coll (BA) %	All Math %
0 required	12	5	17	14
1-3 required	6	3	10	8
4-6 required	41	40	46	45
7-9 required	16	21	11	13
10-12 required	11	16	1	5
More than 12 required	14	15	15	15

Some percentages do not total 100% due to round-off.

ments were asked which of a list of statistics courses were required of all students at their institution who were seeking credentials to teach statistics in grades 9-12, which courses were not required at their institution but generally were taken, and for which courses the department offered a special course for per-service secondary teachers. Table SP.7 presents a summary of the responses to those questions. Across all levels of statistics departments combined, an estimated 41% (SE 3.6) required Introductory Statistics, and an estimated 42% (SE 3.6) required Probability and/or Statistics with a calculus prerequisite for certification to teach statistics in grades 9-12. In addition, at another 27% (with SE 4) of institutions, Introductory Statistics is not required but generally taken, and an estimated 20% (SE 3) of statistics departments offered a special Introductory Statistics course for pre-service secondary teachers.

Statistics departments also were asked for the number of semester hours in statistics that were required by their institution's middle grade (6-8 grade) teacher certification program, and by their institution's elementary grade (K-5) teacher certification program. Table SP.7 shows that an estimated 73% (SE 3.4) of institutions require no statistics for K-5 grade certification; for grades 6-8 certification, 42% (SE 3.9) of institutions require no statistics, while 42% (SE 3.8) require 1-3 semester hours of statistics.

TABLE SP.5 Among all four-year colleges and universities with a 6-8 certification program, the percentage of mathematics departments requiring various numbers of mathematics semester hours for certification, by type of department, in fall 2015. (Table can be compared to Table SP.5 in CBMS2005 and CBMS2010, but the previous surveys asked for the number of courses. Also, the earlier surveys looked at K-8 and at "early" grades, while 2015 asked separately about K-5 and 6-8.)

	Percentage of departments with grade 6-8 certification programs that require various numbers of mathematics courses for certification			
Number of semester hours in mathematics department required for 6-8 certification	Univ (PhD) %	Univ (MA) %	Coll (BA) %	All Math %
0 required	4	0	1	1
1-3 required	0	0	0	0
4-6 required	14	10	4	7
7-9 required	5	3	2	3
10-12 required	6	10	5	6
More than 12 required	71	77	87	83
Number of semester hours in fundamental ideas of mathematics required for 6-8 certification	Univ (PhD) %	Univ (MA) %	Coll (BA) %	All Math %
0 required	15	10	15	14
1-3 required	4		11	8
4-6 required	28	19	26	25
7-9 required	25	16	17	18
10-12 required	15	10	4	7
More than 12 required	13	45	28	29

Some percentages do not total 100% due to round-off.

Tables SP.8-SP.10: Practices in Distance Learning Courses

In the CBMS 2015 survey, a “distance learning course” was defined to be a course offered for credit in which “the majority of the instruction occurs with the instructor and the students separated by time and/or place (e.g. where the majority of the course is taught online, or by computer software, or by other technologies) including MOOC’s that are offered for credit. (A MOOC is a ‘massive open online course’.)” In Appendix I, enrollments for individual courses both with, and without, distance learning enrollments are given, so that distance learning enrollments can be computed for individual courses taught by four-year mathematics and statistics departments; Chapter 6, Table TYE.12, gives the comparable enrollments at two-year college mathematics programs. In fall 2015, by the Table E.4 in Chapter 3, total distance learning enrollments in courses in four-year mathematics departments were estimated at 86,197 enrollments (compared to an estimated 36,297 enrollments in fall 2010), and in statistics departments, there were an estimated 4,297 enrollments (about the same as the 2010 estimate of 4,171 enrollments) in distance learning courses; Table TYE.12 shows that in fall 2015 there were an estimated 225,000 enrollments (compared with 188,000 in fall 2010) in distance learning courses at two-year mathematics programs. Enrollments in distance learning courses appear to be growing, and the 2015 survey sought to explore issues regarding their use and pedagogy.

From Table SP.8 we observe that 87% (SE 4.1) of two-year mathematics programs, 64% of statistics departments (SE 3), and 52% (SE 5.2) of four-year mathematics departments (63% at doctoral-level,

TABLE SP.6 Among four-year colleges and universities with secondary pre-service teaching certification programs, for various courses, the percentage of mathematics departments whose program requires the course, or whose students generally take the course, or who offer a special course in the given subject that is designed for secondary teachers, by type of department, in fall 2015. (This table can be compared to Table SP.9, p. 54, in CBMS2010.)

	Percentage of departments with secondary certification program where:											
	Course is required				Course is generally taken, but not required				Math dept offers special course in the subject for secondary pre-service teachers			
Course	Univ (Ph.D) %	Univ (MA) %	Coll (BA) %	All math %	Univ (Ph.D) %	Univ (MA) %	Coll (BA) %	All math %	Univ (Ph.D) %	Univ (MA) %	Coll (BA) %	All math %
Advanced Calculus/ Analysis	69	64	49	54	13	13	16	15	9	3	10	8
Modern Algebra	72	89	81	81	9	12	14	13	23	4	2	6
Number Theory	25	37	11	17	26	24	24	24	7		9	7
Geometry	85	89	90	89	18	7	10	11	53	5	13	18
Discrete Mathematics	56	52	62	60	8	9	16	14	12	5	4	5
Statistics	66	88	85	83	23	7	12	13	4	8	3	4
Probability	62	68	50	55	15	2	18	15	6	9	6	7
History of Math	60	77	39	48	16	7	17	16	39	5	11	15

Some totals are less than 100% due to round-off.

73% at masters-level, and 45% at bachelors-level) offered a distance learning course at least once in the calendar years 2013-2015. These percentages can be compared to those reported in fall 2010 (see CBMS2010, Table SP.10, p. 55), when 88% of two-year mathematics programs, 39% of statistics departments, and 35% of four-year mathematics departments (48% of doctoral-level, 57% of masters-level, and 28% of bachelors-level) reported offering distance learning courses in 2008-10. The survey asked all departments whether, in fall 2015, the department granted credit for a distance learning class that was not taught by faculty in the respondent's institution; an estimated 62% (SE 5.2) of four-year mathematics departments, 50% (SE 3) of statistics departments, and 58% (SE 5.1) of two-year college mathematics programs reported that they did give credit for such courses. Departments were asked if there is a limit on the number of credits in distance learning courses that can be applied toward graduation, and Table SP.8 shows that in fall 2015 an estimated 36% (SE 3.7) of four-year mathematics departments, 31% (SE 2.9) of statistics departments, and 1% (SE 0.5) of two-year colleges reported that there was such a limit.

Among those departments that offered a distance learning course in 2013-15, Table SP.8 gives the percentages of practices in teaching distance learning courses in four-year mathematics departments, statistics departments, and two-year colleges. Departments were asked to categorize the majority of distance learning courses as completely online, hybrid, or other, and for all three types of departments about two-thirds (66-69%) of the distance learning courses were completely online (with SEs 4-6). Departments were asked to itemize how instructional materials were generally created: by faculty, by commercially produced materials, or by a combination. For the statistics departments combined, an estimated 56% (SE 3.7) indicated faculty created the materials, while at four-year mathematics departments about 36% (SE 4.6) used faculty created materials (and these percentages were about the same across each level of

TABLE SP.7 Among statistics departments at four-year colleges and universities with secondary pre-service teaching certification programs, for various courses, the percentage of statistics departments whose program requires the course, or whose students generally take the course, or who offer a special course in the given subject that is designed for secondary teachers, and the number or semester hours required for certification in grades K-5 and 6-8, by type of department, in fall 2015.

	Percentage of departments with secondary certification program where:								
	Course is required			Course is generally taken, but not required			Stat dept offers special course in the subject for secondary pre-service teachers		
Course	Univ (PhD) %	Univ (MA) %	All stat %	Univ (PhD) %	Univ (MA) %	All stat %	Univ (PhD) %	Univ (MA) %	All stat %
Introductory Statistics	36	57	41	36	0	27	17	29	20
Probability	24	33	26	13	14	13	8	14	9
Probability and/or statistics with calculus prerequisite	36	67	42	4	14	7	12	0	9
Upper level statistics course	12	17	13	9	43	18	8	0	6
Applied statistics course	12	17	13	9	29	14	4	0	3
Other	5	0	4	5	0	4	4	0	4
Number of semester hours required for K-5 grade teachers (%)									
None	85	50	73						
1-3 hours	0	0	0						
4-6 hours	11	50	23						
More than 6 hours	5	0	3						
Number of semester hours required for 6-8 grade teachers									
None	49	25	42						
1-3 hours	33	63	42						
4-6 hours	9	13	10						
More than 6 hours	9	0	6						

Some totals are less than 100% due to round-off.

TABLE SP.8 Percentage of mathematics, statistics, and public two-year college departments offering distance learning[1], and use of various practices with regard to distance learning in fall 2015. This table can be compared to Table SP.10 CBMS 2010 p. 55.

	Mathematics Depts				Statistics Depts			Two-Year Colleges
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total	
Give credit for distance learning not taught by faculty in your institution:								
Yes	60	74	60	62	52	42	50	58
No	40	26	40	38	48	58	50	42
Set a limit on the number of credits earned in distance learning classes	33	33	37	36	34	18	31	1
Percentage offering distance learning	63	73	45	52	69	50	64	87
Format of majority of distance learning:								
Complete online	63	60	74	69	70	50	66	69
Hybrid	36	33	21	26	18	50	23	22
Other	1	7	5	5	13		10	8
Instructional materials created by:								
Faculty	37	30	37	36	54	67	56	14
Commercially produced materials	9	6	11	9	3		3	19
Combination of both	55	65	52	55	43	33	41	67
How distance learning students take majority of tests:								
Not at a monitored testing site	15	15	26	22	10	17	11	11
Online, using monitoring technology	10	14	23	19	16	17	16	10
At proctored testing site	49	34	34	37	32	50	35	47
Combination of both	25	37	18	23	41	17	37	32

[1] Distance-learning courses are those courses in which the majority of instruction occurs with the instructor and students separated by time and/or place (e.g. courses in which the majority of the course is taught online, or by computer software, or by other technologies, including MOOCs that are offered for credit).

TABLE SP.9 Percentages of public two-year colleges (TYCs) with various practices in distance-learning courses in fall 2015. (Data from fall 2010 are in parentheses.) This table can be compared to Table SP.11 CBMS 2010 p. 57.

Requirements of faculty whose entire teaching load is distance-learning courses regarding time required to be on campus to meet with students	% of TYCs	
Never	5	(8)
Only for scheduled meeting or student appointment	12	(6)
A specified number of office hours per week	32	(21)
Not applicable or unreported	51	(65)

four-year mathematics department), and at two-year mathematics programs about 14% (SE 4.4) used materials created by faculty. Instructional materials created by a combination of both faculty and commercially produced materials was reported in 41-67% of institutions, across four-year and two-year departments. The administration of tests was addressed in a question about how distance learning students take the majority of their tests: not at a monitored testing site, online using monitoring technology, at a proctored testing site, or using some combination: an estimated 47% (SE 5.1) of two-year college mathematics programs, 35% (SE 3.7) of statistics departments, and 37% (SE 5.9) of four-year mathematics departments (including 49% of the doctoral-level departments) reported using a proctored testing site; these percentages were roughly comparable to those reported in fall 2010.

Table SP.9 examines the time faculty at two-year mathematics programs, whose entire teaching load is distance-learning courses, were required to be on campus. Estimates of percentage of programs with requirements that faculty in two-year college mathematics programs be on campus to meet with students ranged from 5-32% in fall 2015: an estimated 5% (SE 2) of mathematics programs never required faculty to be on campus, 12% (SE 3) required faculty to be on campus only for scheduled meetings or appointments, and 32% (SE 7) required a specific number of on-campus office hours, an 11% increase from 2010 to 2015.

Table SP.10 considers courses that four-year and two-year departments offered in both distance learning and regular format, and asked for a comparison of the courses offered in the two formats. Almost all of the departments that offered distance learning courses had some course offered in both formats (estimated at 91% of four-year mathematics departments, and 88% of statistics departments), and almost all believed that the courses had the same course outlines. Tables TYE.3 and TYE.12 in Chapter 6 show that almost every course offered was available in both formats at two-year colleges. An estimated ninety-seven percent (97% with SE of 2.7) of two-year colleges reported that the same course outlines were used for distance-learning courses and face-to-face courses (in four-year mathematics departments the estimated percentage was 94% and in statistics departments it was 88%). Instructors held comparable office hours at an estimated 59% (SE 4.8) of the four-year mathematics departments and 68% (SE 3.7) of the statistics departments. Instructors were evaluated in the same ways at an estimated 87% (SE 4) of the four-year mathematics departments, 91% (SE 2.4) of the statistics departments, and 93% (SE 3) of the two-year college mathematics programs. The courses made the same use of common exams at an estimated 58% (SE 8) of the four-year mathematics departments, 45% (SE 4) of the statistics departments, and 67% (SE 5) of the two-year college mathematics programs. The classes had the same projects at an estimated 79% (SE 5.4) of the four-year mathematics departments, 68% (SE 3.5) of the statistics departments, and 77% (SE 4.5) of the two-year college mathematics programs. For four-year departments, these numbers are broken down further by the level of department, but the percentages are not very different at the various levels, and are comparable to the data reported in fall 2010.

The 2015 survey asked departments if, during the academic years 2013-15, the department had offered a MOOC (massive open online course) for credit. Out of all the institutions surveyed, one four-year (bachelors-level) mathematics department, one (doctoral-level) statistics department, and two two-year colleges responded "yes". The two-year colleges reported teaching courses in statistics, developmental mathematics, and college-level courses below, and above, calculus-level courses. The four-year mathematics department taught one or more courses that were college-level, but below calculus, and also statistics. The statistics department taught a course that required previous statistical knowledge. Given the few responses, and large SEs, estimates of the percentage of departments offering MOOCs and the enrollments in MOOCs are not included in this report. That is, given the rarity of such MOOCs, a different sample might show a different distribution of courses and different statistics.

Beginning in 2010 the CBMS survey asked four-year departments to check each upper-level course offered in distance learning format. The numbers of departments reporting such courses were small in both 2010 and 2015, and our estimates are likely unreliable, but the data gathered are reported in Tables SP.11A and SP.11.B, and may be compared to the data reported in CBMS2010 Tables 13.A and 13.B, pp. 58-9. There appears to be some growth in upper-level statistics courses offered by statistics departments as distance learning courses. As distance learning courses become more common, these baseline data may be of some interest.

Tables SP.12-SP.14: Academic Resources Available to Undergraduates

Tables SP.12 and SP.13 present a spectrum of academic enrichment activities available in various kinds of mathematics and statistics departments at each level of department. In most cases, the availability of these options in fall 2015 was comparable to what was available in fall 2010; one exception is the reported increase in the estimated percentage

TABLE SP.10 Percentage of four-year mathematics and statistics departments, and public two-year college (TYC) programs, with courses offered in both distance and non-distance-learning formats, and comparison of various practices in the distance learning and the non-distance-learning formats, by type and level of department, in fall 2015. This table can be compared to Table SP.12 CBMS 2010 p. 57.

	Math				Stat			TYC
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total	
Some courses in both non-distance and distance-learning formats	91	94	90	91	85	100	88	na[1]
Of those with courses in both formats, the percentage where:								
Instructors hold comparable office hours on campus	71	52	57	59	64	83	68	na
Instructors participate in evaluation in same way	89	81	89	87	89	100	91	93
Same use of common exams as in face-to-face	52	64	58	58	44	50	45	67
Same course outlines as in face-to-face	94	91	95	94	85	100	88	97
Same course projects as in face-to-face	85	73	78	79	62	100	69	77
More course projects than in face-to-face	10	18	14	14	9		7	12

[1]See Tables TYE.3 and TYE.12.

of statistics departments that offer participation in statistics contests. Generally, the availability of these options increased as departments offered higher level degrees (e.g. honors sections were available at 69% (SE 5.2) of doctoral-level four-year mathematics departments, but only at 28% (SE 5.7) of the bachelors-level four-year departments). Special programs for women and minorities have increased at almost all levels of four-year mathematics and statistics departments. Two new additions to the CBMS survey questionnaire for four-year mathematics departments and statistics departments in 2015 were the opportunity to tutor, grade papers or TA in the department (offered at 17% (SE 2.9) of all four-year mathematics departments combined, and 75% (SE 2.5) of statistics departments (all levels combined), and the opportunity to participate in a supervised consulting lab with clients (available at 83% (SE 3.2) of four-year mathematics departments and 44% (SE 3.1) of statistics departments).

Another new question, added to the 2015 survey questionnaire, asked four-year mathematics and statistics departments to estimate the number of their majors who had participated in undergraduate research projects in the mathematical sciences, an internship in the mathematical sciences, or mathematical or statistical consulting to clients during September 1, 2014 - August 31, 2015. From these responses, estimates of the total number of undergraduate majors participating in these activities, broken down by level of department, appears in Table SP.14. The estimated total number for each activity is highest at the bachelors-level mathematics department, with the estimate of majors involved in undergraduate research projects at bachelors-level mathematics departments about four times as large as at doctoral-level mathematics departments (and more than 2 SEs above the doctoral-level department estimate). However, the SEs for the bachelors-level estimates of the numbers of majors involved in undergraduate research were 2,454, and, for internships were 1,726, making these particular estimates for bachelors-level departments unreliable.

As seen in Tables SP.12 and SP.13, fall 2015 saw increases in the percentages of two-year colleges offering various kinds of special mathematics opportunities to students. The largest changes were in the estimated percentage offering outreach in K-12 schools (up to 46% with SE 4 in 2015 from 32% in 2010), the estimated percentage offering special programs for women (up to 15% with SE 3 in 2015 from 6% in 2010) and the estimated percentage offering honors sections of courses for majors (up to 28% with SE 4 in 2015 from 20% in 2010); note that, in fall 2015, the estimated percentage of two-year college programs

TABLE SP.11.A Percentage of four-year mathematics departments offering various upper-level mathematics courses by distance learning, by department type, in fall 2015. This table can be compared to Table SP.13.A in CBMS2010 p. 58.

	Mathematics Departments			
	Univ (PhD)	Univ (MA)	College (BA)	Total
E23. Introduction to Proofs	2		3	2
E24-1. Modern Algebra I	2			0
E24-2. Modern Algebra II				
E25. Number Theory				
E26. Combinatorics				
E27. Actuarial Mathematics				
E28. Logic/Foundations (not E23)				
E29. Discrete Structures	1			0
E30. History of Mathematics	4		1	1
E31. Geometry	2			0
E32-1. Advanced Calculus I and/or Real Analysis I	1			0
E32-2. Advanced Calculus II and/or Real Analysis II				
E33. Advanced Mathematics for Engineering and Physical Sciences				
E34. Advanced Linear Algebra (beyond E17, E19)	2			0
E35. Vector Analysis				
E36. Advanced Differential Equations (beyond E18)				
E37. Partial Differential Equations				
E38. Numerical Analysis I and II		3		0
E39. Applied Mathematics (Modeling)		4		1
E409. Complex Variables		4	1	1
E41. Topology		4		1
E42. Mathematics of Finance (not E26, E38)				
E43. Codes and Cryptology				
E44. Biomathematics				
E45. Operations Research (all courses)			0	0
E46. Senior Seminar/ Independent Study in Mathematics				
E47. Other advanced-level mathematics		7	0	1
E48. Mathematics for Secondary School Teachers		7	1	1

Note: These estimates are based on small numbers and have large standard error. Blank entries represent courses with no responses while zero entries indicate percentages that round to 0%.

TABLE SP.11.B Percentage of four-year mathematics and statistics departments offering upper-level statistics courses by distance learning, by department type, in fall 2015. This table can be compared to Table SP.13.B in CBMS2010 p. 59.

	Mathematics Departments				Statistics Departments		
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total
E6. Introductory Probability and/or Statistics for Majors/Minors (no calculus prerequisite)	2	3	5	4	11	15	12
E7. Combined Probability & Statistics (calculus prerequisite)	2	3		1	4	17	7
E8. Probability (calculus prerequisite)	5	7	0	2		8	2
E9. Mathematical Statistics (calculus prerequisite)	3	7	0	2		8	2
E10. Stochastic Processes		3		0			
E11. Applied Statistical Analysis	2	3		1	6	8	7
E12. Data Science/Analytics	2	6		1	3	8	4
E13. Design & Analysis of Experiments	2	3	0	1	7	8	7
E14. Regression (and Correlation)	2	3		1	2		2
F15. Biostatistics		3		0	2		2
E16. Nonparametric Statistics		3		0			
E17. Categorical Data Analysis		3		0			
E18. Sample Survey Design & Analysis		3		0	2	8	3
E19. Statistical Computing and/or Software	2	3		1	4	8	5
E20. Bayesian Statistics	na	na	na	na			
E21. Statistical Consulting	na	na	na	na		8	2
E22. Senior Seminar/ Independent Studies		5		1			
E23. Other upper-level Probability & Statistics	2	5	0	1	2	15	6
E24. Other mathematical science courses	na	na	na	na		8	2

Note: These estimates are based on small numbers and have large standard error. Blank entries represent courses with no responses while zero entries indicate percentages that round to 0%.

TABLE SP.12 Percentage of mathematics and statistics departments in four-year colleges and universities, and of mathematics programs at public two-year colleges, that offer various kinds of special opportunities for undergraduates, by type of department, in fall 2015. (Fall 2010 data in parentheses.) This table can be compared to Table SP.14 in CBMS2010 p. 60.

Percentage with special opportunities for undergraduates	Honors sections of courses for majors %		Math or Stat club %		Special programs for women %		Special programs for minorities %		Math or Stat contests %		Special Math or Stat colloquia for undergrads &		Outreach in K–12 schools %	
Mathematics Departments														
Univ (PhD)	69	(70)	94	(91)	41	(31)	25	(21)	91	(93)	77	(82)	61	(71)
Univ (MA)	39	(40)	91	(96)	37	(21)	31	(21)	78	(82)	87	(88)	77	(75)
Coll (BA)	28	(15)	56	(75)	16	(16)	8	(12)	64	(62)	53	(51)	43	(40)
Total Mathematics Departments	35	(26)	67	(80)	22	(19)	14	(14)	70	(69)	61	(60)	50	(49)
Statistics Departments														
Univ (PhD)	38	(43)	55	(48)	18	(19)	13	(22)	56	(24)	70	(67)	18	(30)
Univ (MA)	50	(55)	18	(45)		(0)	8	(0)	45	(36)	42	(82)	42	(18)
Total Statistics Depts	41	(46)	46	(47)	14	(13)	12	(15)	54	(28)	63	(71)	24	(27)
Two-Year College Mathematics Programs	28	(20)	32	(31)	15	(6)	15	(11)	40	(41)	21	(16)	46	(32)

Note: 0 means less than one-half of 1%.

TABLE SP.13 Percentage of mathematics and statistics departments in four-year colleges and universities, and of mathematics programs in public two-year colleges, that offer various additional special opportunities for undergraduates, by type of department, in fall 2015. (Fall 2010 data, where available, in parentheses.) This table can be compared to Table SP.15, p. 61, of CBMS2010.

Percentage with additional opportunities for undergraduates	Undergrad. Research opportunity %		Indep. Studies opportunity %		Assigned advisors in dept. %		Senior thesis opportunity %		Math career day %		Graduate school advising %		Internship opportunity %		Senior seminar opportunity %		Consulting lab with clients %		Tutor, grade papers, or TA %
Mathematics Departments																			
Univ (PhD)	94	(96)	90	(96)	88	(90)	73	(63)	46	(40)	67	(67)	69	(50)	50	(47)	89		21
Univ (MA)	89	(91)	93	(100)	93	(100)	59	(56)	23	(46)	58	(70)	69	(67)	71	(66)	82		19
Coll (BA)	72	(83)	85	(94)	85	(90)	52	(58)	21	(17)	51	(46)	61	(55)	61	(59)	82		15
Total mathematics depts	77	(86)	87	(95)	86	(91)	56	(59)	25	(24)	55	(52)	63	(56)	60	(58)	83		17
Statistics Departments																			
Univ (PhD)	91	(85)	95	(90)	73	(89)	60	(54)	50	(30)	90	(66)	72	(69)	46	(30)	41	(32)	80
Univ (MA)	69	(82)	92	(100)	83	(73)	42	(27)	27	(45)	50	(64)	69	(91)	27	(27)	54	(55)	62
Total statistics depts	86	(84)	94	(93)	76	(84)	56	(46)	45	(35)	80	(66)	71	(75)	42	(29)	44	(39)	75
Two-Year College Mathematics Programs	17	(14)	41	(36)	49	(42)	na	na	na	na	na	na	na	na	na	na	na	na	na

offering honors sections of courses is the same as that for bachelors-level mathematics departments.

Table SP.15: Interdisciplinary Courses in Four-Year Mathematics Departments

CBMS2015 was also interested in the existence of interdisciplinary courses. Table SP.15 gives the estimated percentages of mathematics departments at four-year colleges and universities that offered various interdisciplinary courses in fall 2015, broken down by the level of the department. Across all levels of four-year mathematics departments combined, the most likely interdisciplinary courses to be taught were in mathematics and education (41%, with SE 4.3), mathematics and business or finance (35% with SE 3.9), and mathematics and computer science (31% with SE 4.7). Some interdisciplinary courses were more likely to be taught at doctoral-level departments (e.g. mathematics and biology was offered at an estimated 47% (SE 7.8) of doctoral-level departments, 36% (SE 7.7) of masters-level departments and 3% (SE 2.6) of bachelors-level departments). A different question regarding interdisciplinary courses was asked on the 2010 survey; in fall 2010, departments were asked about new interdisciplinary courses offered in the last five years (that data is in CBMS2010, Table SP.17, p. 53).

Tables SP.16 and SP.17: Dual Enrollments – College Credit for High School Courses

Dual enrollment courses were defined to be "courses conducted on a high school campus and taught by high school teachers, for which high school students may obtain high school credit and, simultaneously, college credit through your institution". This arrangement is not the same as obtaining college credit based on an AP or IB exam, or high school students enrolling in a course at a college. Dual enrollment is encouraged by many state governments as a way of utilizing statewide educational resources efficiently.

Table SP.16 gives the estimated number of dual enrollments in the courses College Algebra, Precalculus, Calculus I (Mainstream I and Non-Mainstream I, combined), Statistics and "Other" courses that were offered by four-year mathematics departments, two-year mathematics programs, and statistics departments in spring 2015 and fall 2015. In past CBMS surveys (see e.g. CBMS2010, Table SP.18, p. 65), these courses were offered predominately by mathematics programs at two-year colleges; in fall 2010, an estimated 61% of mathematics programs at two-year colleges, 17% of mathematics departments at four-year colleges and universities, and 8% of statistics departments offered dual enrollment courses; in fall 2015, the estimated percentage of four-year mathematics departments offering dual enrollment courses rose to 26% (SE 4.1) (the percentages of two-year colleges and statistics departments offering dual enrollment courses in 2015 were about comparable to percentages in 2010). However, the estimated enrollments in dual enrollment courses offered in 2015 by four-year mathematics departments increased dramatically over the number of dual enrollments estimated in 2010. The estimated enrollment in dual enrollment courses offered by mathematics departments in four-year colleges and universities in spring and fall (combined) 2010 was 42,862, with slightly more than half of the enrollments in the fall 2010; in 2015, the estimated number of enrollments had risen to 117,399, and, again, slightly more than half of the enrollments were in fall 2015. Mathematics programs in two-year colleges had an estimated total of 170,970 enrollments in spring and fall (combined) 2015 (compared to 158,097 enrollments in spring and fall (combined) 2010). In 2010, mathematics programs at two-year colleges had almost four times the estimated dual enrollments of mathematics departments at four-year colleges and universities, while in 2015, the estimated enrollments in four-year college dual enrollment courses were about 2/3 of the estimated enrollments in dual enrollment courses offered by two-year colleges. Statistics departments had a much smaller estimated number of dual enrollments, 1,478 in 2015, compared with 1,573 dual enrollments in 2010.

TABLE SP.14 Total number of majors (best estimate) who participated in various activities over Sept. 1, 2014, through Aug. 31, 2015.

Activity	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Undergraduate research project in the mathematical sciences	12168	2091	1733	8344	575	534	42
Internship in mathematical sciences	6031	1198	766	4068	714	680	34
Mathematical or statistical consulting to client	975	243	170	562	317	300	17

TABLE SP.15 Percentage of all four-year mathematics departments offering interdisciplinary courses, by type of department, in fall 2015.

	Univ (PhD)	Univ (MA)	Coll (BA)	All departments
Offered course in:	Offered course %	Offered course %	Offered course %	Offered course %
Mathematics and finance or business	46	44	31	35
Mathematics and biology	47	36	14	22
Mathematics and the study of the environment	16	8	3	6
Mathematics and engineering or the physical sciences	29	23	13	17
Mathematics and economics	15	11	9	10
Mathematics and social sciences other than economics	5	16	7	8
Mathematics and education	33	59	40	41
Mathematics and the humanities	8	9	14	13
Mathematics and computer science	27	41	30	31
Other	10	6	10	10

By Table SP.16, the percentage of two-year mathematics programs entering into dual enrollment agreements increased to 63% (SE 6.4) in 2015 from 61% in 2010. Large increases were reported in College Algebra and Statistics dual enrollments, with decreases in Precalculus, Calculus, and Other categories. Estimated dual enrollments in College Algebra for spring and fall combined increased to 90,460 in 2015 from 52,828 in 2010 (71% increase). Elementary Statistics dual enrollments for spring and fall combined increased to 18,983 in 2015 from 11,768 (61% increase). Precalculus dual enrollments in spring and fall combined decreased to 32,047 in 2015 from 43,778 in 2010 (21% decrease). Calculus I dual enrollments for spring and fall combined decreased to 10,954 in 2015 from 20,531 in 2010 (47% decrease). The "Other" course category dual enrollments for spring and fall combined decreased to 18,524 in 2015 from 29,192 in 2010 (37% decrease). In 2015, two-year mathematics programs estimated fall dual enrollments represented 16% of estimated College Algebra enrollments, 13% of Precalculus enrollments, 6% of Calculus I enrollments, and 3% of Elementary Statistics enrollments.

Table SP.16 gives the dual enrollments, broken down by course. The largest course estimated dual enrollments in both four and two-year mathematics departments in fall and spring 2015 (combined) occurred in College Algebra. Estimated enrollments in dual enrollment courses in four-year mathematics departments showed large gains across all courses: estimated dual enrollments in College Algebra rose from about 17,000 in 2010 (fall and spring combined) to almost 46,000 in 2015, estimated dual enrollments in Precalculus rose from about 5,000 in 2010 to over 30,000 in 2015, estimated dual enrollments in Calculus I rose from about 10,000 in 2010 to about 20,000 in 2015, estimated dual enrollments in Statistics rose from about 6,000 in 2010 to about 7,000 in 2015, and estimated dual enrollments in "Other" rose from about 4,900 in 2010 to about 13,000 in 2015. Dual enrollments represent a growing percentage of total enrollments in four-year mathematics departments; for example, dual enrollments in College Algebra were about 18% of other College Algebra enrollments at four-year mathematics departments in 2015, and about 7% in 2010. It also should be noted that the SEs on the individual dual enrollments are large; for example, the SE on the number of dual enrollments in College Algebra at four-year mathematics departments in fall 2015 is about 8,400 enrollments. However, it seems clear from the data that four-year colleges' dual enrollments have increased over previous CBMS surveys, and that dual enrollment courses are no longer confined primarily to two-year colleges.

There has been some concern about the degree of quality control exercised by the department through which college-level credit for the courses is awarded. The lower portion of Table SP.16 gives the estimated percentages of departments offering dual enrollment courses that require teaching evaluations. That percentage increased at two-year colleges from 48% in 2010 to 72% in 2015. Only an estimated 34% (SE 7.2) of four-year mathematics departments offering dual enrollment courses in 2015 required teaching evaluations for the instructors, compared to an estimated 40% in 2010. In earlier CBMS surveys other questions related to the control of the quality of dual enrollment courses by the credit granting department were asked; these questions were not repeated in 2015.

The increase in required teaching evaluations at mathematics programs in two-year colleges mentioned in the preceding paragraph may be a response to a concern at two-year colleges regarding dual enrollment courses as reported in Tables TYF.24 and TYF.25. Among all survey respondents (including respondents from two-year colleges that do not have dual enrollment arrangements), in fall 2015, an estimated 7% (SE 3) of mathematics program heads in two-year colleges saw dual enrollment courses as a "major problem" in 2015 (11% in 2010). Another 36% (SE 5) found dual enrollment arrangements "somewhat of a problem" in 2015, up 20 points from 2010.

Table SP.17 examines the practice of colleges and universities sending their own faculty members into high schools to teach courses that grant both high school and college credit; this differs from dual enrollment courses where the instructor is a high school teacher. The number of students involved in these courses has been smaller than the enrollment in dual enrollment courses. However, these programs have grown from 2005 to 2015 at two-year colleges, but, in fall 2015, involved only a small number of four-year departments. In fall 2010, an estimated 22% of two-year and 4% of four-year mathematics departments assigned and paid their own faculty to teach courses in a high school that awarded both high school and college credit. In fall 2015, this estimated percentage was 6% (SE 1.8) at four-year mathematics departments and had doubled to 44% (SE 6.5) at two-year mathematics programs. A two-year college faculty member teaching a dual enrollment course usually was classified as a part-time faculty member at the two-year college that awarded college credit for the course, even though the salary was paid completely by a third party, e.g., the local school district. The 2015 estimate of the number of students enrolled in courses where the two-year college assigned their own faculty members to teach the courses is not displayed in Table SP.17, since it cannot be reliably estimated from the 2015 data because there was one large outlier that increased the SE (and the estimate) significantly. These direct-pay faculty members at two-year colleges were reported in 2010 to have taught 6,358 students, and the 2015 data indicates this number is much larger (perhaps about 30,000) in 2015. The estimated enrollment in four-year mathematics departments, in fall 2015, was 4,014 (about the same as in 2010), with the large SE of 1,649, and no four-year statistics departments reported being involved in this practice.

Table SP.18 and SP.19: Curricular Requirements of Mathematics and Statistics Majors in Four-Year Departments

Requirements for a major in mathematics have become more flexible, as can be seen, for example, in the MAA's Committee on Undergraduate Programs in Mathematics (CUPM) recommendations on requirements for the mathematics major. Departments seem to have more tracks (sets of graduation requirements) and more flexible requirements for mathematics majors. The CBMS 2005 and 2010 surveys asked about these requirements, and some of these questions were repeated in the 2015 survey. Table SP.18 summarizes data from four-year mathematics departments on whether each course option was required in all their majors, required in some but not all of their majors, or required in none of their majors; these numbers are broken down by the level of the department. Table SP.18 can be compared to CBMS2010 Table SP.20, p. 67.

Table SP.18 shows that in fall 2015 (as in fall 2010) the requirement selected most frequently by four-year mathematics departments as being required for all mathematics majors was "at least one computer science course" (required for all majors by more than an estimated 60% of departments at all levels (with SEs of 6-7)); the estimated percentage of four-year mathematics departments requiring a statistics course for all majors decreased at the doctoral and the masters-levels of mathematics departments from fall 2010 to fall 2015 (at the bachelors-level departments, it increased from 32% in 2005, to 55% in 2010, to 59% (SE 5.4) in 2015). The requirement that all

TABLE SP.16 Percentage of departments offering dual-enrollment courses taught in high school by high school (HS) teachers, enrollments in various dual-enrollment courses in spring 2015 and fall 2015 compared to total of all other enrollments in fall 2015, and (among departments with dual-enrollment programs) percentage of departments requiring teacher evaluations, by type of department. (Fall 2010 data in parentheses.) The comparable data in the CBMS2010 report is in Table SP.18 p. 65.

	Four-year Mathematics			Two-year Mathematics			Four-year Statistics		
Percentage of departments with dual-enrollment courses	26% (17%)			63% (61%)			12% (8%)		
Number of dual enrollments in:	Dual Enrollments		Other enrollments	Dual enrollments		Other enrollments	Dual enrollments		Other enrollments
	spring 2015	fall 2015	fall 2015	spring 2015	fall 2015	fall 2015	spring 2015	fall 2015	fall 2015
College algebra	15534	30310	255416	32937	57523	292138	na	na	na
Precalculus	15090	15702	122302	18869	13178	87014	na	na	na
Calculus I [1]	6329	14480	344988	4596	6358	91993	na	na	na
Statistics	3866	3292	226441	11919	7064	251279	299	1179	89756
Other courses	8016	4780	na	8478	10046	na	na	na	na
Departmental teaching evaluations required in dual-enrollment courses	34% (40%)			72% (48%)			26% (0%)		

[1]The question on dual enrollments did not differentiate between mainstream and non-mainstream calculus. To provide comparable data, the column for “Other enrollments” also combines mainstream and non-mainstream calculus even though separate statistics are shown elsewhere in this report.

TABLE SP.17 Percentage of departments in four-year colleges and universities and in public two-year colleges that assign their own full-time or part-time faculty members to teach, in high school, courses that award both high school and college credit, and number of students enrolled, in fall 2015. (Fall 2010 data in parentheses.) This table was Table SP.19 in CBMS2010.

	Four-year Mathematics Departments	Two-year Mathematics Departments	Statistics Departments
Assign their own members to teach dual-enrollment courses (90)	6 (4)	44 (22)	 (0)
Number of students enrolled	4014 (3,932)	* (6,358)	0

*The estimate of 36,368 from the data shows very large standard errors. The only clear finding is that there has been a large increase in this practice, but not necessarily as large as the estimate indicates.

majors take at least one applied mathematics course (beyond calculus) increased at all levels of mathematics departments from 2010 to 2015. Comparable data from 2010 is in CBMS2010 Table SP.20, p. 67, and for 2005 is in CBMS2005 Table SP.20 p. 67.

Historically, Modern Algebra and Real Analysis were considered required courses for all mathematics majors; for example, in the 1990 CBMS survey report, Table D.2 p. 62, showed that Modern Algebra was required for the major at 56% of doctoral-level departments, 70% of masters-level departments, and 78% of bachelors-level departments (in 2015 Table SP. 18 shows that the corresponding percentages were 34%, 34%, and 54%), while in 1990, Real Analysis/Advanced Calculus was required at 70% of doctoral-level departments, 66% of masters-level departments, and 65% of bachelors-level departments (in 2015 Table SP.18 shows that the corresponding percentages were 31%, 49%, and 36%), Table SP.18 shows that at all levels of departments, the estimated percentage of departments requiring Modern Algebra, and the estimated percentage requiring Real Analysis, in all majors, were about the same, or decreased, from 2010 to 2015, while the estimated percentage of departments requiring of all majors either Modern Algebra or Real Analysis (major can choose either) increased at all levels of departments. Of these two courses, Modern Algebra I was a more popular required course at bachelors-level departments (required for all majors at an estimated 54% (SE 8.5) of bachelors-level departments in 2015 (down from 62% in 2010). At the bachelors-level departments, an estimated 41% (SE 6.3) of departments did not require Real Analysis in any major in 2015 (up from 36% in 2010).

Some departments found ways to create more depth in their mathematics major, without requiring particular mathematics courses. In doctoral-level departments, beyond the required computer science course, the requirement most often cited for all majors was the requirement that the major take a one-year sequence (required for all majors by an estimated 48% (SE 8) of all doctoral-level departments); at the masters (respectively, bachelors) level departments, a capstone experience (e.g. a senior project, thesis, seminar, internship) was required for all majors by an estimated 68% (SE 8) (respectively, 76% (SE 4.5)) of all departments.

Table SP.19.A and Table SP.19.B examine the estimated percentages of departments that had various options that were required in all majors, required in some majors, and not required in any major for an undergraduate statistics majors; Table SP.19.A summarizes these percentages for the degrees in statistics awarded by mathematics departments, and Table SP.19.B examines the requirements for the degrees awarded by statistics departments. Table SP.19.A appears for the first time in a CBMS survey, and Table SP.19.B can be compared to CBMS2010, Table SP.21, p. 68.

According to Tables SP.19A and B, the requirements for undergraduate statistics degrees awarded by mathematics and statistics departments in fall 2015 were relatively similar. As might be expected, in mathematics departments it was slightly more likely that mathematics courses (Multivariable Calculus, Linear Algebra, an applied mathematics course, Mathematical Statistics) and also a Probability course were required of all statistics majors than in statistics departments, while statistics departments were more likely to require a course in Linear Models and Computer Science of all majors than were mathematics departments. In fall 2015, a larger estimated percentage of mathematics departments required an applied statistics course for all majors (74% (SE 9.8) of

TABLE SP.18 Percentage of four-year mathematics departments requiring certain courses (or exit exam) in all, some, or none of their majors, by type of department, in fall 2015. These percentages can be compared to Table SP.20 in CBMS2010 p. 67.

	Required in all majors			Required in some but not all majors			Not required in any major		
Mathematics Department Requirements	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %	College (BA) %
Modern Algebra I	34	34	54	40	62	27	26	4	19
Real Analysis I	31	49	36	49	45	23	20	6	41
Modern Algebra I or Real Analysis I (major may choose either to fulfill this requirement)	21	33	24	23	27	14	56	40	62
A one-year upper-level sequence	48	26	28	19	43	6	33	31	66
At least one computer science course	55	67	69	19	13	6	26	20	25
At least one statistics course	31	46	59	37	47	8	32	8	34
At least one applied mathematics course beyond course E21	32	36	43	47	40	16	21	24	41
A capstone experience (senior project, thesis, seminar, internship)	32	68	76	27	17	5	41	15	19
An exit exam (written or oral)	3	10	31	3	15	2	94	75	67

TABLE SP.19A Percentage of mathematics departments that offer a major in statistics requiring certain courses (or exit exam) in all, some, or none of their majors, by type of department, in fall 2015.

	Required in all majors			Required in some but not all majors			Not required in any major		
Percentage of statistics departments that require:	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %	College (BA) %
(a) Calculus I	100	100	91			9			
(b) Calculus II	100	100	83			17			
(c) Multivariable Calculus	100	100	67			17			16
(d) Linear algebra/Matrix theory	92	100	83	6		17	2		
(e) At least one Computer Science course	60	85	67	8	7	33	32	7	
(f) At least one applied mathematics course, not incl. (a), (b), (c), (d)	42	47		8		16	49	53	84
(g) A capstone experience (e.g., a senior thesis or project, seminar, or internship)	16	100	83	18			66		17
(h) An exit exam (oral or written)			9	8			92	100	91
(i) One Probability Course	100	75	83		7	9		18	9
(j) One Mathematical Statistics Course	100	85	50		15	17			33
(k) One applied statistics course	74	85	75	8	15	25	18		
(l) One Linear Models Course	29	43	67	8	57	9	62		25
(m) One Bayesian Inference Course	7	19		8	8	25	84	73	75

TABLE SP.19.B Percentage of statistics departments requiring certain courses (or exit exam) in all, some, or none of their majors, by type of department, in fall 2015. This table can be compared to Table SP.21 in CBMS2010 p. 68.

	Required in all majors		Required in some but not all majors		Not required in any major	
Percentage of statistics departments that require:	Univ (PhD) %	Univ (MA) %	Univ (PhD) %	Univ (MA) %	Univ (PhD) %	Univ (MA) %
(a) Calculus I	97	83	3	17		
(b) Calculus II	97	83	3	17		
(c) Multivariable Calculus	88	50	5	33	8	17
(d) Linear algebra/Matrix theory	86	50	11	33	3	17
(e) At least one Computer Science course	86	67	6	17	7	17
(f) At least one applied mathematics course, not incl. (a), (b), (c), (d)	23	33	28		49	67
(g) A capstone experience (e.g., a senior thesis or project, seminar, or internship)	35	17	14	17	51	67
(h) An exit exam (oral or written)	2		6	17	92	83
(i) One Probability Course	75	50	11	17	13	33
(j) One Mathematical Statistics Course	89	33	8	33	3	33
(k) One applied statistics course	79	50	19	50	2	
(l) One Linear Models Course	60	17	9		31	83
(m) One Bayesian Inference Course	11	17	15		74	83

TABLE SP.20 Percentage of mathematics departments offering various upper-division mathematics courses at least once in the two-academic years 2014-2016 and 2015-2016, plus historical data on the two year period 2009-2011, by type of department. The table can be compared to Table SP.23 in CBMS2010 p. 70.

		Academic Years 2014-2015 & 2015-2016			
Upper-level mathematics courses	All Math Depts 2009-2011 %	All Math Depts 2014-2016 %	PhD Math %	MA Math %	BA Math %
Modern Algebra I	80	78	81	89	75
Modern Algebra II	27	27	57	48	17
Number Theory	51	37	59	65	27
Combinatorics	27	22	39	45	15
Actuarial Mathematics	13	21	38	40	14
Foundations/Logic	11	12	15	19	10
Discrete Structures	30	21	20	27	20
History of Mathematics	49	47	58	66	41
Geometry	74	71	79	77	68
Math for Secondary Teachers	35	33	45	59	26
Adv Calculus/ Real Analysis I	79	72	84	95	65
Adv Calculus/Real Analysis II	31	31	78	49	17
Adv Mathematics for Engineering/Physics	12	12	36	16	5
Advanced Linear Algebra	23	22	56	54	8
Introduction to Proofs	57	56	65	76	50

TABLE SP.20 (continued) Percentage of mathematics departments offering various upper-division mathematics courses at least once in the two academic years 2014-2015 and 2015-2016, plus historical data on the two-year period 2009-2011, by type of department. The table can be compared to Table SP.23 in CBMS2010 p. 71.

		Academic Years 2013-2014 & 2015-2016			
Upper-level math courses, continued	All Math Depts 2009-2011 %	All Math Depts 2014-2016 %	PhD Math %	MA Math %	BA Math %
Vector Analysis	11	11	32	9	7
Advanced Differential Equations	16	16	58	23	5
Partial Differential Equations	26	29	71	61	14
Numerical Analysis I and II	42	43	66	74	33
Applied Math/Modeling	37	36	45	53	31
Complex Variables	44	43	64	55	36
Topology	25	28	51	53	18
Mathematics of Finance	12	13	35	23	7
Codes & Cryptology	11	11	19	18	8
Biomathematics	12	8	26	10	4
Operations Research	17	18	15	35	16
Math senior seminar/Ind study	65	66	63	81	65
All other advanced-level mathematics	25	25	34	47	19

doctoral-level, 85% (SE 11.5) of masters-level, and 75% (SE 19) of bachelors-level mathematics departments) than did the masters-level statistics departments (50% (SE 10.9)). A larger estimated percentage of doctoral-level statistics departments (35% (SE 4)) required a capstone experience of all majors than did doctoral-level mathematics departments (16% (SE 8)), but an estimated 100% (respectively, 83% (SE 12)) of masters (respectively, bachelors)-level mathematics departments required a capstone experience of all statistics majors.

Comparing Table SP.21 from 2010 to Table SP.19.B from 2015, we see that among doctoral-level statistics departments, a larger estimated percentage of departments required Multivariable Calculus, Linear Algebra, Computer Science, and Mathematical Statistics of all majors in 2015 than in 2010. The estimated percentage of doctoral-level statistics departments requiring a Bayesian Inference course, while still small, increased slightly in 2015 over 2010. The option of a course in applied statistics as a requirement in all majors was a new option in the 2015 CBMS survey, and, in fall 2015, an applied statistics courses was required of all majors in an estimated 79% (SE 2.7) of doctoral-level statistics departments and 50% (SE 10.9) of masters-level statistics departments.

Tables SP.20 and SP.21: Availability of Upper-level Courses in Mathematics and Statistics

Concerns about the availability of upper-level courses in mathematics and statistics led to questions on the CBMS surveys. Generally, the availability of upper-level mathematics courses was slightly less in 2014-16 than in 2009-11, and the availability of upper-level statistics courses in statistics departments was greater than in 2014-16 than in 2009-11. As noted in Chapter 1 Table S.2 (and will be seen in more detail in Chapter 3 Table E.3), estimated enrollments in upper-level courses were up (particularly in statistics courses) in fall 2015 over fall 2010.

Table SP.20 examines the availability of many upper-division mathematics courses offered in four-year mathematics departments at least once during the two academic years 2014-2015 and 2015-2016 (and the comparison to 2009-11), and Table SP.21 examines the same question for upper-division statistics courses offered in four-year mathematics and statistics departments; both tables are broken down by level of department. These tables can be compared to the CBMS2010 Tables SP.23 and SP.24, pages 70-72. For mathematics courses, Table SP.20 shows that over all mathematics departments combined, the percentages of departments offering specific upper-division courses in 2014-2016 were less, but only slightly less, than the percentages in 2009-11 for almost every course; two noticeable exceptions were Number Theory, which was available at an estimated 51% of mathematics departments in 2009-2011 and at only an estimated 37% (SE 4.2) of departments in 2014-16, and Actuarial Mathematics, which was available at an estimated 13% of mathematics departments in 2009-11 and at an estimated 21% (SE 2.6) of departments in 2014-16 (and the estimated percentage of mathematics departments that offered Actuarial Mathematics increased at each level of department from 2009-11 to 2014-16). While there were differences in individual course percentages, the trends in 2014-16 over 2009-11 were about the same over all levels of mathematics departments. With the exception of Mathematics for Secondary Teachers and Mathematics for Engineering/Physics, all the estimated percentages of mathematics departments that offered a given course in 2014-16 were above the corresponding estimated percentages ten years ago (2004-6), and these changes are most notable at the bachelors-level departments; for example, in the 2005 survey report (CBMS2005, Table SP.22, p. 70) an estimated 52% of bachelors-level departments offered Modern Algebra I in 2004-6, while an estimated 75% (SE 4.6) of bachelors-level departments offered it in 2014-16. Similarly, an estimated 57% of bachelors-level departments offered Real Analysis I in 2004-6, while an estimated 65% (SE 4.8) offered it in 2014-16. However, both Modern Algebra II (offered at an estimated 15% of bachelors-level departments in 2004-6 and 17% of bachelors-level departments in 2014-16) and Real Analysis II (offered at 17% of bachelors-level departments in both 2004-6 and 2014-16) were offered at roughly the same low percentages in 2004-6 and in 2014-16 (for comparison, at doctoral-level departments, in 2014-16, Modern Algebra II was offered at an estimated 84% (SE 6.4) of departments, and Real Analysis II was offered at an estimated 78% (SE 6.2) of departments).

It is interesting to compare the availability of upper-level mathematics classes in 2014-16 to the reported availability in much earlier CBMS surveys. For example, Table SE 5 p. 10, of the CBMS1995 report presents the reported availability of a smaller list of upper-level mathematics courses in 1984-86, 1989-91, and 1995-96 (the latter only a one-year window). The percentages for the courses listed are roughly comparable to those reported in 2014-16, with the exception of Topology, offered by 35% of all departments (combined) in 1989-91 and 50% of all departments in 1995-96 (compared to 25% in 2014-16), and Foundations of Mathematics, offered by 22% of all departments in 1998-91 and 24% of all departments in 1995-96 (compared to 11% in 2014-16).

Table SP.21 examines the analogous question for statistics courses offered in mathematics departments and in statistics departments, providing data for the academic years 2009-11 and 2014-16. The list

TABLE SP.21 Percentage of mathematics and statistics departments offering various undergraduate statistics courses at least once in two academic years 2009-2010 and 2010-2011 and at least once in the two academic years 2014-2015 and 2015-2016, by type of department. This table can be compared to Table SP.24 in CBMS2010 p. 72.

		AY 2014-15 & 2015-16					AY 2014-15 & 2015-16		
Upper-level statistics courses	All Math Depts 2009-2011 %	All Math Depts %	PhD Math %	MA Math %	BA Math %	All Stat Depts 2009-2011 %	All Stat Depts %	PhD Stat %	MA Stat %
Introductory Probability and/or Statistics	na	18	14	28	16	na	48	54	31
Mathematical Statistics	42	34	47	42	30	78	73	82	46
Probability	37	37	53	41	32	63	70	77	46
Combined Probability and Statistics	26	32	33	45	30	37	48	48	46
Stochastic Processes	9	12	26	25	6	37	49	55	31
Applied Statistical Analysis	13	12	19	29	7	50	46	46	46
Experimental Design	10	9	13	26	5	51	59	58	62
Regression & Correlation	11	15	19	38	10	71	78	84	62
Biostatistics	4	7	11	9	6	27	36	40	23
Nonparametric Statistics	5	6	9	14	4	30	44	46	38
Categorical Data Analysis	1	4	8	11	2	31	30	35	15
Sample Survey Design	2	4	6	13	2	41	50	56	31
Stat Software & Computing	5	11	17	23	8	35/41*	62	64	54
Data Science	na	7	11	17	5	na	36	38	31
Bayesian Statistics	na	na	na	na	na	36	47	55	23
Statistical Consulting	na	na	na	na	na	29	34	38	23
Senior Seminar/ Independent Study	12	9	13	20	6	44	56	59	46

Note: 0 means less than one-half of one percent.

*In 2010, this appeared as two separate items in the statistics questionnaire, with 41 percent reporting courses in statistical computing and 35 percent reporting courses in statistical software.

TABLE SP.22 Departmental estimates of the percentage of graduating mathematics or statistics majors from academic year 2014-2015 who had various post-graduation plans, by type of department, in fall 2015. (Data from fall 2010 in parentheses.)

	Mathematics Departments			Statistics Departments	
Departmental estimates of post-college plans	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %
Students who went into pre-college teaching	12 (13)	25 (48)	26 (27)	1 (1)	1 (1)
Students who went to graduate school in the mathematical or statistical sciences	11 (15)	13 (12)	12 (17)	17 (23)	10 (29)
Students who went to graduate or professional school outside of mathematics/statistics	8 (10)	4 (4)	7 (8)	10 (5)	1 (5)
Students who took jobs in business, government, etc.	27 (27)	19 (19)	34 (30)	34 (41)	20 (45)
Students who had other plans known to the department	3 (5)	3 (3)	4 (4)	3 (2)	0 (3)
Students whose plans are not known to the department	40 (30)	36 (14)	16 (13)	36 (29)	68 (18)

TABLE SP.23 Percentage of four-year mathematics and statistics departments undertaking various assessment activities during the last six years, by type of department, in fall 2015. (Data from fall 2010 when known in parentheses.)

	Four-year Mathematics Departments			Statistics Departments	
Percentage using various assessment tools	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %
Consult outside reviewers	36 (53)	57 (48)	40 (31)	44 (42)	42 (80)
Survey program graduates	67 (71)	83 (80)	59 (71)	70 (63)	67 (70)
Consult other departments	44 (54)	42 (45)	38 (26)	46 (47)	17 (60)
Study data on students' progress in later courses	63 (62)	77 (65)	62 (55)	21 (41)	33 (40)
Assessed teaching objectives	78	81	85	98	67
Evaluate placement system	72 (72)	52 (51)	57 (60)	18 (12)	25 (30)
Change undergraduate program due to assessment	80 (78)	76 (76)	70 (69)	76 (61)	75 (80)

of statistics courses was revised in 2010, increasing the number of upper-divisional statistics offerings for undergraduates that could be reported in statistics departments, and a few changes were made to the list of statistics course options in mathematics and statistics departments in the 2015 survey. Generally, the estimated percentages of statistics departments offering each upper-level course was up slightly in 2014-16 from 2009-11; for example, in 2009-11, an estimated 30% of statistics departments offered a course in nonparametric statistics, while this percentage increased to 44% (SE 3.1) in 2014-16. However, many of the percentages were larger in 2000-2001 than in 2014-16; for example, by CBMS2000 Table SP.23, p. 72, in 2000-1 (a one-year period) Applied Statistical Analysis was offered at 70% of statistics departments, while in 2014-16 (a two-year period) it was offered at 50% (SE 3.2) of statistics departments. Estimated percentages of mathematics departments offering various upper-level statistics courses in 2014-16 were roughly comparable to the estimated percentages in 2009-11, and these percentages were smaller than in statistics departments; for example, an estimated 6% (SE 1.2) of mathematics departments offered a course in nonparametric statistics in 2014-16 (the estimated percentage was 5% for 2009-2011). Over the past fifteen years, the offering of Mathematical Statistics has decreased: in the 2000 survey it was offered by an estimated 52% of mathematics departments and an estimated 90% of statistics departments in the one-year period (2000-1), but, in 2014-16 (a two-year period), it was offered by an estimated 34% (SE 4.3) of mathematics departments and 73% (SE 2.6) of statistics departments (both estimated percentages slightly less than in 2009-11).

Table SP.22: Estimates of Post-Graduation Plans of Graduates of Four-Year Mathematics Departments and Statistics Departments

Table SP.22 presents estimates from four-year mathematics departments and statistics departments of the post-graduation plans of their 2014-2015 graduating undergraduate majors, broken down by the level of department. Departments do not know the post-graduation plans of many of their majors, and, in fact, the estimated percentages of students with unknown post-graduation plans rose among all levels of four-year mathematics and statistics departments from 2009-10 graduates to 2014-15 graduates. The estimated percentage of 2014-15 graduates with post-graduation plans unknown to the department was estimated at 40% (SE 4) among doctoral-level mathematics departments, 36% (SE 9.7) among masters-level mathematics departments, and 18% (SE 2) among bachelors-level mathematics departments; among statistics departments, these estimated percentages were 38% (SE 2.8) among doctoral-level statistics departments (up from 29% in 2009-10 graduates) and 68% (SE 11.3) among masters-level statistics departments (up from 18% of 2009-10 graduates). Given the large percentages of students whose plans were unknown, the plans of the 2014-15 graduates known to the department were roughly comparable to the plans of the 2009-10 graduates, and the plans of the 2014-15 mathematics graduates were roughly similar to the plans of the 2014-15 statistics graduates, except for the small percentage of statistics graduates entering pre-college teaching. Among students whose plans were known to the department, at doctoral (respectively, bachelors) level mathematics departments, the largest estimated percentage 27% (SE 2.7) (respectively, 34% (SE 3)) of 2014-15 graduates took jobs in business, government, etc., and among masters-level mathematics departments, the largest estimated percentage of students (25% (SE 4.7) of 2014-15 graduates, down from 48% of 2009-10 graduates), accepted jobs in pre-college teaching. Among statistics departments, the largest estimated percentage of students whose plans were known took jobs in business, government, etc. (34% (SE 2) at doctoral-level statistics departments and 20% (SE 7.4) at masters-level departments). The estimated percentage of 2014-15 graduates of statistics departments known to go on to graduate study in the statistical sciences was down from the estimated percentage of 2009-10 graduates at both the doctoral and the masters-level statistics departments, but was comparable to the percentages of graduates from mathematics departments that went on to graduate study in the mathematical sciences (these estimates were about the same as the estimates made for 2009-10 graduates). The estimated percentages of 2014-15 graduates of mathematics departments who went into pre-college teaching was slightly down for graduates of all three levels of mathematics departments, and remained estimated at 1% of statistics department graduates.

Table SP.23: Assessment Activities in Four-Year Mathematics Departments and Statistics Departments

State governments, national accrediting agencies, and professional organizations such as the Mathematical Association of America have placed great emphasis on department assessment activities. Beginning with the 2005 CBMS survey, four-year mathematics and statistics departments were asked to identify which of a list of assessment activities they had performed over the last six years. This question was repeated in the 2010 and 2015 CBMS surveys; a summary of the responses to the 2010 and 2015 surveys can be found in Table SP.23. The results obtained in fall 2015 were roughly comparable to those reported in fall 2010. The estimated percentage of doctoral-level mathematics departments that had consulted with outside reviewers dropped from an estimated 53% in 2010 to 36% (SE 6.7) in 2015. The percentage of bachelors-level mathematics departments that had surveyed program graduates dropped from an estimated 71% in 2010 to 59% (SE 5.4) in 2015. The percentage of doctoral-level statistics departments that had studied data on students' progress in later courses dropped from 41% in 2010 to 21% (SE 2.7) in 2015 (compared to 63% (SE 6.4) of doctoral-level mathematics departments). An additional option, added to the 2015 CBMS survey questionnaire, asked about assessment of teaching objectives, which, according to Table SP.23, was reportedly performed at more than an estimated 78% (SEs 3-8) of all the mathematics departments, 98% (SE 0.5) of the doctoral-level statistics departments, and 67% (SE 7) of the masters-level statistics departments. For all levels of mathematics and statistics departments, over 70% (SEs 3-7) said that their assessment activities had resulted in changes to their undergraduate programs.

Table SP.24: Institutional or Divisional Graduation Requirements Satisfied by Advanced Placement Courses in Four-Year Mathematics and Statistics Departments

In 2015 the CBMS survey asked four-year mathematics and statistics departments whether advanced placement courses (taken when in high school) could be used to meet their institution's mathematical sciences divisional graduation requirements. Across all levels of mathematics and statistics departments, in fall 2015, the estimated percentage of departments that reported that these courses did meet divisional graduation requirements was at least 83% (with SEs of 2-3, except at masters-level mathematics departments, where the SE was 7.8).

Tables SP.25-SP.27: Pedagogical Methods and Making Changes at Four-Year Mathematics and Statistics Departments

The 2015 CBMS survey included several new questions asking about pedagogical methods used in mathematics and statistics departments. In asking department chairs to comment on pedagogical methods used in their department, it is useful to determine what information was available to them. Table SP.25 summarizes the information on teaching that was collected in four-year mathematics and statistics departments in fall 2015. The data show that almost all four-year mathematics and statistics departments collected course syllabi, few (an estimated 16% (SE 2.4)) of all mathematics departments combined collected teaching portfolios, but an estimated 36% (SE 2.9) of all statistics departments reported collecting teaching portfolios. Peer evaluation of teaching was done at an estimated 64% of all levels of mathematics departments combined, and all levels of statistics departments combined (the SE for mathematics departments was 3.5, and the SE for statistics departments was 3). Self-evaluation was available less often, and primarily at masters-level mathematics and statistics departments, and at bachelors-level mathematics departments. Departmental discussions of teaching methods were held at about 2/3 of mathematics and statistics departments, across all levels of departments (SE was 5 for all levels of mathematics departments combined, and SE was 2.8 for all levels of statistics departments combined).

Four-year mathematics and statistics departments were asked if each in a list of teaching strategies was used by some member of their department; Table SP.26 presents a summary of the responses, broken down by level of department. No definitions of these strategies were given in the instrument, allowing for broad interpretation of what constitutes "inquiry based learning" (generally regarded as a strategy aimed at promoting active learning that starts by posing questions, rather than presenting established facts) or "flipped classrooms" (typically where the instructional content is delivered outside of the classroom, and class sessions are devoted to activities that might otherwise be done as homework). At least 50% of most levels of mathematics and statistics departments reported that a member of their faculty was using inquiry based learning in a class. In mathematics, across all levels of departments, flipped classrooms were used by someone at more than 50% of the departments, at each level of mathematics departments; flipped classrooms were used less frequently (estimated at 39% (SE 2.9)) across both levels of statistics departments combined. At least one faculty member taught a class largely online in almost 50% of mathematics and statistics departments, except at bachelors-level mathematics departments, where the percentage was estimated at 33% (SE 7.2). Activity based learning was used at an estimated 66% (SE 5.3) of all mathematics departments combined, and 77% (SE 2.7) of all statistics departments combined. Technology was used to develop conceptual understanding at an estimated 86% (SE 3) of all mathematics departments and 84% (SE 3) of all statistics departments. The survey questions did not address how many individual faculty members were using each of these methods (a more difficult question for a chair to answer) but this data shows that these pedagogical methods are represented by at least one faculty member at most mathematics and statistics departments.

Four-year mathematics and statistics departments were asked if the department had experienced major change in the types of pedagogy used in the depart-

TABLE SP.24 Percentage of mathematics and statistics departments that allow a student to meet an institutional or divisional graduation requirement using an advanced placement course.

Meets requirement	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Yes (%)	88	97	83	87	86	84	92
No (%)	12	3	17	13	14	16	8

TABLE SP.25 Percentage of four-year mathematics and statistics departments reporting that various items are significant sources of information to the department about the types of pedagogy used.

Activity	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Syllabi for classes	87	95	96	84	98	98	100
Teaching portfolios	16	23	28	12	36	35	42
Peer evaluation of instructors	64	78	74	60	64	60	75
Self-evaluation of instructors	51	28	47	57	29	22	50
Department discussions of teaching practices	69	66	64	71	73	68	92
None of these are available	2	2	3	1			

ment during last 10 years, and an estimated 60% of mathematics departments and 80% of statistics departments reported that it had (see Table SP.27). Of those departments experiencing change, respondents were asked to attribute the change to any of a list of factors (they could check all that applied), and Table SP.27 summarizes the responses. The overwhelming factor, cited by 91% (SE 3.2) of mathematics departments combined and 88% (SE 2.4) of the statistics departments combined, was the advocacy of some member of their faculty. Educational research was the next most cited factor, noted by an estimated 61% (SE 5.7) of the mathematics departments combined and 49% (SE 3.6) of the statistics departments combined. Advocacy by the institution's administration was cited by an estimated 47% (SE 3.5) of the statistics departments combined and 37% (SE 4.7) of the mathematics departments combined, and advocacy by a professional organization was cited by 39% (SE 4.5) of the mathematics departments combined and 38% (SE 3.5) of the statistics departments combined. Advocacy by another department was cited by 16% of both the mathematics departments combined (where the SE was 4.5) and the statistics departments combined (where the SE was 2.5).

Table SP.28: Statistics Minors and Majors in Four-Year Mathematics Departments

A new set of questions in the 2015 CBMS survey dealt with statistics minors and majors in mathematics departments; the responses to these questions are summarized in Table SP.28. By Table SP.28, in fall 2015, the estimated percentage of mathematics departments offering a major in statistics is 10% (SE 1.8) across all levels of mathematics departments combined; it is 25% (SE 5.7) at doctoral-level departments, 26% (SE 8.2) at masters-level departments, and 4% (SE 1.6) at bachelors-level departments. The estimated percentage of departments offering a minor in statistics is 16% (SE 2.1) across all levels of mathematics departments combined, but 52% (SE 7.5) at

TABLE SP.26 Percentage of four-year mathematics and statistics departments reporting that various pedagogical strategies are used by some member of the department faculty.

Activity	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Inquiry based class	58	56	71	57	54	56	45
Flipped classroom	58	61	52	59	39	35	55
Class conducted largely online	38	49	53	33	48	49	45
Activity based learning	66	64	71	65	77	70	100
Technology used to develop conceptual understanding	86	82	91	86	84	84	82

TABLE SP.27 Percentage of mathematics and statistics departments reporting major changes in the kinds of pedagogy used in their departments, and the percentage citing various reasons for those changes.

Activity	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Department experienced major changes over the last 10 years	60	62	65	58	80	78	85
Of those experiencing change, the percent attributing the change to:							
Educational research	61	67	77	56	49	53	36
Advocacy of some faculty member in the department	91	99	90	90	88	88	91
Advocacy by another department	16	23	14	15	16	21	0
Advocacy by institution's administrators	37	47	30	35	47	48	45
Advocacy by a professional organization	39	31	33	43	38	36	45

masters-level departments. Between July 1, 2014-June 30, 2015, an estimated 1,012 students (SE 213) graduated with a minor in statistics that was obtained in a mathematics department.

Tables SP.29-SP.31 Profiles of other full-time faculty in four-year mathematics and statistics departments

Concern has been voiced about the early career profiles of individuals with Ph.D.s in the mathematical sciences. There are increasing numbers of postdocs and decreasing numbers of tenure-eligible positions, and there seems to be a growing number of non-tenure-eligible positions (see, e.g. Amy Cohen, “Disruptions of the Academic Math Employment Market”, *Notices of the American Mathematical Society*, October 2016, pp. 1057-1060). Data on numbers of faculty obtained from the CBMS survey in fall 2015 are contained in Table S.15, and in the Chapter 4 tables. As a part of the CBMS 2015 survey, and the Annual Survey administered by the American Mathematical Society that is a part of the CBMS survey, a separate instrument (see Appendix V) was sent to mathematics and statistics departments to gain more information about postdocs and other full-time faculty who are not tenure-eligible. This survey consisted of three sets of questions related to the profiles of research postdocs, non-tenure-eligible faculty with renewable appointments, and non-tenure-eligible faculty with fixed-term (nonrenewable) appointments.

The first set of questions was intended to study the career profile of (research) postdoctoral faculty; it inquired about positions postdocs accept after leaving a postdoc position. The question asked departments, first, for the number of individuals in their department in 2014-2015 who were postdoctoral faculty (defined as: “those in a temporary position primarily intended to provide an opportunity to extend graduate training or to further research experience”), and, next, for the number of those individuals who were postdocs in 2014-15, but were not classified as postdoctoral research faculty in fall 2015-16 (including postdocs who remained in the department in a different position), i.e. the number of individuals who were postdocs in 2014-15, and left the position of postdoc at that institution after the 2014-15 academic year. For those individuals who were no longer postdocs, responders were given six choices (and “unknown”) for the current positions of these postdocs; these options were intended to illuminate the career path of postdocs. The responses from this set of questions are summarized in Table SP.29, which is broken down by the level of the responding mathematics department, and by doctoral-level statistics department.

Table SP.29 shows that in the masters and bachelors-level mathematics departments, a large percentage of postdocs left the postdoc position after 2014-15 (an estimated 71% (SE 1) at masters-level departments, and 89% (SE 5.1) at bachelors-level departments), while an estimated 39% (SE 1.4) of the postdocs at doctoral-level mathematics departments, and 30% (SE 5.8) of postdocs who were at doctoral-level statistics departments, left a postdoc position after 2014-15 (hence about 1/3 of postdocs in 2014-15 ended their appointment as a postdoc at the same doctoral-level department, which would be expected with postdocs usually serving a 3-year appointment). These data

TABLE SP.28 Percentage of four-year mathematics departments offering a minor in statistics, the number of students graduating with such a minor between July 1, 2014, and June 30, 2015, and the percentage of four-year mathematics departments offering a major in statistics.

	Mathematics Departments			
Number of tracks	Univ (PhD)	Univ (MA)	College (BA)	Total
Offer a minor in statistics (%)	13	52	10	16
Number of graduates	305	323	384	1012
Offer a major in statistics (%)	25	26	4	10

Some totals are less than 100% due to round-off.

TABLE SP.29 Profile of 2014-2015 Postdocs who left the position at the end of the 2014-2015 academic year.

	Doctoral Math	Masters Math	Bachelors Math	All Math	Doctoral Stat	Masters Stat	All Stat
Postdocs during 2014-2015 academic year	1297	46	119	1463	100	0	100
Number who left the position for fall 2015	501.3	32.8	106.1	640.2	30.0	0.0	30
Percent who left the position for fall 2015	38.6%	70.5%	88.8%	43.7%	30%		30%
Of those who left the position for fall 2015:							
Number who took tenure-track position	179.5	8.3	72.5	260.4	7.2	0.0	7.2
Percent who took tenure-track position	36%	25%	68%	41%	24%		24%
Number who took another postdoc position	111.0	5.8	0.0	116.9	3.8	0.0	3.8
Percent who took another postdoc position	22%	18%	0%	18%	13%		13%
Number who took renewable appointment for fall 2015	66.7	13.3	28.9	108.8	15.4	0.0	15.4
Percent who took renewable appointment for fall 2015	13%	41%	27%	17%	51%		51%
Number who took non-renewable appointment for fall 2015	30.1	0.0	0.0	30.1	1.8	0.0	1.8
Percent who took non-renewable appointment for fall 2015	6%	0%	0%	5%	6%		6%
Number who took non-academic appointment for fall 2015	28.8	2.9	4.7	36.5	1.8	0.0	1.8
Percent who took non-academic appointment for fall 2015	6%	9%	4%	6%	6%		6%
Number unemployed for fall 2015	1.9	0.0	0.0	1.9	0.0	0.0	0.0
Percent unemployed for fall 2015	0%	0%	0%	0%	0%		0%
Number whose status is unknown for fall 2015	83.3	2.3	0.0	85.7	0.0	0.0	0.0
Percent whose status is unknown for fall 2015	17%	7%	0%	13%	0%		0%

suggest that typically a postdoc position at a doctoral-level department is a different experience than at a masters-level or bachelors-level department. The responding departments reported that there were no postdocs that they would classify as unemployed in fall 2015, but the precise status of their former postdocs was not always known (e.g. an estimated 17% (SE 1.5) of postdocs leaving positions at doctoral-level mathematics departments after 2014-15 had “unknown” status in fall 2015, and possibly many of these former postdocs were unemployed). Of those postdocs who left a postdoc position after 2014-15, an estimated 68% (SE 7.6) of the postdocs at bachelors-level departments, 25% (SE 11.4) of the postdocs at masters-level departments, 36% (SE 2.1) of the postdocs at doctoral-level mathematics departments, and 24% (SE 11.1) of postdocs at doctoral-level statistics departments, were employed in a tenure-eligible position in fall 2015. The percentages of postdocs who left a postdoc position after 2014-15, and who were known to be in another postdoc position in fall 2015, was an estimated 22% (SE 1.8) of the postdocs leaving doctoral-level mathematics departments, 18% (SE 7.2) of postdocs leaving masters-level mathematics departments, and 13% (SE 6.2) of postdocs leaving doctoral-level statistics departments. The percentages of postdocs who left a postdoc position after 2014-15 and were in a renewable (but not postdoc or tenure-eligible) position in fall 2015 was estimated at 13% (SE 1.4) of the postdocs leaving doctoral-level mathematics departments, 41% (SE 11) of postdocs who left masters-level mathematics departments, 27% (SE 7) of postdocs who left bachelors-level departments, and 51% (SE 10.8) of postdocs who left doctoral-level statistics departments. The percentages of postdocs who left postdoc positions after 2014-15 and took nonacademic or non-renewable academic positions were small. The data in Table SP.29 provides some light on the career path of postdocs at various kinds of institutions, and, if confirmed by further studies, suggests that the career path of a postdoc varies according to the level of institution where the postdoc was completed. For example, it appears that about half of postdocs at doctoral-level statistics departments took a subsequent renewable appointment, and about a quarter took tenure-track positions after completing a postdoc, that postdocs at bachelors-level departments generally did not take another postdoc, but were likely to find a tenure-eligible job or a renewable position after completing the postdoc, that postdocs at doctoral-level mathematics departments tended to accept tenure-track or renewable positions or another postdoc, etc.

The second set of questions related to the profile of faculty with renewable, but not tenure-eligible (and not postdoc), appointments; these were faculty with positions such as Lecturer, Teaching Professional, Professor of the Practice, Instructor, etc. Data was collected on the number of such positions, the number leaving these positions after 2014-15, and the typical responsibilities of faculty in these positions.

The first question in this second set of questions asked for the number of faculty in renewable positions in 2014-15, and, of those, how many of these faculty were no longer in that position in fall 2015. The survey also asked for the number of faculty who were in such a renewable position in 2015-16. Finally, department chairs were asked, of those faculty who were in such a position in 2015-16, for the number of renewable-term faculty who typically were engaged in each of a list of nine different activities. The responses from this set of questions are contained in Table SP.30, which is broken down by level of mathematics and statistics department.

Table SP.30 shows that, in fall 2015, essentially all faculty with renewable appointments taught, and that in both doctoral and masters-level mathematics departments an estimated 14% (SE 1) (21% (SE 2) in bachelors-level departments) and 8% (SE 2) across both levels of statistics departments left the renewable position after 2014-15 for new position in fall 2015. Across all levels of mathematics departments combined, an estimated 16% (SE 0.8) were active in research; in doctoral-level statistics departments an estimated 33% (SE 2.8) were active in research. Support for attending conferences would appear not to be a standard benefit of renewable positions in fall 2015, as less than an estimated 20% (with SEs around 1 in each level of mathematics department and 2.3 in both levels of statistics departments combined) of faculty with renewable positons would be supported to attend a research conference (even at the doctoral-level statistics departments), and, support to attend a teaching conference was available to only an estimated 29% (SE 1) of faculty with renewable positions across all levels of mathematics departments combined (to an estimated 37% (SE 2.1) at bachelors-level mathematics departments), and to an estimated 13% (SE 2.1) of faculty with renewable positions across all levels of statistics departments combined. Across all levels of departments, more than half of the faculty with renewable positions typically would serve on departmental committees, and less than 1/3 would serve as a course coordinator (except at masters-level statistics departments, where 54% (SE 10.5) of faculty with renewable positions would serve as a course coordinator). Except at bachelors-level mathematics departments and masters-level statistics departments, less than an estimated 20% (SEs 1-2) of faculty with renewable positions would serve on college/university committees. Across all levels of mathematics departments combined an estimated

TABLE SP.30 Profile of Non-tenure-track faculty with renewable appointments.

	Doctoral Math	Masters Math	Bachelors Math	All Math	Doctoral Stat	Masters Stat	All Stat
Renewable positions filled for 2014-2015	1641.1	850.2	1778.1	4269.4	214.4	50.7	265.1
Number that left renewable position for 2015	228.9	121.6	375.3	725.8	15.0	5.3	20.3
Percent that left renewable position for 2016	14%	14%	21%	17%	7%	11%	8%
Renewable positions filled for 2015-2016	1645.2	865.2	1808.5	4318.8	253.2	34.7	287.9
Number active in teaching	1625.1	865.2	1794.3	4284.6	243.6	34.7	278.3
Percent active in teaching	99%	100%	99%	99%	96%	100%	97%
Number active in research	276.4	92.3	310.7	679.4	91.6	2.7	94.3
Percent active in research	17%	11%	17%	16%	36%	8%	33%
Number that attend research conf. with support	174.6	79.7	341.0	595.4	39.0	2.7	41.7
Percent that attend research conf. with support	11%	9%	19%	14%	15%	8%	14%
Number that attend teaching conf. with support	377.5	218.9	665.6	1261.9	37.2	0.0	37.2
Percent that attend teaching conf. with support	23%	25%	37%	29%	15%	0%	13%
Number that serve on dept. committees	866.4	512.0	1145.2	2523.6	137.2	21.3	158.5
Percent that serve on dept. committees	53%	59%	63%	58%	54%	62%	55%
Number that advise undergrad. research projects	200.1	89.6	363.0	652.8	39.8	10.7	50.5
Percent that advise undergrad. research projects	12%	10%	20%	15%	16%	31%	18%
Number that serve as academic advisor	336.9	208.4	725.3	1270.6	77.2	10.7	87.9
Percent that serve as academic advisor	20%	24%	40%	29%	30%	31%	31%
Number that serve on univ. committees	234.0	176.0	711.3	1121.3	30.6	13.3	43.9
Percent that serve on univ. committees	14%	20%	39%	26%	12%	38%	15%
Number that serve as course coordinator	540.4	179.5	503.9	1223.8	50.6	18.7	69.3
Percent that serve as course coordinator	33%	21%	28%	28%	20%	54%	24%

29% (SE 1) of faculty with renewable positions typically would serve as an academic advisor (40% (SE 2.1) at bachelors-level departments), and across all levels of statistics departments an estimated 31% (SE 3) of faculty with renewable positions would serve as an academic adviser. Across all levels of mathematics departments, the percentage of faculty with renewable positions who typically would supervise undergraduate research projects was about the same as the percentage who were active in research. In doctoral-level statistics departments, an estimated 36% (SE 3) of faculty with renewable positions were active in research while an estimated 16% (SE 2.5) would supervise undergraduate research projects; in masters-level statistics departments (which reported an estimated total of only 51 such faculty), an estimated 8% (SE 6.1) of faculty with renewable positions were research-active, but an estimated 31% (SE 10.5) typically would supervise undergraduate research projects.

The final set of questions dealt with the profile of faculty in fixed-term (non-renewable) appointments, and the same questions were asked about this group of faculty that were asked about faculty with renewable appointments. The responses to these questions are summarized in Table SP.31, which is broken down by level of mathematics and statistics department.

From Table SP.31 we see that, in fall 2015, there were estimated to be fewer fixed-term (non-renewable) faculty appointments than renewable-term faculty appointments (an estimated total of 4,269 (SE 187) renewable positions, and 1,503 (SE 127) fixed-term positions, across all levels of mathematics departments combined; for statistics departments, the estimates were 265 (SE 29) renewable and 53 (SE 11) fixed-term appointments). Across all levels of mathematics, about 1/3 of those faculty who were in a fixed-term appointment in 2014-15 were not in the department in fall 2015 (the estimates for statistics departments are small, and the numbers very variable). Across all levels of mathematics departments, a larger percentage of faculty with fixed-term appointments were active in research than the percentage of faculty with renewable appointments, and, except for masters-level mathematics departments, the faculty with fixed-term appointments were more likely to be supported to attend a research conference (e.g. at doctoral level mathematics an estimated 11% (SE 0.7) of renewable-term faculty typically would receive support to attend a research conference, while an estimated 27% (SE 2) of fixed-term faculty would typically receive such financial support). There was a smaller estimated percentage of fixed-term appointment faculty who would typically be supported to attend a teaching conference than the estimated percentage for faculty with renewable appointments. There was a small estimated percentage of fixed-term faculty who typically were involved in the other activities listed (serving on a departmental committee, serving on a university committee, serving as an academic advisor, supervising an undergraduate research project, or serving as a course coordinator); one exception was, at bachelors-level mathematics departments, the estimated percentage of fixed-term appointment faculty typically supervising an undergraduate research project was 27%, (SE 3) while the percentage of renewable-term appointment faculty typically supervising such a project was estimated at 20% (SE 1.7).

TABLE SP.31 Profile of Non-tenure-track faculty with fixed-term (non-renewable) appointments.

	Doctoral Math	Masters Math	Bachelors Math	All Math	Doctoral Stat	Masters Stat	All Stat
Number of Fixed-term positions filled for 2014-2015	511.4	311.4	680.5	1503.3	47.8	5.3	53.1
Number that left fixed-term position for 2015	159.1	81.0	212.5	452.6	25.6	5.3	30.9
Percent that left fixed-term position for 2015	31.1%	26.0%	31.2%	30.1%	54%	100.0%	58%
Number of Fixed-term positions filled for 2015-2016	574.1	382.5	658.5	1615.1	54.6	13.3	67.9
Number active in teaching	567.4	382.5	655.9	1605.9	48.6	13.3	61.9
Percent active in teaching	99%	100%	100%	99%	89%	100.0%	91%
Number active in research	213.7	44.8	267.5	526.0	28.4	2.7	31.1
Percent active in research	37%	12%	41%	33%	52%	20.0%	46%
Number that attend research conf. with support	153.0	27.2	241.6	421.8	9.6	2.7	12.3
Percent that attend research conf. with support	27%	7%	37%	26%	18%	20.0%	18%
Number that attend teaching conf. with support	60.8	40.9	158.7	260.4	0.0	0.0	0.0
Percent that attend teaching conf. with support	11%	11%	24%	16%	0%	0.0%	0%
Number that serve on dept. committees	73.4	117.4	246.1	436.9	9.6	2.7	12.3
Percent that serve on dept. committees	13%	31%	37%	27%	18%	20.0%	18%
Number that advise undergrad. research projects	19.5	32.2	175.6	227.3	4.0	0.0	4.0
Percent that advise undergrad. research projects	3%	8%	27%	14%	7%	0.0%	6%
Number that serve as academic advisor	17.8	14.2	112.8	144.8	4.0	0.0	4.0
Percent that serve as academic advisor	3%	4%	17%	9%	7%	0.0%	6%
Number that serve on university committees	7.2	27.2	78.5	112.8	0.0	0.0	0.0
Percent that serve on university committees	1%	7%	12%	7%	0%	0.0%	0%
Number that serve as course coordinator	44.1	26.0	99.8	170.0	0.0	0.0	0.0
Percent that serve as course coordinator	8%	7%	15%	11%	0%	0.0%	0%

Chapter 3

Mathematical Sciences Bachelors Degrees and Enrollments in Four-Year Colleges and Universities

Mathematics and statistics departments in the nation's four-year colleges and universities offer a wide spectrum of undergraduate mathematical sciences courses and majors, sometimes including mathematics education, actuarial science, operations research, and computer science, as well as mathematics and statistics. This chapter's eleven tables describe:

- the number of bachelors degrees awarded through the nation's mathematics and statistics departments (Table E.1.A-E.1.D),
- enrollments in mathematical sciences courses and the numbers of mathematical sciences course sections (Tables E.2-E.3)
- distance learning enrollments (Table E.4)
- the appointment type of instructors who teach undergraduate courses in mathematics and statistics departments (Table E.5-E.9), and
- average sizes of sections of categories of courses taught in mathematics and statistics departments, and average sizes of recitation sections used in lecture/recitation classes for calculus and introductory statistics courses (Tables E.10-E.11).

These tables are broken down by the level of department based on the highest degree offered. The tables in this chapter expand upon Tables S.1-S.8 from Chapter 1, while Chapter 5 provides additional detail about enrollments in first-year courses in mathematics and statistics. The enrollments in each course listed on the four-year mathematics and statistics questionnaires (both with, and without, distance learning enrollments) are given in Appendix I; in making comparisons to previous CBMS surveys, one should note that the Appendix enrollments in CBMS reports prior to 2010 include distance learning enrollments. Enrollment data from two-year colleges appear in Chapter 6.

In the text that follows, the standard error (SE) in many of the estimates is provided along with the estimate (e.g. enrollment of 255,000 (SE 23,000)); the standard errors for all CBMS2015 tables can be found in Appendix VIII. The change in an estimate from an estimate in a previous survey is often expressed both as percentage change, and as the number of SEs that change represents (e.g. "increased 21% (1.7 SEs)").

Highlights:

A. Number of bachelors degrees awarded

- The estimated total number of mathematical sciences bachelors degrees granted through four-year mathematics and statistics departments in the 2014-15 academic year was 26,234, up from 21,377 in 2009-10 (a 23% increase (1.9 SEs) over 2009-10), This estimate reverses a declining trend in estimated bachelors degrees awarded observed over the CBMS surveys from 1985-2010; the CBMS 1985 estimate was 27,928. See Table S.3 in Chapter 1.
- There was a 19% (1.5 SEs) increase in the estimated number of bachelors degrees awarded by mathematics departments from 2009-10 to 2014-15, and the estimated number of degrees awarded by statistics departments more than doubled in that time period. See Tables E.1.A. and E.1.B.
- In the 2014-15 academic year, all levels of mathematics departments combined awarded more bachelors degrees in mathematics, statistics, actuarial mathematics, other, and computer science, but fewer degrees in mathematics education than in 2009-10. See Table E.1.A and Table S.3 in Chapter 1.
- In the 2014-15 academic year, the estimated total number of bachelors degrees in the mathematical sciences awarded by each level of mathematics department increased. The bachelors-level departments awarded the greatest estimated number of bachelors degrees in the mathematical sciences, but when computer science degrees are removed, the doctoral-level departments awarded the greatest estimated number of bachelors degrees in the mathematical sciences. Doctoral-level statistics departments awarded an estimated 92% of the degrees awarded by statistics departments. See Tables E.1.A and E.1.B.
- The estimated percentage of bachelors degrees in the mathematical sciences awarded to women by mathematics and statistics departments combined in the 2014-15 academic year was 42% (compared

with 43% in both 2009-10 and 1999-2000); in 2014-15 this percentage was 43% in statistics departments and 42% in mathematics departments (in 2009-10 these estimated percentages were 40% and 43% for statistics and mathematics departments, respectively). See Table S.3 in Chapter 1 and Tables E.1.A and E.1.B.

B. Enrollments and number of sections

- Estimated total fall 2015 enrollments (including distance learning enrollments) in mathematics departments were up 12% (1.8 SE) over fall 2010, and up 41% over fall 2005; in statistics departments, the estimated total enrollments were up 32% (9 SEs) over fall 2010, and up 80% over fall 2005. Increases in estimated enrollments occurred at almost all levels of departments and category of courses, except computer science enrollments in mathematics departments (which were up 35% from fall 2005 to fall 2010, but down in 2015) and enrollments in masters-level statistics departments (where estimated enrollments in 2015 were almost half of estimated enrollments in 2010). Estimated enrollments in statistics courses in mathematics departments were up 19% (2.1 SEs) over fall 2010 and up 72% (5.5 SEs) over fall 2005. See Table E.2.
- Most of the growth in estimated enrollments in mathematics departments was due to growth in enrollments in doctoral-level mathematics departments, which were up 28% (2.4 SEs). See Table E.2 and Figure E.2.3.
- The largest increase in estimated enrollments in mathematics courses was at the lower levels of mathematics courses, as enrollments in precollege-level mathematics were up 21% (1.7 SEs), and in introductory-level mathematics courses estimated enrollments were up 16% (1.7 SEs) in fall 2015 over fall 2010. See Table E.2.
- Estimated statistics enrollments made gains from fall 2010 to fall 2015, in both mathematics and statistics departments, particularly at the upper-level. as enrollments in upper-level statistics courses taught in mathematics and statistics departments combined were up 83%; estimated enrollments in upper-level statistics courses in doctoral-level statistics departments in fall 2015 were three times the estimated enrollments in fall 2010. Introductory statistics course enrollments showed slower growth from 2010 to 2015. See Table E.2.
- Estimated enrollments in calculus-level courses (which include courses in linear algebra, differential equations, and discrete mathematics, as well as calculus courses of various kinds) rose only 8% (0.95 SEs) in 2015 over 2010, but grew by 37% (3.5 SEs) in 2015 over 2005. See Table E.2.
- From fall 2010 to fall 2015, the estimated total number of course sections offered in mathematics departments grew by 11% (1.2 SEs). The number of sections of upper-level statistics courses in mathematics departments more than doubled from 2010 to 2015, and, at masters-level mathematics departments, more than tripled. In doctoral-level statistics departments the estimated number of sections of upper-level statistics courses increased by 73% (9.3 SEs) from 2010 to 2015. See Table E.3.

C. Distance learning enrollments

- Estimated enrollments in distance learning courses were up in 2015 over 2010 for most course categories reported in 2010, in four-year mathematics departments, with the estimated total distance learning enrollments in all course categories combined in fall 2015 more than double the estimate for fall 2010. In fall 2015, in mathematics departments of four-year departments, distance learning enrollments represented 3% of precollege level enrollments, 5% of College Algebra, Trigonometry and Pre-Calculus (combined) enrollments, 3% of both Calculus I and of Calculus II enrollments, and 8% of Introductory Statistics enrollments; all of these percentages, except for precollege level, are increases over 2010. In statistics departments, an estimated 5% of the introductory statistics enrollment was taught in distance learning format in both 2010 and 2015. See Table E.4

D. Appointment type of section instructor

- Over all levels of mathematics departments combined, there was a 48% (2.9 SEs) increase in the estimated number of sections of calculus-level courses taught by other full-time (OFT) faculty, and a 15% (2.6 SEs) decrease in the estimated number of sections taught by tenured or tenure-eligible (TTE) faculty. The trend of decreasing estimated number of sections taught by TTE faculty and increasing number of sections taught by OFT faculty held for each level of mathematics department. See Table E.5.
- Over all levels of mathematics departments combined, in fall 2015, an estimated 41% of the introductory-level statistics sections were taught by TTE faculty, 21% were taught by OFT faculty, 25% were taught by part-time (PT) faculty, and 4% were taught by graduate teaching assistants (GTAs); in all levels of statistics departments combined, an estimated 14% of the introductory statistics sections were taught by TTE faculty, 25% taught by OFT faculty, 10% taught by PT faculty, and 31% taught by GTAs. See Table E.6.
- The estimated percentage of sections of lower-level computer science courses in mathematics departments taught by PT instructors declined from

2010 to 2015, but the percentage of sections of middle-level computer science course taught by PT instructors increased. See Tables E.7 and E.8.

- In bachelors-level and in doctoral-level departments, the estimated percentage of sections of advanced-level mathematics courses taught by TTE faculty declined from 2010 to 2015. See Table E.9.

E. Average section size

- Over both levels of statistics departments combined, estimated average section size of statistics courses increased significantly. In introductory statistics classes, the estimated average section size rose from 45 in fall 2010 to 60 (with SE 2.4) in 2015, and in upper-level statistics course sections, the estimated average section size grew from 30 in fall 2010 to 52 (with SE 2.0) in fall 2015. See Table E.10.
- The estimated average recitation section size in Non-Mainstream Calculus I at doctoral-level departments increased, from 30 in fall 2010, to 36 (SE 1.7) in fall 2015. See Table E.11.

Terminology: The two preceding CBMS survey reports are called CBMS2005 and CBMS2010.

In the CBMS 2015 survey, the term "mathematics department" includes departments of mathematics, applied mathematics, mathematical sciences, and departments of mathematics and statistics. The term "statistics department" refers to departments of statistics that offer undergraduate statistics courses. The term "mathematical sciences courses" covers all courses that are taught in mathematics or statistics departments in the United States; it includes courses in mathematics education, actuarial sciences, and operations research taught in a mathematics or statistics department, as well as courses in mathematics, applied mathematics, and statistics. Computer science courses (and majors) are included in CBMS2015 totals when the courses (and majors) are taught (granted through) a mathematics department (previous CBMS surveys gathered data on computer science courses/majors offered through statistics departments, but this data were not collected beginning in 2010). CBMS2015 data do not include any courses or majors that are taught in, or granted through, separate departments of computer science, actuarial science, operations research, etc. Departments are classified by the highest degree offered. For example, the term "bachelors-level department" refers to one that does not offer masters or doctoral degrees.

Tables E.1.A and E.1.B: Bachelors degrees granted between July 1, 2014 and June 30, 2015

Total numbers of degrees awarded by mathematics and statistics departments

The CBMS 2015 survey (Table S.3 of Chapter 1) estimated that the total number of mathematical sciences bachelors degrees granted through the nation's four-year mathematics and statistics departments in the 2014-15 academic year was 26,234, up from 21,377 in 2009-10 (a 23% (1.9 SEs) increase over 2009-10), and up from the estimate of 21,437 in 2004-5. The six previous CBMS surveys (see Table S.3 in Chapter 1 for the estimates from the surveys of 1995, 2000, 2005, and 2010, and Table SE.4 in CBMS2000, p. 14, for the estimates from the surveys of 1985 and 1990) reported a declining trend in the total number of bachelors degrees awarded by the nation's mathematics and statistics departments in the preceding academic year, and, over the 25 years, 1985-2010, the estimated number of bachelors degrees awarded decreased by 31%. The 2015 estimate, while higher than any of the estimates in the last five CBMS surveys, is below the 1985 estimate of 27,928 (which included an estimated 8,691 degrees in computer science awarded by mathematical sciences departments), and, if the apparent increase is not due to statistical error, it indicates a reversal in the trend of decline in the number of bachelors degrees awarded the previous academic year, perhaps fueled by increases in estimated enrollments observed in the CBMS surveys of 2010 and 2015. When computer science degrees were removed from the count, the estimated number of degrees awarded by mathematics and statistics departments appeared relatively constant in past CBMS surveys: 19,237 in 1984-1985 (the first year computer science degrees were tabulated), 19,380 degrees in 1989-1990 and 19,241 degrees in 2009-10 (see Table S.3 and Table SE.4 in CBMS2000). However, first, the number of computer science degrees awarded by mathematics departments over the preceding academic year, 2014-2015, is the largest number recorded in the last five CBMS surveys (see Table S.1), and, second, when we remove the estimated 3,968 computer science degrees from the estimated CBMS2015 total number of bachelors degrees awarded, the estimated total is 22,266, seemingly an increase over the past surveys.

Table E.1.A presents the estimated number of bachelors degrees awarded by mathematics departments from July 1, 2014-June 30, 2015, broken down by the level of the department, and the type of degree awarded (the subcategories of degrees are: mathematics (including applied mathematics), mathematics education, statistics, actuarial science, computer science, joint majors, and other degrees).

TABLE E.1.A Bachelors degrees in mathematics, mathematics education, statistics, and computer science in mathematics departments awarded between July 1, 2014 and June 30, 2015, by gender of degree recipient and type of department. This table can be compared to Table E.1 in CBMS2010, p. 78.

	Mathematics Departments			
Bachelors degrees in Math Depts	Univ (PhD)	Univ (MA)	Coll (BA)	Total Math Depts
Mathematics Majors (including applied)				
Men	3431	1436	2529	7396
Women	1645	1365	2388	5398
Percentage of women	*32%*	*49%*	*49%*	*42%*
Total Math degrees	5076	2801	4917	12794
Mathematics Education Majors				
Men	235	412	497	1143
Women	401	480	851	1732
Percentage of women	*63%*	*54%*	*63%*	*60%*
Total Math Ed degrees	636	891	1348	2875
Statistics Majors				
Men	98	77	95	270
Women	28	56	62	147
Percentage of women	*22%*	*42%*	*40%*	*35%*
Total Stat degrees	126	133	157	416
Computer Science Majors				
Men	7	483	2177	2666
Women	3	217	1082	1302
Percentage of women	*33%*	*31%*	*33%*	*33%*
Total CS degrees	10	700	3259	3968
Actuarial Mathematics Majors				
Men	997	207	167	1371
Women	635	134	75	844
Percentage of women	*39%*	*39%*	*31%*	*38%*
Total Actuarial Math degrees	1632	341	243	2215
Joint Mathematics Majors				
Men	212	224	491	927
Women	109	168	156	433
Percentage of women	*34%*	*43%*	*24%*	*32%*
Total Joint degrees	321	393	646	1360
Other Mathematics Majors				
Men	357	87	16	460
Women	251	37	10	298
Percentage of women	*41%*	*30%*	*38%*	*39%*
Total other Math degrees	608	124	26	758
Total degrees - Men	5337	2925	5971	14233
Total degrees - Women	3072	2458	4624	10154
Percentage of women	*37%*	*46%*	*44%*	*42%*
Total all degrees	8409	5383	10595	24387

Note: Round-off may make row and column sums seem inaccurate.

TABLE E.1.B Bachelors degrees in statistics departments awarded between July 1, 2014 and June 30, 2015, by gender of degree recipient and type of department. This table can be compared to Table E.1 in CBMS2010, p. 78.

	Statistics Departments		
Bachelors degrees in Stat Depts	Univ (PhD)	Univ (MA)	Total Stat Depts
Statistics Majors			
Men	540	55	594
Women	418	42	460
Percentage of women	*44%*	*43%*	*44%*
Total Statistics degrees	958	97	1055
Biostatistics			
Men	17	0	17
Women	21	0	21
Percentage of women	*55%*	*NA*	*55%*
Total Biostatistics degrees	**38**	**0**	38
Actuarial Science			
Men	58	7	65
Women	73	1	74
Percentage of women	*56%*	*17%*	*53%*
Total Actuarial Science degrees	131	8	139
Joint Statistics and Computer Science			
Men	46	0	46
Women	18	0	18
Percentage of women	*28%*	*0%*	*28%*
Total Joint Statistics and Computer Science degrees	**64**	**0**	64
Joint Statistics and Mathematics			
Men	*124*	*0*	*124*
Women	*72*	*0*	*72*
Percentage of women	*37%*	*0%*	*37%*
Total Joint Statistics and Mathematics degrees	**196**	**0**	196
Joint Statistics and (Business or Economics)			
Men	*116*	*0*	*116*
Women	*84*	*0*	*84*
Percentage of women	*42%*	*0%*	*42%*
Total Joint Statistics and (Business or Ecoomics) degrees	**200**	**0**	200
Statistics Education			
Men	*2*	*0*	*2*
Women	*3*	*0*	*3*
Percentage of women	*60%*	*0%*	*60%*
Total Statistics Education degrees	**5**	**0**	5
Other			
Men	*62*	*29*	*90*
Women	*47*	*12*	*59*
Percentage of women	*43%*	*29%*	*39%*
Total other degrees	*109*	*41*	*149*
Total degrees - Men	965	90	1055
Total degrees - Women	737	55	792
Percentage of women	*43%*	*38%*	*43%*
Total all degrees	1702	145	1847

Note: Round-off may make row and column sums seem inaccurate.

Table E.1.C. Comparisons of NCES Tabulations of Bachelors Degrees awarded to Majors in Math & Stat during 2014-2015 survey cycle with estimates from 2015 CBMS Survey and 2015 Annual Survey Departmental Profile survey.

Institutions with a:	NCES	Annual Survey [1]	Annual Survey SEs	CBMS [2]
Doctoral Mathematics Departments	14256	13477	*70*	10256
Masters Mathematics Departments	4354	4701	*141*	5383
Bachelors Mathematics Departments	9058	12204	*270*	10595
Grand Total	27668	30382	*348*	26234

[1] Doctoral Math. Depts. includes degrees awarded by doctoral stat departments; Masters stat departments were not surveyed.

[2] Doctoral Math. Depts. includes degrees awarded by doctoral and masters stat departments; some masters stat departments are at institutions whose math department does not offer a doctorate. Computer science degrees included.

Table E.1.D. Comparisons of NCES Tabulations of Bachelors Degrees awarded to Majors in Math & Stat during 2014-2015 survey cycle with estimates from 2015 Annual Survey Departmental Profile survey adjusted to remove CS-only Bachelors. The CBMS estimates include CS majors.

Institutions with a:	NCES	Annual Survey with CS-only removed [1]	CBMS [2]
Doctoral Mathematics Department	14256	13334	10256
Masters Mathematics Department	4354	4457	5383
Bachelors Mathematics Department	9058	10666	10595
Grand Total	27668	28457	26234

[1] Doctoral Math. Depts. includes degrees awarded by doctoral stat departments; Masters stat departments were not surveyed.

[2] Doctoral Math. Depts. includes degrees awarded by doctoral and masters stat departments; some masters stat departments are at institutions whose math department does not offer a doctorate. Computer science degrees included.

Table E.1.B gives the estimated number of degrees awarded by statistics departments over that same time period. Mathematics departments award most of the degrees in the mathematical sciences, 93% in 2015, down from 96% in 2009-10, so the number of degrees awarded by mathematics departments is the major component in the number of undergraduate degrees awarded in the mathematical sciences. The estimated total number of degrees awarded by four-year mathematics departments in 2014-15 was 24,387 with an SE of 2,535, and the estimated total number awarded by statistics departments was 1,847 with an SE of 101; the corresponding estimates for 2009-10 were 20,540 (SE 1,180) degrees awarded by mathematics departments, and 838 (SE 83) degrees awarded by statistics departments [CBMS2010 Table E.1, p. 78]. Hence, there was a 19% (1.5 SEs) increase in the estimated number of degrees awarded by mathematics departments from 2009-10 to 2014-15, and the estimated number of degrees awarded by statistics departments more than doubled in that time period.

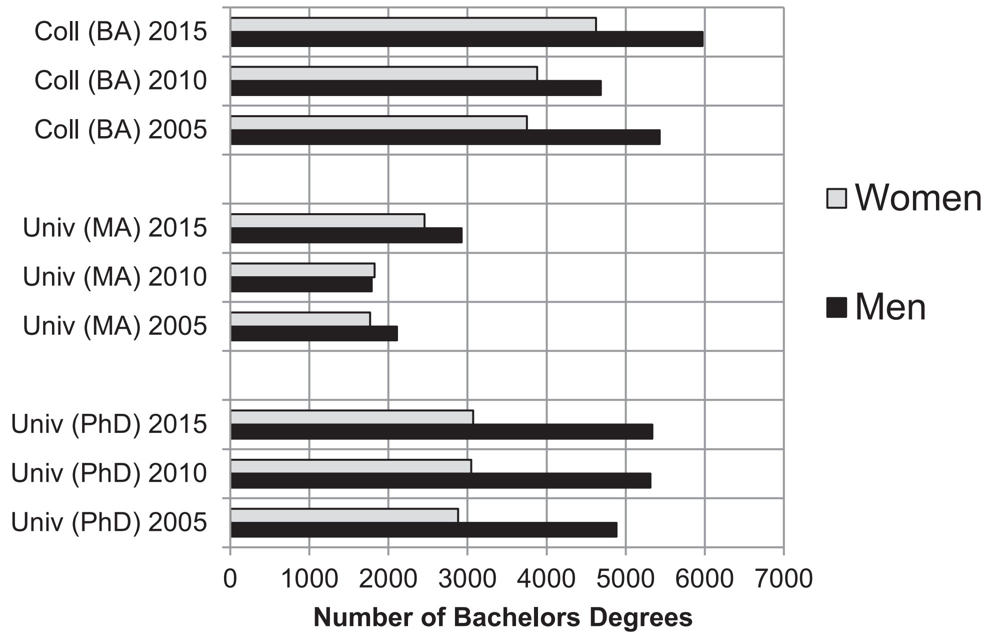

FIGURE E.1.1 Bachelors degrees in mathematics departments awarded between July 1 and June 30 in the academic years 2004-2005, 2009-2010, and 2014-2015, by gender and type of department.

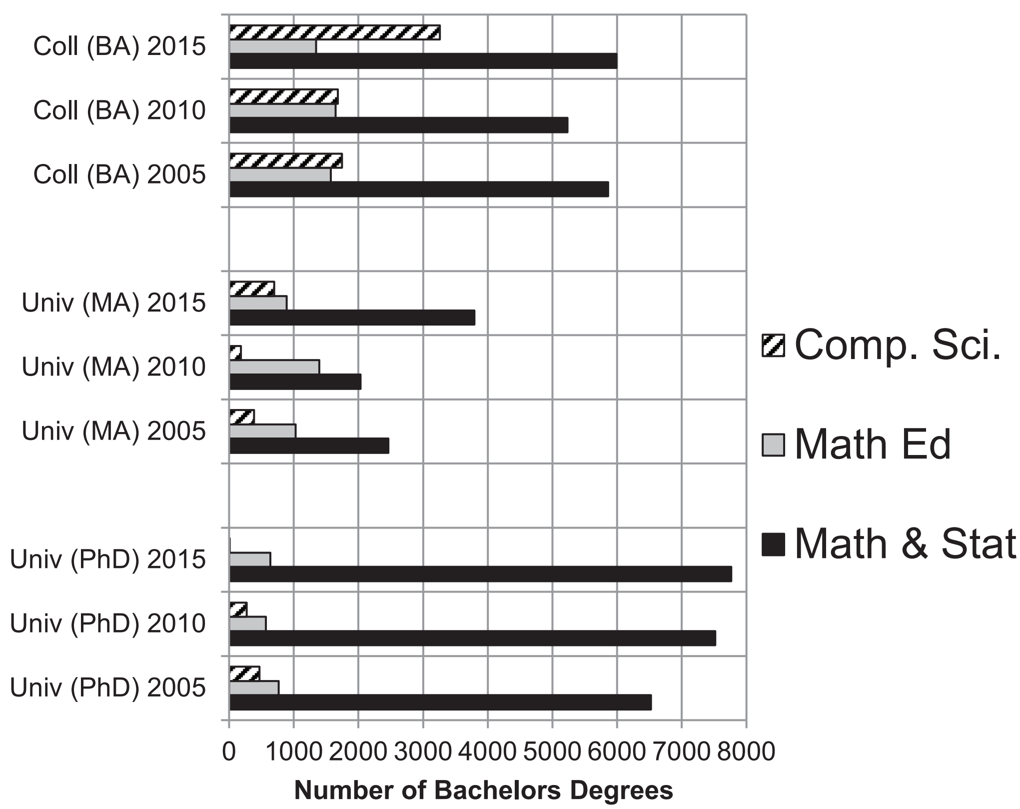

FIGURE E.1.2 Number of bachelors degrees granted by mathematics departments in academic years 2004-2005, 2009-2010, and 2014-2015 by type of major and type of department.

Degrees awarded by mathematics departments broken down by level of department

Table E.1.A breaks down the estimated numbers of degrees awarded in 2014-15 by the level of mathematics department awarding the degree. In the 2005 and 2010 CBMS surveys, most of the growth in the number of bachelors degrees awarded in mathematics occurred at the doctoral-level mathematics departments. In 2005, for the first time, the estimated number of bachelors degrees in mathematics granted by doctoral-level departments exceeded the number granted by bachelors-level departments. In 2015, the largest growth in estimated degrees awarded occurred in the masters and bachelors-level departments, with bachelors-level departments awarding more degrees total than doctoral-level departments, but when computer science degrees are removed, the situation is reversed. Figures E.1.1 and E.1.2 display the numbers of degrees awarded by each level of mathematics department in 2004-5, 2009-10 and 2014-15; Figures E.1.3, and E.1.4 display the percentage of mathematical science degrees awarded by each level of mathematics department, and by statistics departments, with, and without, degrees in computer science awarded by mathematics departments included. In 2014-15 doctoral-level departments awarded 34% of all the estimated total degrees awarded by mathematics departments, and bachelors-level departments awarded 43%; when computer science degrees awarded by mathematics departments are removed, doctoral-level departments awarded 41% of all the estimated degrees, and bachelors-level departments awarded 36% of the degrees.

Degrees awarded by mathematics departments broken down by category of degree

Table E.1.A breaks the estimated number of degrees awarded by mathematics departments in 2014-15 down by category of the major, and by level of the department; Figure E.1.2 displays this breakdown of degrees awarded in 2004-5, 2009-10, and 2014-15. Table E.1.A shows that the estimated number of bachelors degrees in the category "mathematics", awarded in 2014-15 by all levels of mathematics departments combined, was 12,794, and Table S.3 of Chapter 1 shows that this is an increase over both 2009-10 and 2004-05. Note that Table E.1 in CBMS2010 p. 78, includes actuarial mathematics, joint majors, and "other" in the category "mathematics", while the comparable Table E.1.A in CBMS2015 breaks out these categories separately; these categories are also broken out in Table S.3, which can be used to make comparisons between estimated number of degrees awarded in mathematics in 2014-15 to number awarded in 2009-10 over all levels of mathematics department combined. To make comparisons between the number of degrees awarded in 2009-10 and 2014-5, broken down by level of department, using Table E.1.A in CBMS2015 and Table E.1 in CBMS2010, we combine the numbers of degrees awarded in mathematics, actuarial mathematics, joint majors and "other" in 2014-15. Hence, the number of degrees awarded by doctoral-level departments in these categories in 2014-15 was 7,637 degrees, and the number of degrees awarded by bachelors-level departments was 5,832 degrees; in the CBMS 2010 survey the corresponding estimates were 7,303 degrees awarded by doctoral-level departments, and 5,167 degrees awarded by bachelors-level departments. If one considers the narrower category of only mathematics, the estimated numbers of degrees awarded in 2014-15 are closer: 5,076 by doctoral-level departments, and 4,917 by bachelors-level departments.

The estimated number of degrees awarded by all levels of mathematics departments combined in 2014-15 in mathematics education was estimated at 2,875 degrees (SE 333), down from 3,614 in 2009-10, 3,369 in 2004-5, 4,991 in 1999-2000, and 4,829 in 1994-95 (see Table S.3 in Chapter 1). In 2014-15, the estimated number of mathematics education degrees awarded was down from 2009-10 in all three levels of departments, but the largest decline was at the masters-level mathematics departments, where the estimated number of mathematics education degrees awarded dropped from an estimated 1,396 degrees awarded in 2009-10 to an estimated 891 degrees awarded in 2014-15. See Figure E.1.2.

Table E.1.A, shows that the estimated number of bachelors degrees in statistics awarded by mathematics departments increased from 241 degrees in 2004-5, to 354 degrees in 2009-10, to 416 degrees (SE 96) in 2014-15, almost doubling in the past 10 years, but still a relatively small number, and, in mathematics departments, the estimated number of degrees awarded in statistics was only about 20% of the estimated number of actuarial mathematics degrees. The degrees awarded in statistics by mathematics departments were spread pretty evenly across the three levels of mathematics departments, unlike in 2009-10, when more than half of the statistics degrees awarded by mathematics departments were awarded by the doctoral-level mathematics departments. As we will see later in this chapter, mathematics departments have a relative large enrollment in both lower and upper level statistics courses, but, apparently, offer few degrees classified by the survey responders as statistics degrees.

As was already observed, there was an increase in the estimated number of bachelors degrees awarded in computer science by mathematics departments. In 1994-5 the CBMS study estimated that mathematics departments awarded 2,741 bachelors degrees in computer science (Table S.3 of Chapter 1), while Table E.1.A shows that in 2014-15 this number

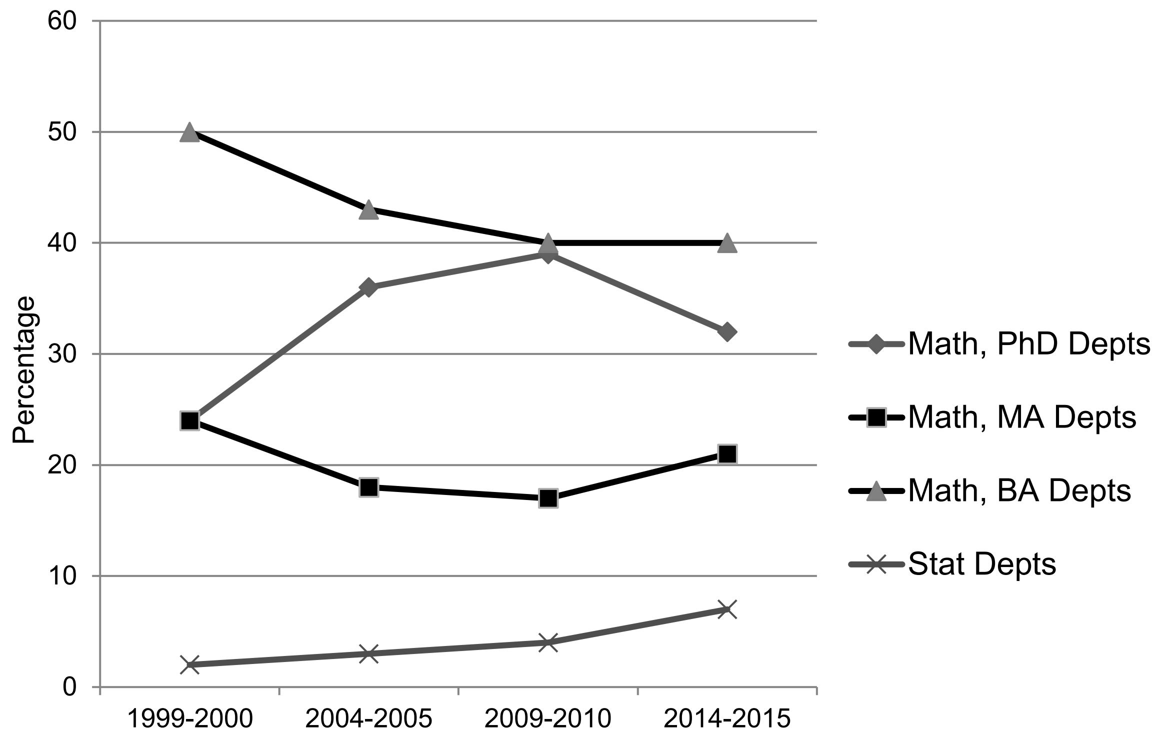

FIGURE E.1.3 Percentage of mathematical sciences bachelors degrees (including computer science) awarded through mathematics and statistics departments of various kinds in academic years 1999-2000, 2004-2005, 2009-2010, and 2014-2015.

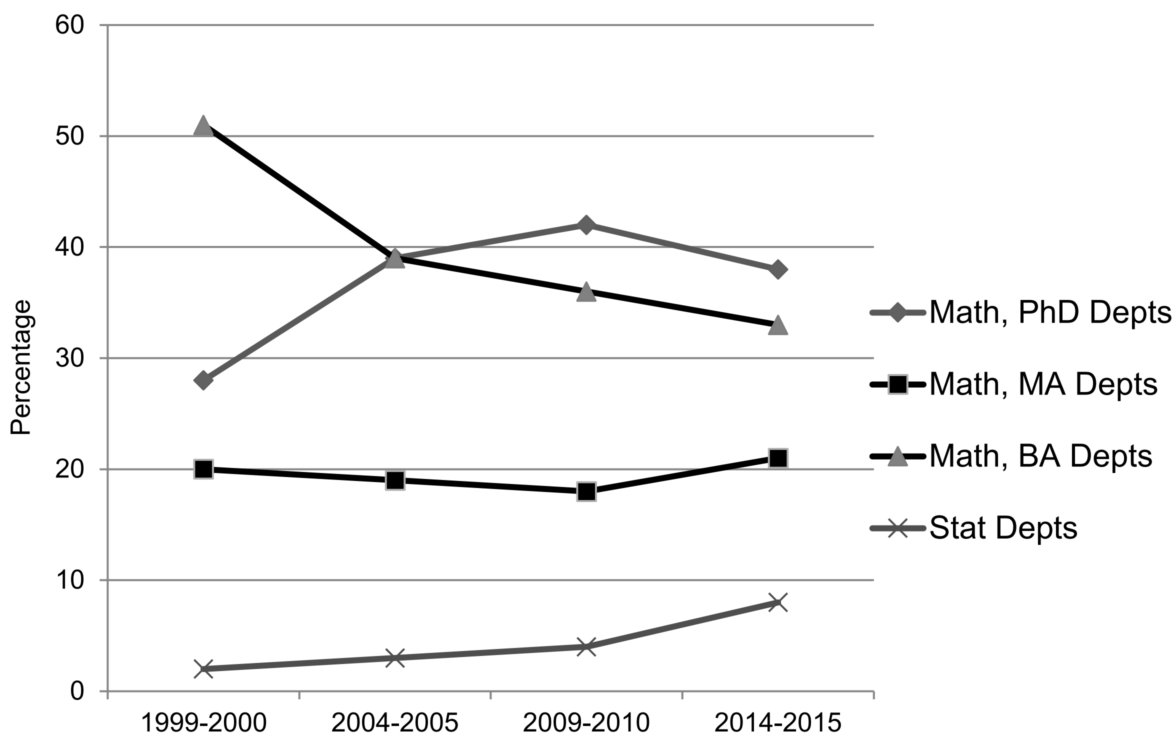

FIGURE E.1.4 Percentage of mathematical sciences bachelors degrees (excluding computer science) awarded through mathematics and statistics departments of various kinds in academic years 1999-2000, 2004-2005, 2009-2010, and 2014-2015.

TABLE E.2 Enrollment (in thousands) in undergraduate mathematics, statistics, and computer science courses (including distance-learning enrollments) in mathematics and statistics departments by level of course and type of department in fall 2015. Numbers in parentheses are (2005, 2010) enrollments.

	Fall 2015 (2005, 2010) enrollments (in 1000s)						
	Mathematics Departments				Statistics Departments		
	Univ (PhD)	Univ (MA)	Coll (BA)	Total Math Depts	Univ (PhD)	Univ (MA)	Total Stat Depts
Mathematics Courses							
Precollege	80 (55,57)	48 (60,64)	125 (87,88)	253 (201,209)			
Introductory (incl. Precalc)	408 (269,299)	226 (190,214)	365 (248,350)	1000 (706,863)			
Calculus level	474 (345,383)	157 (88,145)	176 (154,221)	807 (587,748)			
Advanced Mathematics	81 (52,64)	30 (24,39)	43 (36,47)	154 (112,150)			
Total Math courses	1043 (720,803)	461 (362,462)	709 (525,706)	2213 (1607,1971)			
Statistics Courses							
Introductory Statistics	57 (30,51)	62 (32,40)	134 (86,140)	253 (148,231)	78 (42,54)	16 (13,27)	94 (54,81)
Upper Statistics	17 (15,15)	24 (9,6)	20 (10,11)	60 (34,32)	45 (20,15)	5 (3,12)	50 (24,28)
Total Stat Courses	74 (44,66)	85 (42,45)	154 (96,151)	313 (182,262)	124 (62,70)	20 (16,39)	144 (78,109)
Computer Science Courses							
Lower Computer Science	4 (3,3)	5 (11,3)	36 (30,50)	45 (44,56)			
Middle Computer Science	1 (1,1)	2 (1,1)	14 (6,9)	16 (8,12)			
Upper Computer Science	0 (1,1)	2 (1,1)	5 (3,8)	6 (5,10)			
Total CS courses	5 (5,5)	8 (13,6)	55 (39,67)	68 (57,77)			
Total all courses	1122 (769,874)	554 (417,513)	918 (659,924)	2594 (1845,2310)	124 (62,70)	20 (18,39)	144 (80,109)

Note: Beginning in 2010, the CBMS Survey did not include computer science courses taught in statistics departments

Note: Due to round-off, row and column sums may appear inaccurate.

was 3,968. Most of the bachelors degrees awarded in computer science in 2014-15 by mathematics departments were given by the bachelors-level departments. The CBMS2010 study showed an increase in estimated computer science enrollments in mathematics departments for fall 2010 over the computer science enrollments for fall 2005 that were reported in CBMS2005 (see Table E.2 of CBMS2010), but, as we will see later in this chapter, the 2015 report on enrollments shows a decline in computer science enrollments over 2010 in mathematics departments.

Degrees awarded by statistics departments

Table E.1.B shows that in 2014-15 the estimated number of bachelors degrees awarded by statistics departments was 1,847, compared with 838 bachelors degrees awarded in 2009-10, and compared with 416 degrees awarded by mathematics departments in 2014-15 in statistics. The number of degrees awarded by doctoral-level statistics programs in 2014-15 was 1,702, compared with 481 in 2009-10. In the 2015 CBMS survey the degrees awarded by statistics departments were broken down into the categories of statistics, biostatistics, actuarial science, joint statistics and computer science, joint statistics and mathematics, and joint statistics and business/economics. Statistics was the category with the largest estimated number of degrees awarded (1,055) in 2014-15, followed by joint statistics and business/economics (200), and joint statistics and mathematics (196). There were an estimated 139 degrees awarded by statistics departments in actuarial science, and an estimated 2,215 degrees awarded by mathematics departments in actuarial mathematics.

Degrees awarded broken down by gender

Table E.1.A (respectively, Table E.1.B) breaks down the estimated number of bachelors degrees awarded by mathematics departments (respectively, statistics departments) by gender, and Figure E.1.1 displays the numbers of degrees awarded by mathematics departments, broken down by level of department and gender, for 2004-5, 2009-10, and 2014-15. Tables E.1.A and E.1.B show that the estimated total numbers of mathematical sciences degrees awarded to women increased from 2009-10 to 2014-15 at each level of mathematics and statistics department, except at masters-level statistics departments; however, over the course of the last 25 years the estimated percentage of bachelors degrees awarded to women has decreased slightly in mathematics departments and increased in statistics departments. Comparisons to previous CBMS surveys can be found at [CBMS1990 Table E.6, p. 30], [CBMS1995 Table E.1, p. 42], [CBMS2000 Table E.1, p. 71], [CBMS2005 Table E.1, p. 78], and [CBMS2010 Table E.1, p.78]. The total estimated percentage of undergraduate degrees awarded to women by all levels of mathematics departments combined in 2014-15 was 42% (SE 2) women, comparable to the percentage that in 2009-10 was 43% women, and in 2004-5 was 40% women; in 1989-90 the estimated percentage of women was 46%. The estimated percentage of bachelors degrees awarded to women by statistics departments in 2014-2015 was estimated at 43% (SE 0.5) (Table E.1.B), up from 40% in 2009-2010; in 2004-5 it was 40%, in 1999-2000 it was 43%, and in both 1989-90 and 1994-95 it was 38%. The percentage of degrees awarded to women varies by the level of department. The estimated percentage of all bachelors degrees awarded to women by doctoral-level mathematics departments in 1989-90 was 37%, in 1994-5 was 43%, in 1999-2000 was 40%, in 2004-5 was 37%, in 2009-10 was 36%, and in 2014-15 it was 37% (SE 1.2) by Table E.1.A. In 2014-15, the estimated percentage of bachelors degrees awarded by masters-level mathematics departments to women decreased from 50% in 2009-10 to 46% (SE 3.3) in 2014-15 by Table E.1.A (it was 50% in 1989-90), and in the bachelors-level departments it decreased from 45% in 2009-10, to 44% (SE 4.3) in 2014-15; it was 52% in 1989-90. See Figure E.1.1, which shows the estimated number of bachelors degrees awarded, broken down by gender in 2004-5, 2009-10, and 2014-15.

Table E.1.A shows that the percentage of degrees awarded to women also varies by category of mathematics degree. it is highest in mathematics education (in 2014-15 it was 60% (SE 2.9), in 2009-10 it was 63%, and in 2004-5 it was 60%). The percentage of degrees awarded to women by mathematics departments made the biggest changes in the number of computer science degrees awarded; in all levels of mathematics departments combined, women were 33% of the degrees awarded in 2014-15 and 16% of degrees awarded in 2009-10.

Table E.1.B breaks down the number of bachelors degrees awarded by statistics departments into more categories than in previous CBMS surveys. Though the numbers are small, the table shows that the percentage of bachelors degrees in biostatistics awarded to women was 55% (SE 2).

Tables E.1.C and E.1.D: Comparison: Annual Survey, NCES, and CBMS Survey Estimates of Numbers of Degrees Awarded

Next we compare the estimates of the number of degrees awarded that were obtained from the CBMS survey, to the estimates of these numbers obtained from the Annual Survey, and from data available through NCES. In both the 2010 and the 2015 CBMS surveys, the estimated number of bachelors degrees awarded was less than the estimate in the Annual Survey. NCES data is entered by college and university offices of institutional research, rather than by the department chair; at one time these offices were not

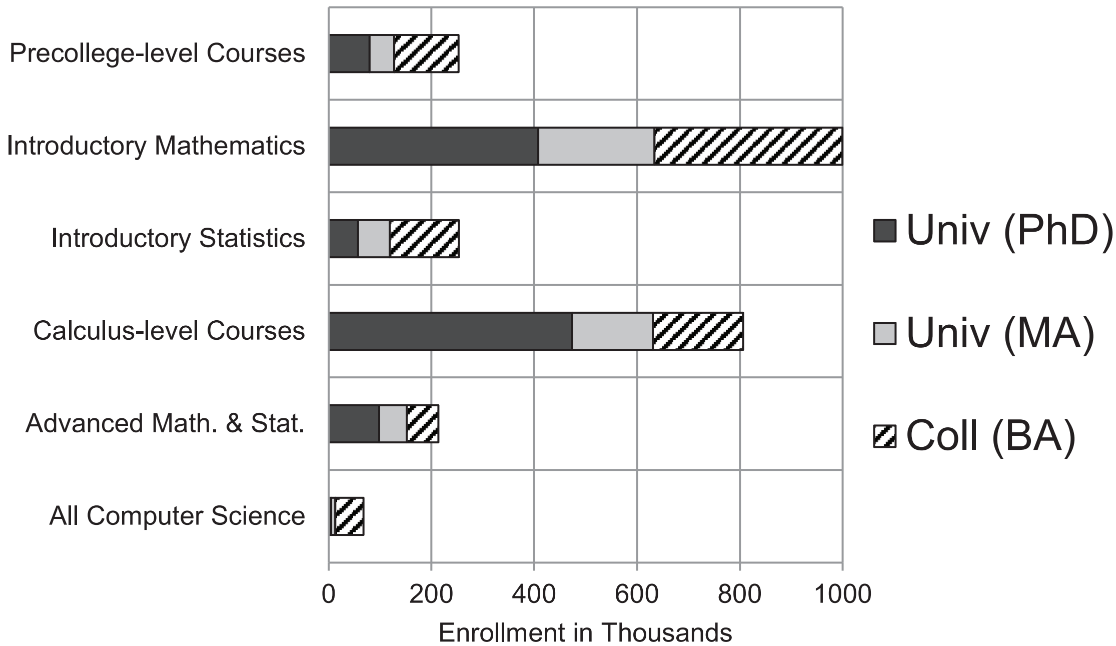

FIGURE E.2.1 Enrollment (in thousands) in undergraduate mathematics, statistics, and computer science courses in four-year college and university mathematics departments by type of course and type of department in fall 2015.

allowed to enter more than one major for a student, and, for this reason, the NCES estimates did not seem to be an accurate estimate of numbers of degrees awarded by mathematical sciences departments. In the data institutions give NCES, it now is possible for a degree to be counted under more than one major, but whether that is done depends upon how the local institution implements that policy. If counting the same things, the NCES data should be more accurate than both the Annual Survey and the CBMS survey, as NCES data is a census, rather than a survey. The Annual Survey and the CBMS survey use basically the same methodology to count the same quantities, but they are conducted at different times of the year (the CBMS survey in the fall, and the Annual Survey in January). The CBMS estimates of degrees awarded by four-year mathematics and statistics department are less than the numbers reported by NCES, and the NCES numbers are less than the Annual survey estimates.

Tables E.1.C and E.1.D consolidate the estimates of bachelors degrees awarded by mathematics and statistics departments during 2014-15 from the Annual Survey and from the CBMS 2015 survey so as to try to make them roughly comparable with the total bachelors degrees awarded as reported by NCES, given the differences in the three surveys. In creating these tables using NCES institutional data, the data are combined according to the highest degree awarded (doctoral, masters, or bachelors) by the mathematics department at the institution (the level of a possible statistics department is not used, and we make the assumption that if an institution has a statistics department, it also has a mathematics department). To make the NCES data comparable to the CBMS data, in Tables E.1.C and E.1.D the CBMS total number of bachelors degrees awarded in mathematics and statistics for “Doctoral Mathematics Departments” includes CBMS estimated degrees awarded by masters and doctoral-level statistics departments, since these degrees would likely be combined in the institutional total number of bachelors degrees awarded in mathematics and statistics. The Annual Survey total shown for “Doctoral Mathematics Departments” includes the degrees reported separately for departments in the Annual Survey that are labelled Applied Mathematics Departments and Doctoral Statistics Departments (the CBMS labelled masters-level statistics departments are not part of the Annual Survey).

The NCES totals in Table E.1.C include only one type of Computer Science Degree, those submitted to NCES under the label Mathematics and Computer Science, CIP code 30.08. Since computer science degree programs are sometimes housed within the mathematics departments, the Annual Survey bachelors degree totals certainly include degrees viewed within the department as falling within Computer Science broadly, and certainly include Joint Mathematics and

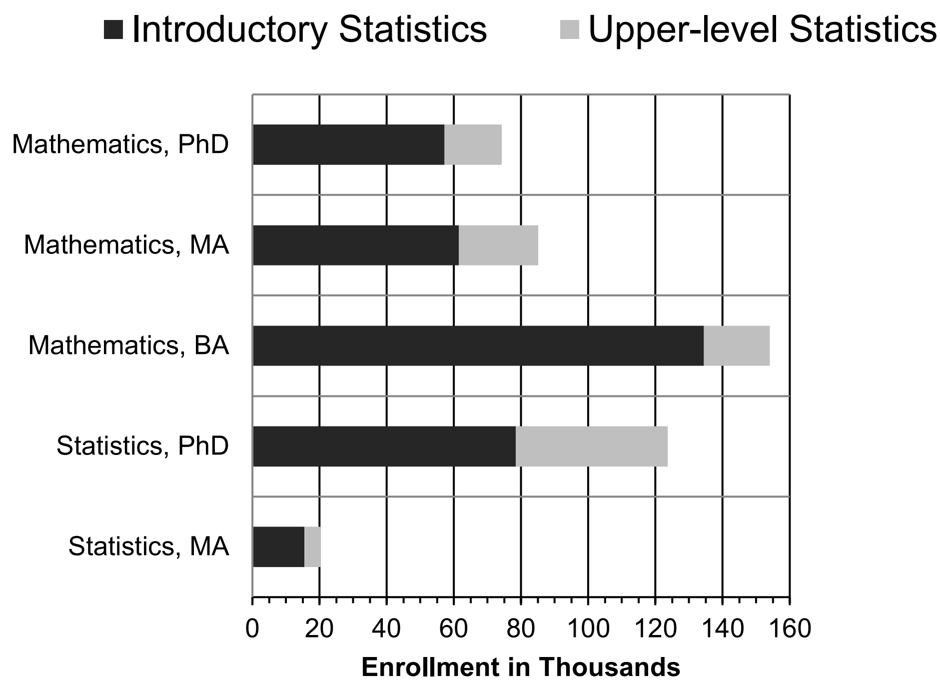

FIGURE E.2.2 Enrollment (in thousands) in undergraduate statistics courses by level of course and type of department in fall 2015.

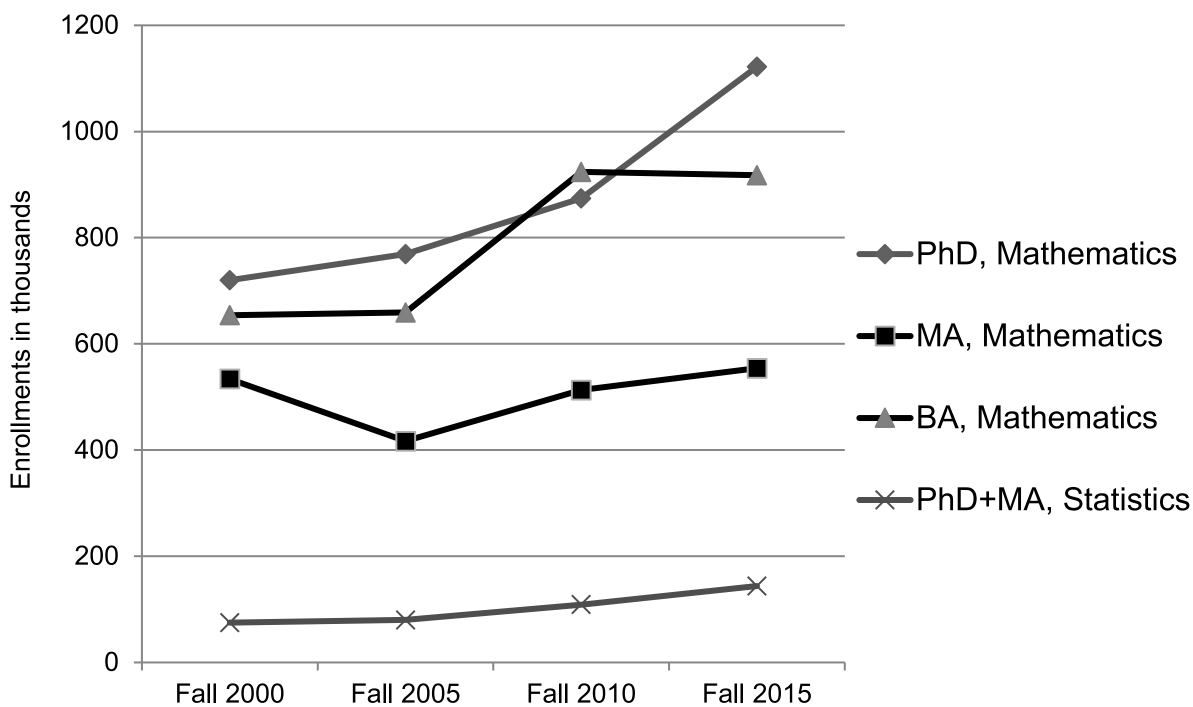

FIGURE E.2.3 Undergraduate enrollment (in thousands) by type of department in fall 2000, fall 2005, fall 2010, and fall 2015.

Computer Science bachelors degrees. The Annual Survey asks departments to report separately on how many Computer Science only degrees were included in the number they reported in their department degrees awarded total. No doubt some (and perhaps even most) of these Computer Science-only degrees are reported to NCES under a program total other than CIP code 30.08, the one used to produce the NCES totals shown in Table E.1.C. The NCES uses the label Computer Science, CIP code 11.07, which is one code that could easily be assigned by the institutional research unit at the institution for the degrees reported to Annual Survey as Computer Science only degrees. This difference in the NCES and Annual Survey data might explain why the Annual Survey estimate is higher than the NCES total in Table E.1.C.

In order to try to make the Annual Survey estimate closer to the NCES data, in Table E.1.D the Annual Survey data with the Computer Science only degrees reported by departments are removed from the Annual Survey estimates. For the CBMS survey, departments can report computer science degrees in the CBMS survey under the label "Computer Science majors", and they can report degrees that might have NCES CIP code 30.08 under the label "Joint Mathematics Majors", or they might decide to place then under the label "Other Mathematics Majors"; all these degrees are included in both Tables E.1.C and E.1.D in the CBMS survey column. It is interesting to note that the 2015 CBMS survey total bachelors degree awarded estimate for "Computer Science majors" is 3,968, whereas the Annual Survey's estimate for "Computer Science only" majors is 1,925. In addition, the NCES total tally of Mathematics and Computer Science degrees awarded is just 300.

Tables E.2 and E.3: Undergraduate enrollments and number of sections offered in mathematics and statistics departments

The CBMS2015 data show that estimated enrollments in mathematical sciences courses were larger in fall 2015 than in fall 2010, but perhaps not always significantly higher, and these enrollments were up in almost every category. The 2010 CBMS survey showed large growths in enrollments over 2005, and the 2015 survey generally maintains those high levels, suggesting that there has been real enrollment growth since 2005 (see Figure S.2.1 in Chapter 1 for growth in mathematics enrollments since fall 1990, and Figure S.2.3 in Chapter 1 for growth in statistics enrollments over that 25-year time period). Table E.2 shows that estimated total fall 2015 enrollments (including distance learning enrollments) in mathematics departments were up 12% (1.8 SE) over fall 2010, and up 41% over fall 2005; in statistics departments, the total estimated enrollments were up 32% (8.8 SEs) over fall 2010 and 80% over fall 2005. Table E.2 breaks enrollments down by broad categories of courses (mathematics courses, statistics courses, and computer science courses) and by levels of department. The enrollments of individual courses are given in Appendix I (where enrollments both with, and without, distance learning enrollments can be found; in CBMS survey reports prior to 2010, Appendix I gives enrollments with distance learning enrollments included). Enrollments in introductory-level mathematics, calculus, and introductory-level statistics are considered in more detail in Chapter 5 (where tables generally do not include distance learning enrollments). When a table in this report concerns sections of a course, the corresponding enrollments do not contain distance-learning enrollments; otherwise, distance learning enrollments generally are included.

Table E.2 shows that increases in estimated enrollments occurred at almost all levels of departments and types of courses, except computer science enrollments in mathematics departments (which were up 35% from fall 2005 to fall 2010, but down in 2015) – including enrollments in mathematics courses, and mathematics department enrollments in statistics courses, which were up 19% (2.1 SEs) over fall 2010 and 72% over fall 2005.

Enrollments in mathematics courses

Considering, first, the enrollments in mathematics courses, Table E.2 shows that the estimated total national enrollment in mathematics courses taught at four-year mathematics departments in fall 2015 was roughly 2,213,000 (with an SE of 140,000), up 12% (1.7 SEs) from the estimated 1,971,000 in 2010, and up 38% from the estimated 1,607,000 in fall 2005. Mathematics course enrollments are broken down into enrollments in precollege courses, introductory courses (including Precalculus), calculus-level courses (including Linear Algebra, Differential Equations, Discrete Mathematics, as well as various kinds of Calculus), and advanced mathematics; each of these course grouping enrollments is broken down further by the level of the department. Figure E.2.1 shows that the largest estimated total mathematics enrollments are in the introductory-level courses, as was seen, also, in the two previous CBMS surveys. The biggest percentage growth in estimated mathematics course enrollment was in precollege-level courses, which increased 21% (1.7 SEs), from an estimated enrollment of roughly 209,000 in 2010 to an estimated enrollment of 253,000 (with SE 26,000) in 2015. The next largest growth in estimated enrollment in fall 2015 over fall 2010 occurred in introductory-level courses, up 16% (1.7 SEs), followed by an 8% (1 SE) growth in enrollment in calculus-level courses (which rose 37% in 2015 over 2005), and only a 3% (0.3 SE) increase in enrollment in advanced-level mathematics courses (which rose 38% in 2015 over 2005). In the

TABLE E.3 Number of sections (not including distance learning) of undergraduate mathematics, statistics, and computer science courses in mathematics and statistics departments by level of course and type of department in fall 2015 with fall 2010 figures in parentheses.

	Number of sections: Fall 2015 (Fall 2010)						
	Mathematics Departments				Statistics Departments		
	Univ (PhD)	Univ (MA)	Coll (BA)	Total Math Depts	Univ (PhD)	Univ (MA)	Total Stat Depts
Mathematics Courses							
Precollege level	2235	1578	4206	8020			
	(1578)	(2075)	(3699)	(7352)			
Introductory (incl. Precalc)	8245	6999	16948	32192			
	(6268)	(6556)	(12525)	(25349)			
Calculus	8323	4579	8285	21186			
	(7976)	(4559)	(9575)	(22110)			
Advanced Mathematics	3676	2633	4461	10771			
	(3266)	(3304)	(3913)	(10483)			
Total Math courses	22479	15788	33901	72168			
	(19088)	(16494)	(29712)	(65294)			
Statistics Courses							
Introductory Statistics	1319	1493	4562	7374	1256	238	1494
	(969)	(1208)	(5014)	(7191)	(1113)	(638)	(1751)
Upper Statistics	752	1432	1776	3960	796	174	970
	(561)	(420)	(929)	(1910)	(461)	(447)	(907)
Total Stat Courses	2072	2925	6338	11334	2052	412	2464
	(1530)	(1628)	(5943)	(9102)	(1573)	(1085)	(2658)
Computer Science Courses							
Lower Computer Science	109	186	1987	2282			
	(101)	(146)	(2230)	(2477)			
Middle Computer Science	31	69	1128	1227			
	(51)	(92)	(769)	(912)			
Upper Computer Science	0	84	375	460			
	(49)	(69)	(741)	(859)			
Total CS courses	140	339	3490	3970			
	(201)	(307)	(3740)	(4248)			
Total all courses	24692	19053	43728	87472	2052	412	2464
	(20820)	(18428)	(39396)	(78644)	(1573)	(1085)	(2658)

Note: Due to round-off, row and column sums may appear inaccurate.

2010 CBMS survey data, the advanced-level courses showed the largest growth from 2005 to 2010, while the precollege-level courses showed the smallest growth, so at least some of the variation we see from 2010 to 2015 may be explained by standard error, though the general trend seems to be increasing enrollments (see Figure E.2.3). Growth in estimated enrollments occurred in all levels of departments, except precollege-level in masters-level departments, calculus-level in bachelors-level departments, and advanced-level in both masters and bachelors-level departments. Estimated total enrollments in mathematics courses grew 30% (2.5 SEs) at the doctoral-level departments, and were almost identical in the masters and bachelors-levels to the enrollments observed in fall 2010 (in the 2010 CBMS survey, the doctoral-level estimate showed the smallest growth over 2005). In 2015, total estimated enrollment in doctoral-level mathematics departments exceeded that in bachelors-level departments; see Figure E.2.3.

Enrollments in statistics courses

Statistics enrollments showed large gains in both mathematics and statistics departments, particularly in upper-level courses; Table E.2 shows that the estimated total enrollments in statistics departments were 144,000 (SE 4,000) in fall 2015 and 109,000 in fall 2010, a 32% (9 SEs) increase over fall 2010. In fall 2015, the estimated total enrollments in statistics courses in mathematics departments were 313,000 (SE 24,000), and, hence, roughly 2/3 of the estimated undergraduate statistics enrollments were in mathematics departments. It should also be noted (see Figure S.2.3 in Chapter 1) that, in fall 2015, for the first time, two-year college enrollments in introductory statistics courses surpassed four-year mathematics department enrollments in introductory statistics. The estimated number of enrollments in upper-level statistics courses were closer, but mathematics department enrollments in upper-level statistics courses were 20% more than statistics department enrollments at the upper-level in fall 2015. In mathematics departments, Table E.2 shows that the estimated introductory statistics enrollments in fall 2015 were 253,000, up 10% (1.1 SEs) from fall 2010, and the estimated upper-level statistics enrollments were up 88% (4.7 SEs). In statistics departments, the estimated introductory statistics enrollments in fall 2015 were up 16% (4.3 SEs) over fall 2010, and upper-level statistics enrollments were up 79% (11 SEs). The 2010 CBMS survey showed large gains from 2005 to 2010 in introductory enrollments, and modest gains in upper-level enrollments; perhaps the increased interest in beginning statistics courses in 2010 has matured to interest in the upper-level statistics courses in 2015.

Most of the introductory statistics that is taught in four-year mathematics departments occurs in bachelors-level departments, where the fall 2015 enrollment in introductory statistics was roughly 134,000 with an SE of 14,000; this estimate was slightly lower than the 2010 estimate. In masters-level departments, estimated upper-level statistics enrollments in 2015 were four times the 2010 estimate. Enrollment growth in statistics department occurred at the doctoral-level departments, as estimated enrollments in both lower-level and upper-level courses in masters-level statistics departments declined from 2010 to 2015. In doctoral-level statistics departments, estimated introductory statistics enrollments were up 44% (12 SEs) over fall 2010, and estimated upper-level enrollments were three times the 2010 estimate, and more than twice the 2005 estimate. Figure E.2.2 presents a bar graph of statistics course enrollments in the three levels of mathematics departments and two levels of statistics departments.

Enrollments in computer science courses in mathematics departments

Computer science enrollments in mathematics departments are now confined largely to bachelors-level departments. The estimated computer science enrollments in mathematics departments were down to 68,000 (SE 11,000) in fall 2015, below the 2010 estimate of 77,000, but above the 2005 estimate of 57,000, but well below the 2000 estimate of 123,000 enrollments. The long-run trend is declining computer science enrollments in mathematics departments, as more computer science courses are taught in computer science departments. The computer science enrollments in mathematics departments, though small, are still significant in mathematics department enrollments; as one example, according to Table E.2, in fall 2015 (as in fall 2010), the bachelors-level mathematics departments had more total estimated enrollments in computer science courses than in advanced-level mathematics courses.

Enrollments: numbers of sections

Another way to measure changes in enrollment is to track the number of course sections that are offered. Table E.3 shows that, from fall 2010 to fall 2015, the estimated total number of course sections offered in mathematics departments grew 11% (1.2 SEs), and the estimated total number of sections of mathematics courses grew 11% (1 SE); these data provide an estimate similar to the estimated growth observed in enrollments. The number of sections of precollege-level mathematics courses grew by an estimated 9% (0.9 SEs) from fall 2010 to fall 2015, and the number of sections of introductory-level courses grew by an estimated 27% (1.4 SEs). The estimated number of sections of calculus-level courses was smaller in 2015 than in 2010, due to a smaller number of sections in the bachelors-level departments. The estimated number of sections of mathematics courses in

TABLE E.4 Enrollments in distance-learning courses (meaning courses in which the majority of the instruction occurs with the instructor and the students separated by time and/or space [e.g. courses in which the majority of the course is taught online, or by computer software, or by other technologies], including MOOCs that are offered for credit) and other sections for various freshman and sophomore courses, by type of department, in fall 2015. (A MOOC is a "massive open online course.") (Fall 2010 data in parentheses.)

	Four-year Mathematics Departments		Two-year Mathematics Departments		Statistics Departments	
	Distance-learning Enrollments	Other Enrollments	Distance-learning Enrollments	Other Enrollments	Distance-learning Enrollments	Other Enrollments
Precollege Level	8405 (8106)	244475 (201089)	89035 (87073)	693252 (1062667)		
College Algebra, Trigonometry, & Pre-Calculus	45226 (12021)	954356 (431420)	55227 (40898)	390066 (309272)		
Calculus I (mainstream and non-mainstream)	8968 (2159)	346343 (332632)	7455 (3504)	84537 (82192)		
Calculus II (mainstream and non-mainstream)	3410 (782)	125126 (128104)	1813 (285)	32523 (30827)		
Differential Equations & Linear Algebra	1492 (862)	137567 (115837)	480 (298)	13559 (10473)		
Introductory Statistics	18696 (12368)	234558 (218385)	30608 (23363)	220671 (110910)	4291 (4171)	89620 (77153)

Note: For some distance-learning enrollments in this table, the Standard Error (SE) was very large. See Appendix VIII.

doctoral-level departments showed a growth of 18% (1.4 SEs), the largest growth of the three levels of mathematics departments. There were an estimated 548 more sections of advanced-level mathematics courses in fall 2015 over fall 2010 at bachelors-level departments, an increase of 14% (0.8 SEs); however, we noted that estimated total enrollments in these courses were slightly lower in 2015 than in 2010 by Table E.2.

Table E.3 also supports the general pattern of growth in estimated enrollments observed in statistics courses noted already. From fall 2010 to fall 2105, the estimated total number of sections of statistics courses offered in mathematics departments increased 25% (2 SEs), while the estimated number of sections in statistics departments decreased, due to the fact that the estimated number of sections in masters-level statistics departments in fall 2015 was less than half the 2010 estimate (and Table E.2 showed enrollments decreased as well). The estimated number of sections of upper-level statistics courses in all levels of mathematics departments combined more than doubled from 2010 to 2015, and, at masters-level mathematics departments, more than tripled. In doctoral-level statistics departments Table E.3 shows the estimated number of sections of upper-level statistics courses increased by 73% (9.3 SEs) from 2010 to 2015.

The issue of what constitutes a course "section" has become more problematic, as courses now are taught in many different formats, and some departments list courses in different sections even though they are taught in the same room at the same time. The issue of enrollment in course sections is addressed further in Chapter 5, where enrollment tables are broken down by the format of section.

Table E.4: Distance education in four-year colleges and universities

The 2015 CBMS survey defined distance learning courses as "those courses offered by your institution for credit, in which the majority of the instruction occurs with the instructor and the students separated in time and/or place (e.g. courses in which the majority of the course is taught online, or by computer software, or by other technologies) including MOOCs that are offered for credit. (A MOOC is a 'massive open online course')". Various practices in distance learning courses were discussed in Chapter 2 (see Tables SP.8-SP.11B). While at four-year departments these enrollments are still a small percentage of total enrollments, yet these enrollments appear to be growing. Distance learning enrollments are a larger percentage of two-year college enrollments than of four-year college enrollments, and data on distance learning enrollment at two-year colleges is included here for comparison (more information regarding distance learning enrollments at two year-colleges is contained in Chapter 6).

Table E.4 shows that enrollments in distance learning courses were up in fall 2015 over fall 2010, for every category of courses in the table, with the total distance learning enrollments in Table E.4 for four-year mathematics departments (combined), in fall 2015 estimated at 86,197, more than double the fall 2010 estimate of 36,798. In fall 2015, at two-year colleges, estimated distance learning enrollments represented 11% of estimated precollege (distance learning + other) enrollments, 12% of College Algebra, Trigonometry and Pre-Calculus (combined) enrollments, 8% of Calculus I enrollments, and 12% of introductory statistics enrollments (all of these percentages, with the exception of introductory statistics, are up over 2010). At four-year mathematics departments, these estimated percentages in fall 2015 were 3%, 9%, 3%, and 7%, respectively, (all larger than in 2010), and in four-year statistics departments, 5% of the introductory statistics enrollment was taught in distance learning sections (same estimated percentage as in 2010). Distance learning estimated enrollments for individual courses (except for advanced-level courses) are contained in Appendix I; Chapter 2, Tables SP.11(A) and SP.11(B), present data on the advanced-level mathematics and statistics courses that were reported to be available in a distance learning format in 2015.

Table E.4 shows that the largest estimated distance learning course category enrollment in mathematics departments at four-year institutions in fall 2015 occurred in the category of College Algebra, Trigonometry and Pre-Calculus courses combined, where the estimated distance learning enrollment in fall 2015 was almost four times the fall 2010 estimate, increasing from 12,021 in fall 2010 to 45,226 (SE 9,043) in fall 2015. The next largest category of the distance learning enrollments in four-year mathematics departments was introductory statistics, where estimated distance learning enrollments increased 51% (1.6 SEs). Distance learning enrollments in both Calculus I and in Calculus II were more than 4 times the 2010 estimates, and Differential Equations and Linear Algebra combined distance learning enrollments were up 73% (1.1 SEs) from 2010. Many of the SEs for the data in Table E.4 are large, so these percentages of increase, as large as they appear, may be somewhat misleading; however, it does appear that distance learning enrollments are increasing in four-year mathematics departments and in two-year colleges. The estimated distance-learning enrollment in introductory statistics courses offered in statistics departments was almost identical in 2010 and 2015.

TABLE E.5 Number of sections (excluding distance learning) of calculus-level courses in mathematics departments taught by various types of instructor, by type of department in fall 2015, with fall 2010 figures in parentheses. This table can be compared to Table E.8 in CBMS2010, p. 92.

	Number of calculus-level sections taught by					
	Tenured/ tenure-eligible [1]	Other full-time	Part-time	Graduate Teaching Assistant	Unknown	Total Sections
Mathematics Departments						
Univ (PhD)	2803	2962	733	1370	454	8323
	(3120)	(2057)	(789)	(1289)	(721)	(7976)
Univ (MA)	2365	994	797	84	339	4579
	(3080)	(495)	(611)	(160)	(213)	(4559)
Coll (BA)	5896	1078	585	0	727	8285
	(6743)	(839)	(1223)	(0)	(771)	(9575)
Total	11064	5034	2115	1454	1520	21186
	(12943)	(3391)	(2622)	(1448)	(1705)	(22110)

[1] In 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously. In 2015 the word "permanent" was deleted.

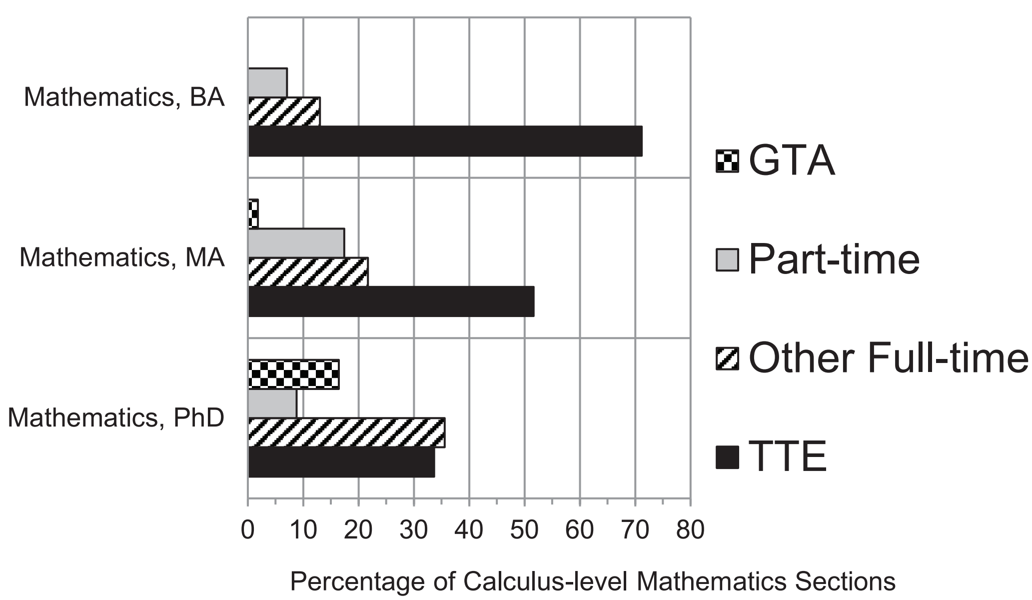

FIGURE E.5.1 Percentage of calculus-level mathematics sections in mathematics departments whose instructors were tenure/tenure-eligible (TTE), other full-time faculty, part-time faculty, and graduate teaching assistants (GTA), by type of department in fall 2015. (Percentages may not sum to 100 due to "unknown" instructor percentages.) (Note: Figure E.5.1 in CBMS2010, p. 98, included data on all mathematics courses offered.)

TABLE E.6 Number of sections (excluding distance learning) of introductory statistics courses taught in mathematics departments and statistics departments by type of instructor and type of department in fall 2015 with fall 2010 figures in parentheses. This table can be compared to Table E.9 in CBMS2010, p. 93.

	Number of introductory statistics sections taught by					
	Tenured/ tenure-eligible [1]	Other full-time	Part-time	Graduate Teaching Assistant	Unknown	Total Sections
Mathematics Departments						
Univ (PhD)	268	392	239	245	175	1319
	(251)	(243)	(124)	(274)	(77)	(969)
Univ (MA)	781	467	216	0	29	1493
	(641)	(185)	(293)	(19)	(70)	(1208)
Coll (BA)	2006	725	1389	30	411	4562
	(2564)	(601)	(1130)	(28)	(691)	(5014)
Total	3055	1584	1844	275	615	7374
	(3456)	(1029)	(1547)	(320)	(838)	(7191)
Statistics Departments						
Univ (PhD)	136	281	111	466	263	1256
	(262)	(202)	(103)	(243)	(302)	(1113)
Univ (MA)	75	97	33	3	31	238
	(318)	(93)	(113)	(17)	(96)	(638)
Total	210	378	144	468	295	1494
	(581)	(295)	(217)	(260)	(399)	(1751)

Note: Round-off may make row and column sums seem inaccurate.

[1] In 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously. In 2015 the word "permanent" was deleted.

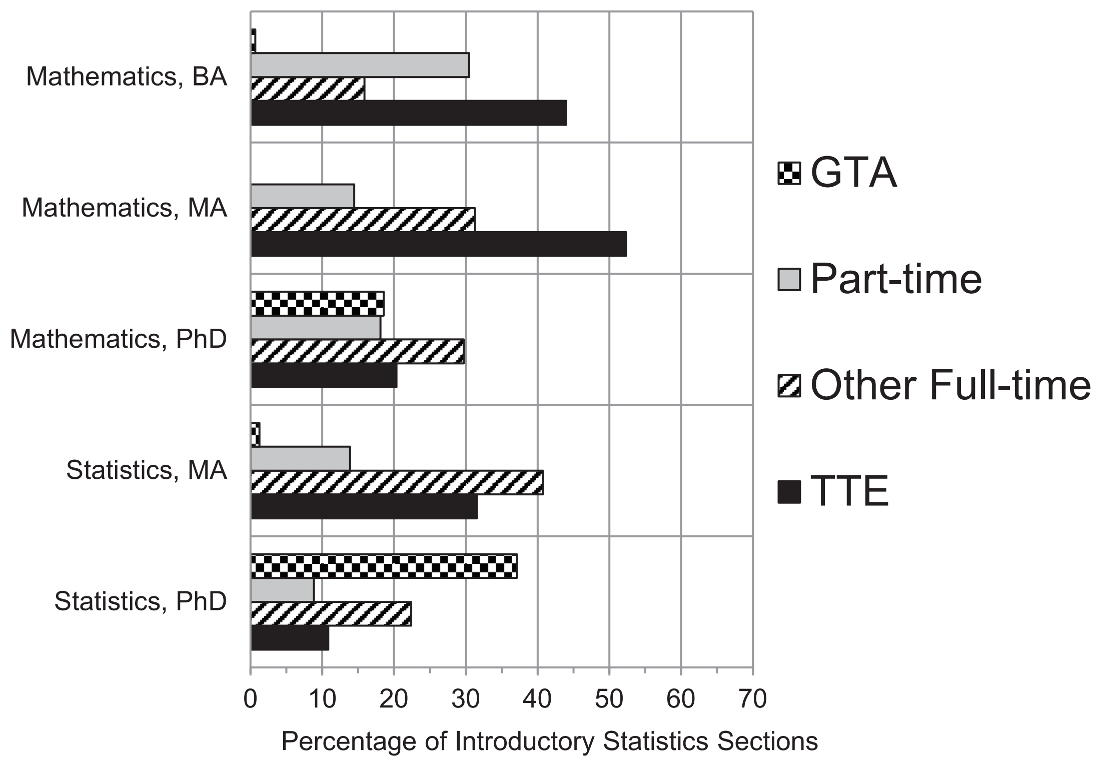

FIGURE E.6.1 Percentage of introductory statistics sections in mathematics and in statistics departments whose instructors were tenure/tenure-eligible (TTE), other full-time faculty, part-time faculty, and graduate teaching assistants (GTA), by type of department in fall 2015. (Percentages may not sum to 100 due to "unknown" instructor percentages.) (Note: Figure E.5.2. in CBMS 2010, p. 90, included data on all statistics courses offered.)

Tables E.5-E.9: Appointment type of instructors in mathematics and statistics courses at four-year mathematics and statistics departments in fall 2015

Past CBMS surveys have analyzed the appointment type of the instructors teaching mathematics and statistics courses at four-year departments. The 2000 survey generally tabulated percentages of enrollments taught by various rank instructors, while the 2005 survey switched to percentages of sections taught by instructors of various ranks. The 2015 survey continues the practice begun in 2005 of considering percentages of sections. In 2015, instructors were broken into the appointment type categories: tenured or tenure eligible (TTE), other full time (OFT) (a category that includes, for example, postdocs, faculty with appointments that are renewable (but not tenure-eligible), and academic visitors), part-time (PT), graduate teaching assistant (GTA), and unknown (a category that was used when the response did not account for all sections of a course). In the 2010 survey the label “permanent” was added to the description of the TTE category on the questionnaire (to include the small percentage of cases where an institution does not recognize tenure), and this change, unintentionally, may have added to the number of instructors in the TTE category instructors who have teaching positions that are regarded as permanent, although these faculty do not have tenure and are not eligible for tenure, at institutions that recognize tenure; these latter faculty should have been counted as OFT faculty. The 2015 survey instructions tried to make it more clear that such faculty should be counted as OFT faculty. To shorten the questionnaire, in 2015 the survey instrument asked for this breakdown of who is teaching the section only in calculus-level mathematics courses (including Calculus (in all flavors and levels), Differential Equations, Linear Algebra, and Discrete Mathematics), introductory statistics courses, and computer science courses taught in mathematics departments; for advanced-level courses, the survey asked for only the number of sections taught by TTE faculty. A similar scheme was used on the 2015 statistics department questionnaire. In the 2010 survey, this breakdown of the appointment type of the instructor was also sought for precollege-level and college algebra-level mathematics courses, but these questions were deleted from the 2015 survey instrument. In both 2010 and 2015 there were unknown rank instructors reported; the numbers of these unknown seem roughly comparable in the two surveys.

Appointment type of calculus-level instructors

Table E.5 and Figure E.5.1 summarize the appointment types of the calculus-level instructors in mathematics departments at four-year institutions in fall 2015. The estimated percentage of calculus-level sections taught by faculty at each rank, for each level of department, is presented. The total number of sections (excluding distance learning sections) is also given, and the numbers in parentheses are from the 2010 CBMS survey [CBMS2010, Table E.8, p 92]. Table E.6 and Figure E.6.1 give these appointment types for introductory statistics courses in mathematics and statistics departments, by level of department (compare with CBMS2010, Table E.8, p 92), Table E.7 gives these appointment types for advanced-level courses in mathematics and statistics departments, by level of department (compare with CBMS2010, Table E.12, p. 96), Tables E.8 and E.9, and Figure E.9.1, gives these ranks for computer science courses taught in mathematics departments, by level of department (compare with CBMS2010, Tables E.10 and E.11, p. 94).

Although by Table E.3 the estimated number of calculus-level sections decreased by 4% (0.6 SEs) from 2010 to 2015, Table E.5 shows that, over all levels of mathematics departments combined, there was a 48% (2.9 SEs) increase in the estimated number of calculus-level sections taught by OFT faculty, and a 15% (2.6 SEs) decrease in the estimated number of sections taught by TTE faculty. This trend occurred across all levels of mathematics departments: from fall 2010 to fall 2015, the estimated number of sections of calculus-level courses taught by OFT faculty increased 44% (2 SEs) at doctoral-level departments, were double (2.2 SEs) in masters-level departments, and increased 28% (1 SE) in bachelors-level departments. Figure E.5.1 presents a bar graph, displaying, at each level of department, the estimated percentage of sections taught by each appointment type of faculty, and it shows that, in doctoral-level departments, in fall 2015, slightly larger percentage of sections of calculus-level courses were taught by OFT faculty than by TTE faculty, in contrast to the situation in the other two levels of mathematics departments, and different from fall 2010, when a larger percentage of sections were taught by TTE faculty. GTAs taught an estimated 16% of sections of calculus-level courses offered at doctoral-level mathematics departments in fall 2015, the same estimate as in 2010. Over all levels of mathematics departments combined, the estimated percentage of calculus-level sections taught by TTE faculty has been decreasing; it was estimated at 61% in 2005, 59% in 2010, and 52% in 2015. The estimated number of sections taught by PT faculty declined, most dramatically at the bachelors-level departments, where the estimated number of sections of calculus-level courses taught by PT faculty in fall 2015 was less than half the 2010 estimate. We note that bachelors-level departments were the only level where the estimated number of sections of calculus-level courses declined from fall 2010 to fall 2015 (Table E.3) and, also, where estimated calculus enrollments declined (Table E.2), so, perhaps, these declines led to fewer PT faculty. For further discussion of the decline in TTE faculty teaching Calculus classes, see Chapter 5, and also David Bressoud's Launchings blog http://launchings.blogspot.com/ for October 2017.

Appointment type of statistics instructors

Table E.6 breaks down the estimated number of sections of introductory statistics courses taught in mathematics departments, and in statistics departments, by the appointment type of the instructor; the table invites comparison of the percentages of the appointment types of the instructors in mathematics and statistics departments, which differ over the two kinds of departments, and over the different levels of departments (see Figure E.6.1). The estimated total number of sections of introductory statistics courses was slightly larger in fall 2015 than in fall 2010, in mathematics departments, but slightly smaller in fall 2015 in statistics departments, due to a decreased number of sections in masters-level statistics departments. Over all levels of mathematics departments combined, in fall 2015, an estimated 41% of the introductory-level statistics sections were taught by TTE faculty, 21% were taught by OFT faculty, 25% were taught by PT faculty, and 4% were taught by GTAs; in all levels of statistics departments combined, an estimated 14% of the introductory-level sections were taught by TTE faculty, 25% were taught by OFT faculty, 10% were taught by PT faculty, and 31% were taught by GTAs. Comparing these percentages to the estimates obtained in 2010, we see in mathematics departments, from 2010 to 2015, a slight shift toward OFT faculty, and, in statistics departments, from 2010 to 2015, there was roughly a reversal of the percentage of sections taught by TTE faculty and those taught by GTAs. In doctoral-level statistics departments, the estimated number of introductory statistics sections taught by TTE faculty decreased 48% (11.5 SEs) and the number of sections taught by GTAs increased 92% (5 SEs).

Appointment type of advanced-level course instructors

Table E.7 presents the appointment types of instructors in advanced-level mathematics and statistics courses, in mathematics and statistics departments. For advanced-level courses, the survey instruments asked for only the numbers of sections taught by TTE faculty. In fall 2015 (respectively, fall 2010), in

TABLE E.7 Number of sections of advanced mathematics (including operations research) and statistics courses in mathematics departments, and number of sections of advanced statistics courses in statistics departments, taught by tenured/tenure-eligible[1] (TTE) faculty, and total number of advanced level sections, by type of department in fall 2015 with fall 2010 data in parentheses. This table can be compared to Table E.12 in CBMS2010, p. 95.

Mathematics Departments	Sections taught by TTE [1]	Total sections	Statistics Departments	Sections taught by TTE [1]	Total sections
Advanced Mathematics courses					
Univ (PhD)	2519 (2500)	3676 (3266)			
Univ (MA)	1769 (2098)	2633 (3304)			
Coll (BA)	3236 (3548)	4461 (3913)			
Total advanced mathematics	7525 (8146)	10771 (10483)			
Advanced Statistics courses			Advanced Statistics courses		
Univ (PhD)	452 (438)	752 (561)	Univ (PhD)	394 (324)	796 (452)
Univ (MA)	656 (308)	1432 (420)	Univ (MA)	140 (382)	174 (442)
Coll (BA)	1010 (721)	1776 (929)			
Total advanced statistics	2118 (1467)	3960 (1910)	Total advanced statistics	533 (706)	970 (894)
Total all advanced courses	9643 (9613)	14731 (12394)	Total all advanced courses	533 (706)	970 (894)

Note: Round-off may make row and column sums seem inaccurate.

[1] In 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously. In 2015, the word "permanent" was deleted.

TABLE E.8 Number of sections (excluding distance learning) of lower-level computer science taught in mathematics departments, by type of instructor and type of department in fall 2015, with fall 2010 figures in parentheses. This table can be compared to Table E.10 in CBMS2010, p. 94.

	Number of lower-level computer science sections taught by					
	Tenured/ tenure-eligible/ permanent [1]	Other full-time	Part-time	Graduate Teaching Assistant	Unknown	Total Sections
Mathematics Departments						
Univ (PhD)	30	71	8	0	0	109
	(25)	(29)	(29)	(15)	(4)	(101)
Univ (MA)	112	48	26	0	0	186
	(116)	(0)	(30)	(0)	(0)	(146)
Coll (BA)	899	339	277	0	472	1987
	(1089)	(397)	(656)	(14)	(73)	(2230)
Total	1042	458	311	0	472	2282
	(1229)	(426)	(715)	(30)	(77)	(2477)

Note: Round-off may make row and column sums seem inaccurate.

[1] In 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously. In 2015 the word "permanent" was deleted.

doctoral-level mathematics departments, an estimated 69% (respectively, 77%) of sections of advanced-level mathematics courses were taught by TTE faculty, in masters-level departments, an estimated 67% (respectively, 63%) of sections of advanced-level mathematics courses were taught by TTE faculty, and in bachelors-level departments, an estimated 73% (respectively, 91%) of sections of advanced-level mathematics courses were taught by TTE faculty. The estimated percentage of sections of advanced-level statistics courses taught by TTE faculty, in all levels of mathematics departments combined, dropped from 78% in fall 2010, to 53% in fall 2015; in statistics departments, the corresponding estimated percentages dropped from 79% to 55%. These changes in the percentages are another indication of the apparently decreasing role in undergraduate teaching played by TTE faculty.

Appointment type of computer science instructors

Tables E.8 and E.9 give the estimated number of sections of lower-level and middle-level computer sciences courses taught by faculty at the various appointment types; the estimated number of sections of lower-level computer science taught by PT faculty decreased, while the estimated number of sections of upper-level computer science courses taught by PT faculty increased. Figure E.8.1 displays the percentages of faculty at each rank, for all levels of computer science courses taught in mathematics departments combined.

Tables E.10 and E.11: Average section size

Table E.10 summarizes data on the average section size for each of the course categories, broken down by the level of department in fall 2015 (and fall 2010), and the overall averages over the last four CBMS surveys. The Mathematical Association of America has recommended 30 students as the appropriate maximum class size for undergraduate mathematics courses [MAAGuidelines], and the CBMS surveys have shown that this maximum is not always maintained. In particular, section sizes at the doctoral-level departments often substantially exceed the MAA Guidelines. As we have noted, the definition of a section caused some problems with responses in 2010, particularly with calculus sections.

Table E.10 shows that the largest changes from 2010 in the estimated average section size in 2015

TABLE E.9 Number of sections (excluding distance learning) of middle-level computer science taught in mathematics departments, by type of instructor and type of department in fall 2015, with fall 2010 figures in parentheses. This table can be compared to Table E.11 in CBMS2010, p. 94.

	Number of middle-level computer science sections taught by					
	Tenured/ tenure-eligible/ permanent [1]	Other full-time	Part-time	Graduate Teaching Assistant	Unknown	Total Sections
Mathematics Departments						
Univ (PhD)	17	0	5	0	9	31
	(31)	(11)	(2)	(7)	(0)	(51)
Univ (MA)	55	4	9	0	0	69
	(92)	(0)	(0)	(0)	(0)	(92)
Coll (BA)	549	311	161	0	107	1128
	(521)	(156)	(95)	(0)	(0)	(769)
Total	621	316	174	0	116	1227
	(644)	(168)	(97)	(7)	(0)	(912)

Note: Round-off may make row and column sums seem inaccurate.

[1] In 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously. In 2015 the word "permanent" was deleted.

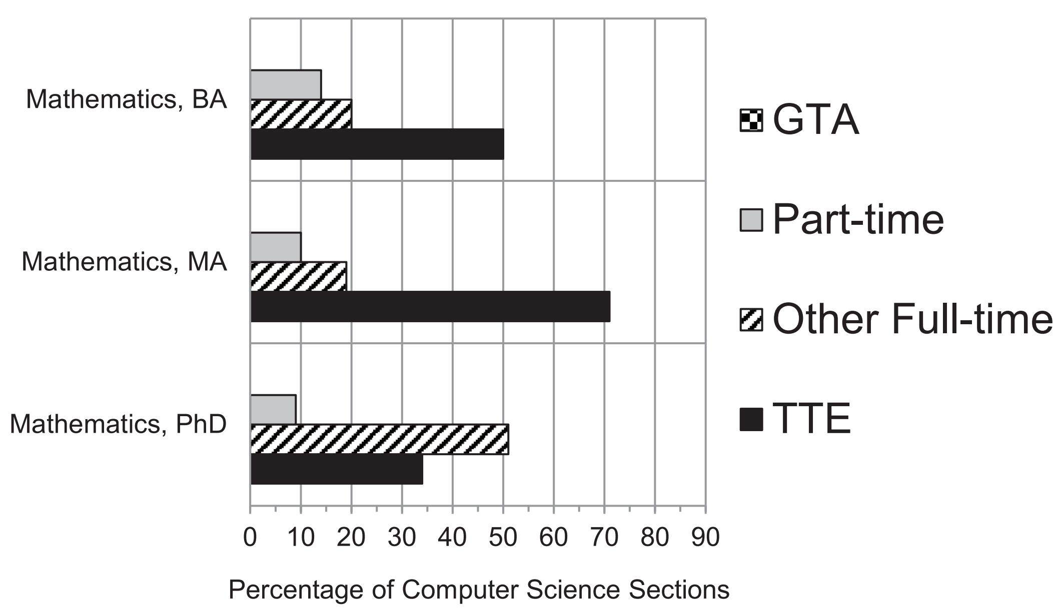

FIGURE E.9.1 Percentage of computer science sections (all levels) in mathematics departments whose instructors were tenure/tenure-eligible faculty (TTE), other full-time faculty, part-time faculty, and graduate teaching assistants (GTA), by type of department in fall 2015. (Percentages may not sum to 100 due to "unknown" instructor percentages.) This figure can be compared to Figure E.5.3 in CBMS2010, p. 91.

TABLE E.10 Average section size (excluding distance learning) for undergraduate mathematics, statistics, and computer science courses in mathematics and statistics departments, by level of course and type of department in fall 2015, with fall 2010 data, when available, in parentheses. Also, all departments' average section sizes from previous CBMS surveys. This table can be compared to Table E.13 in CBMS2010, p. 96.

	Average section size Fall 2015 (2010)							All Departments			
	Mathematics Depts				Statistics Depts						
	Univ (PhD)	Univ (MA)	Coll (BA)	Overall Math	Univ (PhD)	Univ (MA)	Overall Stat	2000	2005	2010	2015
Mathematics courses											
Precollege	34 (36)	30 (30)	29 (23)	30 (27)				29	28	27	30
Introductory (incl. Precalc)	47 (47)	31 (31)	20 (27)	30 (33)				35	33	33	30
Calculus level	55 (48)	34 (31)	21 (24)	37 (34)				32	32	34	37
Advanced Mathematics	22 (20)	11 (12)	10 (12)	14 (14)				13	14	14	14
Statistics courses											
Introductory Statistics	40 (52)	39 (32)	27 (26)	32 (30)	59 (49)	65 (38)	60 (45)	37	35	33	37
Upper Statistics	23 (27)	16 (13)	11 (12)	15 (17)	57 (33)	27 (27)	52 (30)	22	19	21	22
CS courses											
Lower CS	38 (29)	24 (22)	18 (20)	19 (21)				22	19	21	19
Middle CS	20 (18)	22 (15)	13 (12)	13 (12)				22	9	12	13
Upper CS	NA (15)	19 (16)	13 (11)	14 (11)				11	8	11	14

NA = Not applicable (there were no upper division computer science courses at doctorate-granting institutions).

TABLE E.11 Average recitation size in Mainstream Calculus I and II and other Calculus I courses and in introductory statistics courses that are taught using lecture/recitation method, by type of department in fall 2015, with fall 2010 data in parentheses. Distance-learning sections are not included. (A calculus course is "mainstream" if it leads to the usual upper-division mathematical sciences courses.)

	Average recitation section size		
For Lecture/Recitation Courses	Univ (PhD)	Univ (MA)	College (BA)
Calculus Courses			
Mainstream Calculus I	31 (29)	34 (30)	17 (30)
Mainstream Calculus II	29 (29)	14 (25)	9 (33)
Other Calculus I	36 (30)	16 (19)	9 (15)
Introductory Statistics			
in Mathematics Depts	33 (28)	19 (29)	26 (32)
in Statistics Depts	25 (30)	28 (34)	na na

occurred in sections of courses in statistics departments and in sections of calculus-level courses in doctoral-level mathematics departments. In both levels of statistics departments combined (as well as in each individually) there was an increase in the estimated average section size; over both levels of statistics departments combined, in introductory-level classes, estimated average section size rose from 45 in fall 2010 to 60 (with SE 2.4) in 2015, a significant change, and in sections of upper-level statistics courses, estimated average section size grew from 30 in fall 2010 to 52 (with SE 2.0) in fall 2015, again a significant change. In doctoral-level mathematics departments, average section size rose from 48 in fall 2010 to 55 (SE 3) in fall 2015, an increase of more than 2 SEs.

Table E.11 presents the estimated average size of recitation sections in Calculus and introductory statistics courses in mathematics and statistics departments that were taught in a lecture/recitation format. The SEs in the masters-level departments were generally large. The bachelors-level estimated average recitation section size decreased significantly from fall 2010 to fall 2015, but the fall 2010 estimates were double the 2005 estimates. Perhaps the most interesting change in estimated average size of recitation sections is the increase in Non-Mainstream Calculus I estimated average recitation section size in doctoral-level departments, from 30 in fall 2010, to 36 (SE 1.7) in fall 2015. Table FY.2 in Chapter 5 will show large estimated average section size in "other" formats than lecture/recitation for Non-Mainstream Calculus I at doctoral-level mathematics departments.

Chapter 4

Faculty Demographics in Mathematical Sciences Departments of Four-Year Colleges and Universities

Introduction

In this chapter we consider data on the number, gender, age, and race/ethnicity of mathematical sciences faculty in doctoral-level, masters-level, and bachelors-level four-year mathematics departments, and also in doctoral-level and masters-level statistics departments having an undergraduate program in statistics. The same topics were presented in Chapter 1 tables for the profession as a whole. In this chapter we will consider differences across departments grouped according to the highest degree offered ("level of department"), by "type of appointment" (tenured, tenure-eligible, other full-time, postdoc), by highest degree obtained by the faculty ("doctoral" and "non-doctoral" faculty) and by gender. So that the discussion here can be relatively self-contained, we repeat some demographic data from Chapter 1.

- Table S.13 and Figure S.13.3 in Chapter 1 showed a pattern of increases in the estimated number of full-time faculty in all levels of mathematics departments combined, observed in the CBMS surveys of 2000, 2005, 2010, and 2015, and a pattern of decreases in the estimated number of part-time faculty that occurred until the current survey of 2015, when the number of part-time mathematics faculty increased significantly. Table S.13 and Figure S.13.5 showed a pattern of growth in the estimated numbers of full-time faculty in doctoral-level statistics departments, and relative stability in the estimated numbers of part-time faculty, over that same time frame for the doctoral-level statistics departments (the masters-level statistics departments were not included in the 2005 survey).
- Table S.13 and Figure S.13.3 of Chapter 1 showed that, in fall 2015, the estimated total number of full-time mathematics faculty was slightly larger than the fall 2010 estimate, but the 2010 estimate was within 1 SE of the 2015 estimate. However, the estimated number of part-time mathematics faculty increased by about 27% (more than 5 SEs from the 2010 estimate), ending the pattern of small declines in estimated numbers of part-time faculty in mathematics departments observed since 2000 (See Chapter 1, Figures S.13.2 and S.13.3). Tables F.1 and F.2 in this chapter break down these numbers further, showing that most of this growth in part-time faculty occurred in the doctoral-level and bachelors-level mathematics departments.
- Larger growth was observed in the estimated numbers of full-time statistics faculty. Table S.13 and Figure S.13.5 of Chapter 1 indicated that in fall 2015, the estimated total number of full-time faculty in doctoral-level statistics departments increased 23% (almost 5 SEs), and the estimated number of part-time faculty in doctoral-level statistics departments increased 22% over fall 2010 (1.2 SE). The total number of full-time statistics faculty in doctoral-level statistics departments in 2000 was estimated at 808 faculty; the 2015 estimate is 1,237 (Chapter 1, Table S.13). Tables F.1 and F.3 in this chapter include the data for masters-level statistics departments, as well as for doctoral-level statistics departments, and are broken down further.
- Breaking down the number of full-time mathematics faculty by the type of appointment, by Table S.15 in Chapter 1, the components of the small growth in the estimated number of full-time mathematics faculty from fall 2010 to fall 2015 were a 6% decline in the estimated number of tenured faculty (a decline of 4.8 SEs), a 9% decline in the estimated number of tenure-eligible faculty (4.1 SEs), and a 22% (6.1 SEs) increase in the estimated number of "other full time faculty" (full-time, non-tenure-eligible faculty, including postdocs). These estimates are broken down further in Tables F.1 and F.2 in this chapter.
- Table F.1 (and Tables F.1.1 and F.2, which are derived from this table) in this chapter provide more detail on the estimated numbers of mathematics faculty, broken down by level of department, highest degree of the faculty, and by gender. The estimated numbers of tenured, and of tenure-eligible, faculty remained stable or declined from fall 2010 to fall 2015, the largest declines being a 20% (5 SEs) decline in masters-level tenure-eligible mathematics faculty, and a 12% (4.3 SEs) (respectively, 9% (2.5 SEs)) decline in tenured (respectively, tenure-eligible) mathematics faculty in the bachelors-level departments. The estimated number of tenured mathematics faculty at doctoral-level mathematics departments has

declined from the CBMS2000 estimate of 5,022 in each of the following CBMS surveys.

- Breaking down the estimated number of full-time statistics faculty in masters and doctoral-level statistics departments combined by type of appointment, Table S.15 in Chapter 1 showed that, from fall 2010 to fall 2015, the estimated number of tenured statistics faculty increased by 6% (1.3 SEs), the number of tenure-eligible statistics faculty decreased by less than 1%, and hence these were not significant changes. However, the number of other full-time statistics faculty (including postdocs) increased by 129 faculty (a 47% (5.9 SEs) increase). Tables F.1 and F.3 in this chapter break these estimates down further.
- In doctoral-level statistics departments the estimated number of tenured faculty in fall 2015 was 649, nearly the same as it was in fall 2000. The estimated number of tenure-eligible faculty has increased from 138 faculty in fall 2000, to 220 in fall 2015 (Table F.3 in this chapter, and in CBMS2000, p. 98).
- Table S.15 in Chapter 1 showed that the estimated number of other full-time faculty in all levels of mathematics departments combined, from fall 2010 to fall 2015, increased by 1,332 faculty to 7,261 faculty (a 22% increase (6.1 SEs) from fall 2010); this estimate includes an increase of 292 postdoc faculty (a 28% (4.8 SEs) increase from 2010). The estimated number of other full-time mathematics faculty has more than doubled in the past 15 years. The estimated number of mathematics postdocs increased 61% from 2005 (when this data was first collected) to 2015 (for the 2000 and 2005 data see CBMS2005 Table S.15, p. 35).
- Tables F.1 and F.2 of this chapter provide more detail on other full-time and postdoc appointments, broken down by level of mathematics department, highest degree of the faculty, and by gender. Increases in the estimated numbers of both other full-time and postdoc appointments were observed across all three levels of mathematics departments. Over the past fifteen years, the estimated number of other full-time faculty has more than doubled at the doctoral and bachelors-level mathematics departments, and increased 69% in the masters-level mathematics departments. Especially dramatic was the increased number of postdocs at bachelors-level mathematics departments, which grew from an estimated 6 postdocs in fall 2010 to an estimated 137 postdocs in fall 2015.
- In masters- and doctoral-level statistics departments combined, Table S.15 of Chapter 1 showed that the estimated number of other full-time faculty (including postdocs) increased from fall 2010 to fall 2015 by 129 faculty (5.9 SEs) to 401 other full-time faculty (a 47% increase from 2010), and, over that time period, the estimated number of postdocs increased by 30 postdocs (a 35% (2 SEs) increase from fall 2010).
- From Table F.3 we see that, in fall 2015, the number of other full-time faculty in doctoral-level statistics departments was estimated at 369 faculty. In fall 2000 there were 99 estimated other full-time faculty in doctoral-level statistics departments; hence, this category of faculty has more than tripled in the past 15 years. The estimated number of postdocs in doctoral-level statistics departments increased from 51 in 2005 to 113 in 2015, so this estimate has more than doubled from 2005 to 2015. The estimated numbers of other full-time faculty and of postdocs were smaller in fall 2015 than in fall 2010 in masters-level statistics departments. (See CBMS2005 Table F.3, p. 105 for data in 2000 and 2005.)
- The estimated numbers of faculty with a doctorate generally increased from fall 2010 to fall 2015. For example, it follows from Table F.1 that, from fall 2010 to fall 2015, in doctoral-level mathematics departments, the estimated number of part-time faculty with a doctorate increased by 59% (9 SEs), and the estimated number of other full-time faculty with a doctorate, who are not postdocs, increased 61% (7 SEs).
- Table S.15 in Chapter 1 showed that, in fall 2015, women comprised 31% of all full-time mathematics faculty, 22% of all tenured mathematics faculty, 36% of all tenure-eligible mathematics faculty, and 22% of all mathematics postdocs, all estimates, except estimated percentage of postdocs, are a few percentage points above the estimated percentages in 2010. In statistics departments, in fall 2015, women were 27% of all full-time faculty, 20% of tenured faculty, 35% of tenure-eligible faculty, and 19% of all postdocs; all of these estimated percentages, except the percentage of tenure-eligible faculty and the percentage of women postdocs. are up over 2010. Tables F.1, F.2, and F.3 and Figure F.3.1 in this chapter provide more detail on the estimated numbers of women faculty. Among the significant changes from 2010 was an increase in the estimated number of tenured women faculty in doctoral-level mathematics departments, which was up 21% (7.5 SEs) in fall 2015 over fall 2010.
- Table S.16 in Chapter 1 gave estimated age distribution of tenured and tenure-eligible mathematics faculty. The percent of tenured and tenure-eligible faculty age 65 and older increased from 8% in 2005 to 12% in 2010, and is estimated at 13% in 2015, suggesting a decline in the rate of retirement among the most senior faculty. Tables S.17 in Chapter 1 showed a similar trend in statistics faculty, where

the estimated percent of tenured and tenure-eligible faculty aged 65 and older increased from 8% in 2005 to 10% in 2010, and is estimated at 14% in 2015. Table F.4 in this chapter gives data on the age distribution of faculty, broken down by level of department, and the average ages of faculty in fall 2005, 2010, and 2015.

- Tables S.18 and S.19 of Chapter 1 showed that the estimated distribution of faculty by race/ethnicity in mathematics and statistics departments in fall 2015 had changed only slightly from fall 2010. The estimated percentages of White male faculty continued to decrease slightly, as they had over the recent CBMS surveys, and the estimated percentages of Asian faculty were generally slightly higher in fall 2015 than in previous surveys. The estimated percentages of Black and Hispanic faculty remain small. More information on race-ethnicity and gender is contained in Tables F.5 (full-time faculty) and F.6 (part-time faculty) in this chapter; Table F.5 estimated that, in fall 2015, 22% (respectively 11%) of tenured and tenure-eligible statistics faculty were Asian male (respectively, female); in fall 2000 these percentages were estimated at 15% (4%) [CBMS2000 Table SF.12, p. 26].

Data sources and notes on the tables

Each fall the AMS conducts the Annual Survey of the Mathematical Sciences (that we will call just the Annual Survey when the context is clear), a collection of national surveys of mathematical sciences departments at four-year institutions. This work is sponsored by the AMS, ASA, IMS, MAA, and SIAM with oversight provided via the Joint Data Committee (JDC) whose members are appointed by the sponsoring societies. Reports on these surveys are published in the Notices of the American Mathematical Society each year, and online at http://www.ams.org/profession/data/annual-survey/annual-survey. Beginning with the CBMS survey in 2005, the demographic data for the CBMS survey is collected as part of the Annual Survey; sampled departments were asked additional demographic questions that normally do not appear on the Annual Survey.

In comparing data from the CBMS surveys to data published in the Annual Surveys, one must keep in mind several differences between the survey reports. The Annual Surveys do not include postdoctoral appointments as a part of "other full-time faculty" (OFT), while CBMS surveys do – i.e. CBMS surveys list "other full-time faculty" (which includes postdoctoral appointments), and also lists the portion of other full-time faculty that are postdoctoral appointments. The CBMS surveys of "statistics" include only statistics departments that offer an undergraduate program in statistics, while the Annual Surveys go to all departments of statistics and biostatistics that award a Ph.D. The 2005 Annual Survey did not include masters-level statistics departments, and the 2010 and 2015 surveys did include these departments; hence comparisons to 2005 are for doctoral-level statistics programs, and comparisons to 2010 data include masters-level programs (it should be noted that there are a smaller number of masters-level statistics programs and estimates for these departments tend to have large standard errors). The Annual Surveys use stratified random samples of bachelors-level mathematics programs but a census of doctoral and masters-levels programs.

Table entries are rounded to the nearest integer, and the sum of rounded numbers is not always equal to the rounded sum. In the text that follows, the standard error (SE) in many of the estimates is provided along with the estimate (e.g. "estimate 4,596 (SE 58)"); the standard errors for all CBMS2015 tables can be found in Appendix VIII. The change in an estimate from the estimate in a previous survey is often expressed both as percentage change and as the number of SEs that change represents (e.g. "increased 22% (1.2 SEs)").

Numbers of full-time mathematics and statistics faculty

Table S.13 and Figure S.13.3 in Chapter 1 showed a pattern of increases in the estimated number of full-time faculty in all levels of mathematics departments combined, observed in the CBMS surveys of 2000, 2005, 2010, and 2015, and a pattern of decreases in the estimated number of part-time mathematics faculty that occurred until the current survey in 2015, when the estimated number of part-time faculty increased. Table S.13 showed that, in fall 2015, the estimated total number of full-time mathematics faculty plus part-time mathematics faculty for all levels of four-year mathematics departments combined increased by almost 7% from 2010 to 2015. From Table S.13 and Figures S.13.1 and S.13.3 we see that the estimated total number of full-time mathematics faculty in four-year colleges and universities across all types of departments increased slightly from 22,293 in fall 2010 to 22,532 in fall 2015; the SE on the 2015 estimate was 312, so the 2010 estimate is within 1 SE of the 2015 estimate, and hence not significantly different. The fall 2005 estimate was 21,885 faculty, and the fall 2000 estimate was 19,799 faculty.

Table S.13 and Figure S.13.5 in Chapter 1 showed a pattern of growth in the estimated numbers of full-time faculty in doctoral-level statistics departments, observed over the CBMS surveys of 2000, 2005, 2010, and 2015, and the relative stability in the estimated numbers of part-time faculty in doctoral-level statistics departments, over that same time frame; we note the masters-level statistics departments were not included in the 2005 survey and hence are not included in Table S.13. Table S.13 and Figure S.14.3 of Chapter 1 indicated that, in fall 2015, the estimated total number of full-time statistics faculty plus part-time statistics faculty in doctoral-level statistics departments increased about 23% from the fall 2010 estimate (compared to the 5% growth observed from 2005 to 2010). The number of full-time faculty in doctoral-level statistics departments increased from 1,004 in fall 2010, to 1,237 in fall 2015, a 23% (4.9 SEs) increase, and is up 53% since fall 2000. The fall 2005 estimate was 946 faculty, and the fall 2000 estimate was 808 faculty.

Numbers of tenured and tenure-eligible mathematics faculty

Despite the possibly slight increase in the estimated number of full-time mathematics faculty, Table S.14 in Chapter 1 shows that the estimated number of tenured plus tenure-eligible mathematics faculty decreased over the past 10 years: from 17,256 in 2005, to 16,364 in 2010, to 15,270 in 2015, a loss of almost 2,000 tenured or tenure-eligible positions over 10 years, eliminating the gains that had been made since fall 2000, when the estimated number of tenured plus tenure-eligible faculty was 16,245 (data from 2000 and 2005 can be found in CBMS2005 Table S.15, p. 35).

Table S.15 in Chapter 1 showed that across all types of four-year mathematics departments combined, from fall 2010 to fall 2015, the estimated number of tenured faculty decreased by 768 faculty, and the estimated number of tenure-eligible faculty decreased by 326 faculty, producing a 6% (4.3 SEs) decrease in the total number of tenured faculty and a 9% (4.1 SEs) decrease in the number of tenure-eligible faculty.

Table F.1 in this chapter gives the estimated numbers of full-time and part-time mathematics and statistics faculty, broken down by the level of department (the highest degree the department offered), the type of appointment (tenured, tenure-eligible, other full-time, postdoc, part-time), the highest degree of the faculty (doctoral or non-doctoral), and faculty gender, comparing fall 2010 and fall 2015. Table F.1.1, derived from F.1, gives totals for full-time faculty across all of the levels of mathematics (combined) and statistics departments (combined) broken down by the highest degree and gender. Table F.2, derived from F.1, gives the estimated numbers of full-time mathematics faculty, broken down by the level of department, the type of appointment, and faculty gender, and Table F.3, derived from F.1, gives these same data for statistics departments.

From Table F.2 we see that for mathematics departments, except for the doctoral-level departments, where the estimated number of tenure-eligible faculty was almost identical in fall 2010 and fall 2015, and also for the doctoral and masters-level mathematics departments, where the number of tenured faculty in 2015 was lower than (but within 1 SE of) the 2010 estimate, in each of the other levels of mathematics departments, the estimated numbers of tenured, and of tenure-eligible, faculty declined significantly from 2010 to 2015: a 20% (5 SEs) decline in masters-level tenure-eligible mathematics faculty, and a 12% (4 SEs) (respectively, 9% (2.5 SEs)) decline in tenured (respectively, tenure-eligible) mathematics faculty in the bachelors-level departments. Over the past 15 years, the estimated number of tenured faculty at doctoral-level mathematics departments shows a pattern of decline; it was estimated at 5,022 in fall 2000, at 4,719 in fall 2005, at 4,621 in fall 2010, and at 4,596 (with SE 58) in fall 2015. For bachelors-level departments, the estimated number of tenured faculty has a more varied pattern; the fall 2000 estimate was 4,817, the fall 2005 estimate was quite a bit larger at 5,612, the fall 2010 estimate was about the same at 5,693, and the fall 2015 was smaller at 5,018 (with SE 155); the 2000 estimate was 1.3 SEs below the 2015 estimate. (Data for 2000 and 2005 can be found in CBMS2005 Table F.2, p. 104.)

Numbers of tenured and tenure-eligible statistics faculty

Table S.14 of Chapter 1 showed that the estimated number of tenured faculty plus tenure-eligible faculty in doctoral-level and masters-level statistics departments combined grew by 4% (0.96 SEs) to 1,031, from fall 2010 to fall 2015. Table S.15 in Chapter 1 showed that, from fall 2010 to fall 2015, the estimated number of tenured statistics faculty increased by 6% (1.4 SEs), and the number of tenure-eligible statistics faculty decreased by 3% (0.5 SE), not significant changes. However, Table F.3 in this chapter shows both the estimated numbers of tenured, and of tenure-eligible, faculty grew from 2010 to 2015 in doctoral-level statistics departments, but declined in masters-level statistics departments.

To compare the data from fall 2015 to several previous CBMS surveys we consider the changes in the estimated numbers of tenured and tenure-eligible positions in doctoral-level statistics departments, since masters-level statistics departments were not surveyed in 2005. From Table F.3 we see that the estimated numbers of tenured and tenure-eligible faculty in doctoral-level statistics departments have increased over the past 15 years. In fall 2000, the estimated number of tenured faculty in doctoral-level statistics departments was 572, and, in fall 2015, the estimate was 649, an increase of 13% (2.3 SEs); in fall 2000, the estimated number of tenure-eligible faculty in doctoral-level statistics departments was 137, and, in fall 2015, it was 220, an increase of

TABLE F.1 Number of faculty, and of female faculty (F), in various types of mathematics departments and PhD and MA statistics departments, by highest degree and type of department, in fall 2015. (Fall 2010 figures are in parentheses, and postdocs are included in other full-time (OFT) faculty totals.)

	Univ (PhD)					Univ (MA)					Coll (BA)				
	Tenured	Tenure-eligible	OFT	Post-docs	Part-time	Tenured	Tenure-eligible	OFT	Post-docs	Part-time	Tenured	Tenure-eligible	OFT	Post-docs	Part-time
Mathematics Depts															
Doctoral Faculty	4591 (4,604)	998 (986)	2336 (1,739)	1150 (1,001)	588 (370)	2309 (2,369)	608 (758)	398 (237)	31 (16)	441 (354)	4780 (5,218)	1582 (1,712)	747 (627)	137 (6)	911 (609)
Doctoral (F)	635 (518)	260 (269)	652 (496)	234 (226)	151 (107)	587 (579)	244 (273)	307 (89)	3 (6)	148 (102)	1346 (1,408)	614 (546)	420 (158)	51 (0)	289 (220)
Non-doctoral Faculty	5 (16)	0 (8)	833 (756)	0 (0)	857 (731)	56 (65)	10 (17)	942 (749)	0 (1)	1469 (1,434)	238 (475)	93 (136)	2005 (1,821)	0 (0)	3416 (2,553)
Non-doctoral (F)	2 (6)	0 (1)	480 (449)	0 (0)	361 (326)	18 (26)	9 (11)	540 (427)	0 (1)	686 (659)	99 (203)	45 (127)	882 (828)	0 (0)	1612 (1,263)
Total Mathematics	4596 (4,621)	998 (994)	3170 (2,495)	1150 (1,001)	1445 (1,101)	2365 (2,434)	618 (775)	1339 (986)	31 (18)	1911 (1,787)	5018 (5,693)	1675 (1,848)	2752 (2,448)	137 (6)	4326 (3,161)
Total Mathematics (F)	637 (525)	260 (270)	1133 (946)	234 (226)	512 (433)	605 (605)	252 (284)	847 (516)	3 (7)	835 (761)	1445 (1,611)	659 (673)	1303 (987)	51 (0)	1901 (1,484)
Statistics Depts	Univ (PhD)					Univ (MA)									
Doctoral Faculty	649 (579)	220 (207)	226 (184)	113 (71)	91 (84)	123 (145)	40 (57)	13 (20)	3 (15)	21 (9)					
Doctoral (F)	137 (95)	71 (84)	107 (61)	22 (18)	19 (15)	16 (20)	19 (18)	8 (7)	0 (7)	5 (0)					
Non-doctoral Faculty	0 (1)	0 (2)	143 (31)	0 (0)	37 (21)	0 (2)	0 (0)	19 (37)	0 (0)	5 (20)					
Non-doctoral (F)	0 (0)	0 (0)	129 (20)	0 (0)	19 (11)	0 (2)	0 (0)	8 (20)	0 (0)	3 (7)					
Total Statistics	649 (580)	220 (209)	369 (215)	113 (71)	128 (105)	123 (147)	40 (57)	32 (57)	3 (15)	27 (29)					
Total Statistics (F)	137 (95)	71 (84)	237 (82)	22 (18)	38 (26)	16 (22)	19 (18)	16 (26)	0 (7)	8 (7)					

TABLE F.1.1 Number of faculty, and of female faculty (F), in mathematics departments combined and of statistics departments combined in fall 2015. (Fall 2010 figures are in parentheses.)

	Tenured	Tenure-eligible	OFT	Post-docs	Part-time
Mathematics Depts	Univ (PhD) + Univ (MA) + Coll (BA)				
Doctoral Faculty	11,681 (12,191)	3,188 (3,456)	3,481 (2,603)	1,317 (1,024)	1,940 (1,332)
Doctoral (F)	2,568 (2,505)	1,118 (1,088)	1,379 (744)	288 (232)	588 (429)
Non-doctoral Faculty	298 (557)	103 (161)	3,780 (3,326)	0 (1)	5,742 (4,718)
Non-doctoral (F)	120 (235)	54 (139)	1,903 (1,705)	0 (1)	2,659 (2,249)
Total Mathematics	11,979 (12,747)	3,291 (3,617)	7,261 (5,929)	1,317 (1,025)	7,682 (6,050)
Total Mathematics (F)	2,688 (2,740)	1,171 (1,227)	3,282 (2,449)	288 (233)	3,248 (2,678)
Statistics Depts	Univ (PhD) + Univ (MA)				
Doctoral Faculty	772 (724)	260 (264)	239 (204)	116 (86)	112 (93)
Doctoral (F)	153 (115)	90 (102)	115 (68)	22 (24)	25 (15)
Non-doctoral Faculty	0 (3)	0 (2)	162 (69)	0 (0)	43 (41)
Non-doctoral (F)	0 (2)	0 (0)	137 (40)	0 (0)	21 (18)
Total Statistics	772 (727)	260 (267)	401 (272)	116 (86)	155 (133)
Total Statistics (F)	153 (117)	90 (102)	253 (108)	22 (24)	46 (32)

61% (5.9 SEs) (see CBMS2005 Table F.3, p. 105 for 2000 and 2005 estimates). Table F.3 in this chapter shows that, from fall 2010 to fall 2015, the estimated number of tenured faculty in doctoral-level statistics departments increased by 12% (2.5 SEs), and the estimated number of tenure-eligible faculty increased by 5% (1.1 SEs); from fall 2005 to fall 2010, the estimated number of tenured faculty in doctoral-level statistics departments decreased by 24 (4%), and the estimated number of tenure-eligible faculty increased by 30 (17%).

From Table F.3 we see that in masters-level statistics departments from fall 2010 to fall 2015 the estimated number of tenured faculty decreased by 24 faculty (16% (1.4 SEs)) and the estimated number of tenure-eligible faculty decreased by 17 faculty (30% (1.7 SEs)).

Numbers of other full-time mathematics and statistics faculty

The category "other full-time faculty" is defined to be all full-time faculty who are not tenured or tenure-eligible, faculty with renewable positions, postdoctoral faculty, and visiting faculty; note that in the CBMS tables postdoctoral faculty are included in the count of other full-time faculty, and also are broken out from that category in the category "postdocs". "Postdoctoral appointments" are defined as "temporary positions primarily intended to provide an opportunity to extend graduate training or to further research

TABLE F.2 Number of tenured, tenure-eligible, postdoctoral, and other full-time faculty in mathematics departments at four-year colleges and universities by gender and type of department in fall 2015. (Note: Postdoctoral faculty are included in other full-time totals.)

	Univ (PhD)				Univ (MA)				Coll (BA)				**Total**			
	Tenured	Tenure-eligible	Other full-time	Post-docs[1]	Tenured	Tenure-eligible	Other full-time	Post-docs[1]	Tenured	Tenure-eligible	Other full-time	Post-docs[1]	Tenured	Tenure-eligible	Other full-time	Post-docs[1]
Men, 2015	3958	739	2037	916	1760	366	493	28	3573	1015	1450	85	9292	2120	3979	1030
Women, 2015	637	260	1133	234	605	252	847	3	1445	659	1303	51	2688	1171	3282	288
Total, 2015	4596	998	3170	1150	2365	618	1339	31	5018	1675	2752	137	11979	3291	7261	1317
Men, 2010	4096	724	1549	775	1829	490	470	10	4082	1175	1461	6	10007	2390	3480	792
Women, 2010	525	270	946	226	605	284	516	7	1611	673	987	0	2740	1227	2449	233
Total, 2010	4621	994	2495	1001	2434	775	986	18	5693	1848	2448	6	12747	3617	5929	1025

[1] A postdoctoral appointment is a temporary position primarily intended to provide an opportunity to extend graduate training or to further research experience. Postdoctoral faculty are included in the other full-time-faculty totals throughout CBMS2015. This contrasts with publications of the AMS-ASA-IMS-MAA-SIAM Annual Survey since 2003, which list postdoctoral faculty as a category separate from other full-time-faculty. Before 2003, separate counts of postdoctoral faculty were not collected by the Annual Survey.

Note: Round-off may make marginal totals seem inaccurate.

TABLE F.3 Number of tenured, tenure-eligible, other full-time, and postdoctoral faculty in statistics departments, by gender, in fall 2015 and 2010. (Postdoctoral faculty are included in other full-time faculty totals.)

	Doctoral Statistics Departments				Masters Statistics Departments				Total			
	Tenured	Tenure-eligible	Other full-time	Postdocs[1]	Tenured	Tenure-eligible	Other full-time	Postdocs[1]	Tenured	Tenure-eligible	Other full-time	Postdocs[1]
Men, 2015	512	148	132	91	107	21	16	3	618	170	148	94
Women, 2015	137	71	237	22	16	19	16	0	153	90	253	22
Total, 2015	649	220	369	113	123	40	32	3	772	260	401	116
Men, 2010	485	125	133	53	125	40	31	9	610	165	164	62
Women, 2010	95	84	82	18	22	18	26	7	117	102	108	24
Total, 2010	580	209	215	71	147	57	57	15	727	267	272	86

[1] A postdoctoral appointment is a temporary position primarily intended to provide an opportunity to extend graduate training or to further research experience. Postdoctoral faculty are included in the other full-time-faculty totals throughout CBMS2010. This contrasts with publications of the AMS-ASA-IMS-MAA-SIAM Annual Survey since 2003, which list postdoctoral faculty as a category separate from other full-time-faculty. Before 2003, separate counts of postdoctoral faculty were not collected by the Annual Survey.

experience", and these positions occur primarily (but not exclusively) in doctoral-level departments. The most consistent trend in the CBMS2015 data on faculty is the growth in the estimated numbers of other full-time faculty.

Table S.15 in Chapter 1 showed that the estimated number of other full-time faculty (including postdocs) in all levels of mathematics departments combined increased by 1,332 faculty (22% (6.1 SEs) increase) from fall 2010 to fall 2015 to 7,261 faculty; this number includes an increase of 292 postdoc faculty (a 28% (4.8 SEs) increase) from fall 2010). The estimated number of other full-time mathematics faculty increased by 1,300 faculty from 2005 to 2010, and, hence, there was an estimated increase of 2,632 other full-time mathematics faculty (a 57% increase) from 2005 to 2015 (the estimated number of mathematics postdocs increased 61% over that ten-year interval). In fall 2000, there were 3,533 estimated other full-time mathematics faculty; hence this category of full-time mathematics faculty has more than doubled in the past 15 years. Data for 2000 and 2005 can be found in CBMS2005 Table S.17, p. 38.

Using Tables F.1 or F.2 in this chapter, we observe that the increases in other full-time faculty extend across the three levels of mathematics departments. In the doctoral-level mathematics departments, the estimated number of other full-time faculty increased from fall 2010 to fall 2015 by 675 faculty, a 27% (10 SEs) increase. In the masters-level mathematics departments, the estimated number of other full-time faculty increased from fall 2010 to fall 2015 by 353 faculty, a 36% (4.6 SEs) increase. In the bachelors-level mathematics departments, the estimated number of other full-time faculty increased from fall 2010 to fall 2015 by 1,332 faculty, a 22% (6.9 SEs) increase. In fall 2000, the number of other full-time faculty was estimated at 1,449 at the doctoral-level mathematics departments, 793 at the masters-level mathematics departments, and 1,292 at the bachelors-level mathematics departments [CBMS2005 Table F.2, p. 104], and hence, over the past fifteen years, the estimated number of other full-time faculty has more than doubled at the doctoral and bachelors-level mathematics departments, and increased 69% in the masters-level mathematics departments.

Furthermore, increases in the estimated numbers of postdocs among the three levels of mathematics departments are also seen in Tables F.1 or F.2. In doctoral-level mathematics departments, the estimated number of postdocs increased from fall 2010 to fall 2015 by 149 postdocs (15% (2.8 SEs)) to 1,150

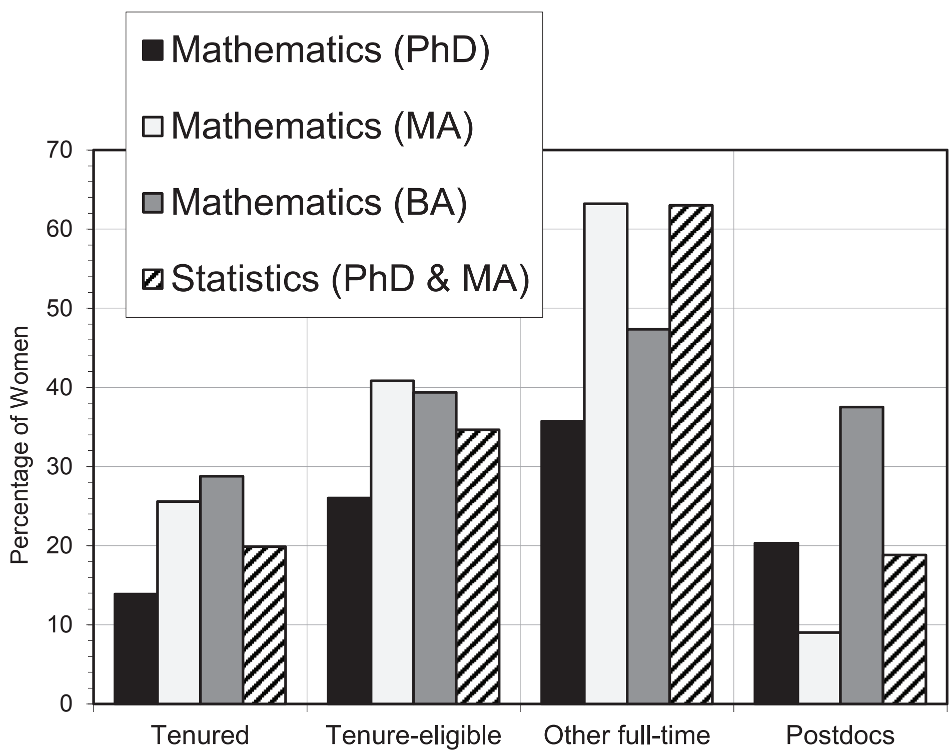

FIGURE F.3.1 Percentage of women in various faculty categories, by type of department, in fall 2010.

TABLE F.4 Percentage of tenured and tenure-eligible mathematics department faculty at four-year colleges and universities belonging to various age groups by type of department and gender in fall 2015.

	<30 %	30-34 %	35-39 %	40-44 %	45-49 %	50-54 %	55-59 %	60-64 %	65-69 %	>69 %	Average age 2005	Average age 2010	Average age 2015
Mathematics Depts.													
Univ (PhD)													
Tenured Men	0	1	5	8	8	10	10	12	8	9	54.4	55.4	55.9
Tenured Women	0	0	1	2	2	2	2	1	1	0	50.0	50.5	51.1
Tenure-eligible men	1	6	5	1	0	0	0	0	0	0	36.3	36.3	36.0
Tenure-eligible women	0	2	2	0	0	0	0	0	0	0	37.3	36.8	36.3
Total Univ (PhD)	1	9	12	12	10	12	12	13	9	9			
Univ (MA)													
Tenured Men	0	0	4	6	9	10	8	10	6	5	53.8	54.1	55.1
Tenured Women	0	1	2	3	5	3	3	3	1	1	52.1	50.7	51.6
Tenure-eligible men	1	4	4	2	0	0	0	0	0	0	38.3	37.3	36.1
Tenure-eligible women	1	3	2	1	1	0	0	0	0	0	38.7	39.1	37.7
Total Univ (MA)	2	8	12	12	14	14	11	13	7	6			
Coll (BA)													
Tenured Men	0	1	4	7	9	9	7	8	5	4	52.9	54.0	53.6
Tenured Women	0	1	2	4	3	5	2	3	1	0	49.6	50.9	50.8
Tenure-eligible men	2	6	4	2	0	0	0	0	0	0	40.2	37.2	36.6
Tenure-eligible women	1	4	2	1	0	1	0	0	0	0	38.9	37.4	37.0
Total Coll (BA)	3	12	13	14	13	15	10	11	6	4			

Note: 0 means less than half of 1%.

TABLE F.4 (cont.) Percentage of tenured and tenure-eligible mathematics department faculty at four-year colleges and universities belonging to various age groups by type of department and gender in fall 2015.

	<30 %	30-34 %	35-39 %	40-44 %	45-49 %	50-54 %	55-59 %	60-64 %	65-69 %	>69 %	Average age 2005	Average age 2010	Average age 2015
Statistics Depts.													
Univ (MA)													
Tenured Men	0	0	7	8	10	5	7	13	11	5	na	52.5	55.6
Tenured Women	0	0	5	2	0	0	0	2	2	0	na	49.8	47.5
Tenure-eligible men	3	5	0	5	0	0	0	0	0	0	na	34.4	35.0
Tenure-eligible women	0	7	5	0	0	0	0	0	0	0	na	32.5	34.6
Total Univ (MA)	3	11	16	15	10	5	7	15	13	5			
Univ (PhD)													
Tenured Men	0	1	5	7	7	8	9	8	6	7	52.7	54.2	55.2
Tenured Women	0	1	2	3	3	3	2	1	1	0	45.6	48.1	48.0
Tenure-eligible men	2	9	5	2	0	0	0	0	0	0	33.7	34.9	34.5
Tenure-eligible women	1	5	2	0	0	0	0	0	0	0	33.2	36.2	34.4
Total Univ (PhD)	4	16	13	13	11	11	11	9	6	7			

Note: 0 means less than half of 1%.

postdocs. In masters-level mathematics departments, the estimated number of postdocs increased from fall 2010 to fall 2015 by 13 postdocs (72% (1.3 SEs)) to 31 postdocs. In bachelors-level mathematics departments, the estimated number of postdocs increased from fall 2010 to fall 2015 by 131 postdocs (from 6 postdocs), indicating a dramatic change (4.7 SEs increase) in the use of postdoctoral appointments at bachelors-level mathematics departments.

Even larger increases in the estimated numbers of other full-time faculty were observed in statistics departments. Table S.15 of Chapter 1 showed that the estimated number of other full-time faculty (including postdocs) in doctoral and masters-level statistics departments combined, from fall 2010 to fall 2015, increased by 129 faculty to 401 (a 47% (5.9 SEs) increase). Furthermore, the estimated number of postdocs increased by 29 postdocs, an increase of 35% (2 SEs), from fall 2010 to fall 2015.

From Table F.3 we see that in the doctoral-level statistics departments the estimated number of other full-time faculty increased by 154 faculty to 369 faculty (a 72% (7 SEs) increase from 2010), and, over that time period, the estimated number of postdocs increased by 42 postdocs (a 59% (2.8 SEs) increase from 2010) to 113 postdocs. In fall 2010, the estimated number of other-full time doctoral-level statistics faculty increased by 52 faculty from the fall 2005 estimate, and the estimated number of postdocs increased by 20 postdocs from the fall 2005 estimate. Hence, the estimated number of other full-time statistics faculty in doctoral-level departments increased from 163 in 2005 to 369 in 2015, and the estimated number of postdocs increased from 51 in 2005 to 113 in 2015, so both estimated numbers have more than doubled from 2005 to 2015. In fall 2000. there were 99 estimated other full-time faculty in doctoral-level statistics departments; hence, this category of faculty has more than tripled in the past 15 years. However, in the masters-level statistics departments Table F.3 shows that the estimated number of other-full time faculty actually declined from fall 2010 to fall 2015 by 25 faculty (a 44% (3.6 SEs) decline), and the estimated number of postdocs declined by 12 faculty (an 80% (6 SEs) decline).

Chapter 2 contains data from a special topic survey on employment of postdocs after the completion of the postdoc appointment, and on the responsibilities of other full-time faculty who are in renewable, and in non-renewable, positions. See Tables SP.29-SP.31 of Chapter 2.

Numbers of part-time mathematics and statistics faculty

Table S.13 and Figures S.13.2 and S.13.3 in Chapter 1 showed that the number of part-time faculty in all levels of mathematics departments combined, in fall 2015, was estimated at 7,682, with SE of 282; this estimate represents an increase of about 27% (more than 5 SEs from the fall 2010 estimate), ending the pattern of small declines in numbers of part-time faculty observed since 2000 (when the estimate was 7,301). The fall 1995 estimate was 5,399 part-time

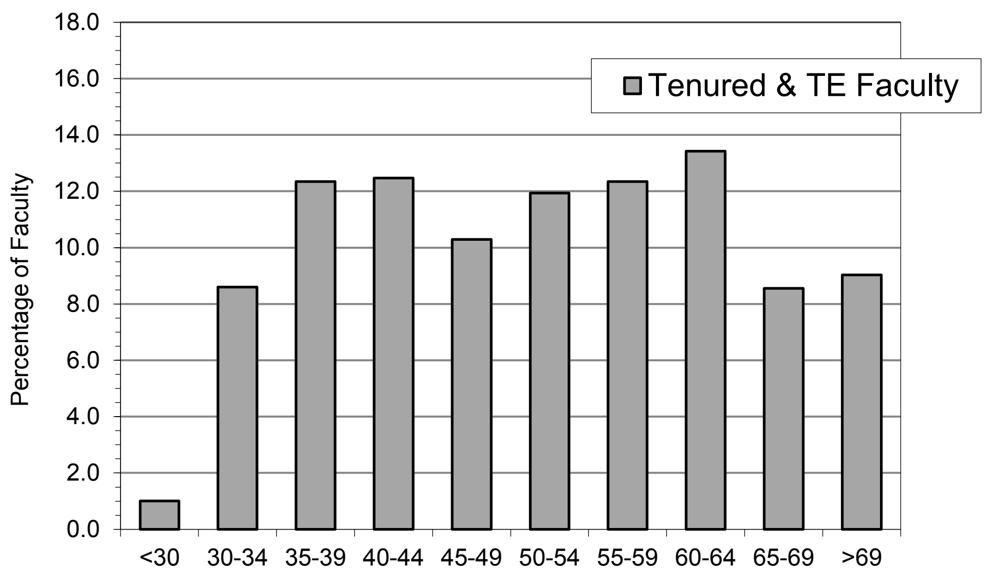

FIGURE F.4.1 Percentage of tenured and tenure-eligible faculty in doctoral mathematics departments in various age groups in fall 2015.

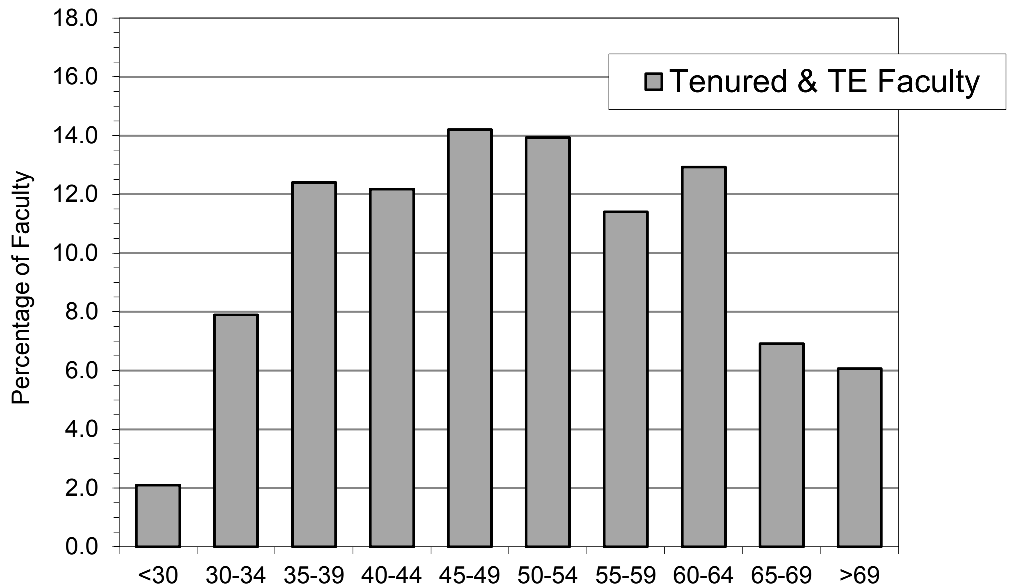

FIGURE F.4.2 Percentage of tenured and tenure-eligible faculty in masters-level mathematics departments belonging to various age groups in fall 2015.

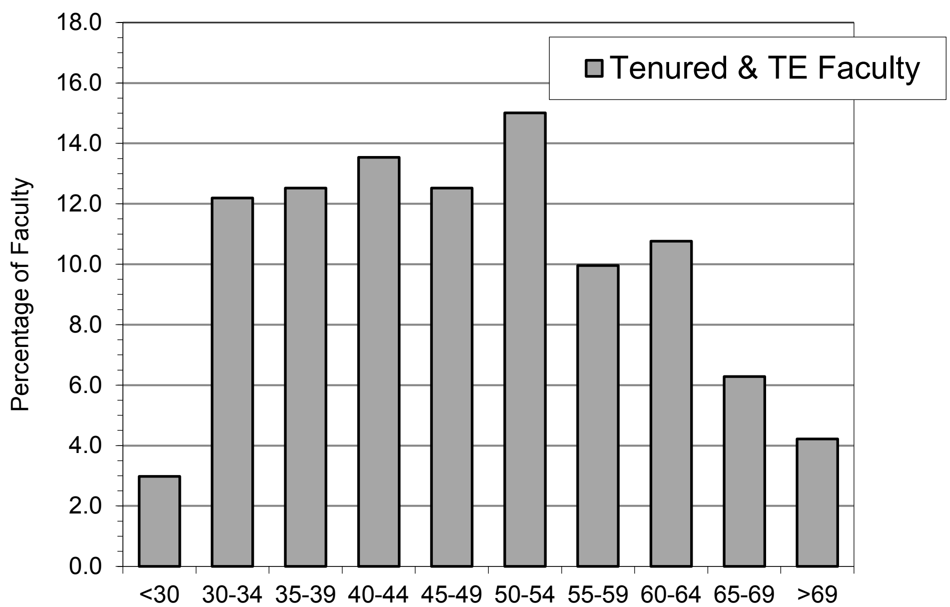

FIGURE F.4.3 Percentage of tenured and tenure-eligible faculty in bachelors-level mathematics departments belonging to various age groups in fall 2015.

TABLE F.5 Percentages of full-time faculty belonging to various ethnic groups, by gender and type of department, in fall 2015. Except for round-off, the percentages within each departmental type sum to 100%.

	Percentage of Full-time Faculty					
	Asian	Black, not Hispanic	Mexican American/ Puerto Rican/ other Hispanic	White, not Hispanic	AIAN or NHPI [1]	Unknown
	%	%	%	%	%	%
PhD Mathematics Departments						
All full-time men	15	1	3	55	0	2
All full-time women	5	0	1	16	0	1
MA Mathematics Departments						
All full-time men	11	2	3	46	0	2
All full-time women	6	1	1	26	0	1
BA Mathematics Departments						
All full-time men	6	2	1	53	0	2
All full-time women	4	1	1	30	0	1
All Statistics Departments						
All full-time men	22	1	2	45	0	2
All full-time women	11	0	1	15	0	1

[1] Includes the federal categories *American Indian or Alaskan Native* (AIAN) and *Native Hawaiian or Other Pacific* (NHPI).

Note: Zero means less than one-half of one percent.

mathematics faculty [CBMS2005 Table S.14, p. 31], so that over the past twenty years, the estimated number of part-time mathematics faculty has increased about 42%. This increase in the numbers of part-time mathematics faculty, combined with the increase in the numbers of other full-time faculty, and a decline in numbers of tenured and of tenure-eligible faculty is a cause for some concern. Tables F.1 and F.2 in this chapter break down the number of part-time faculty further.

From Table F.1 we see that most of the growth in the numbers of part-time faculty in mathematics departments occurred at the doctoral and bachelors-levels departments. From fall 2010 to fall 2015, the estimated number of part-time mathematics faculty increased 31% (5.5 SEs) at doctoral-level departments, 7% (0.9 SEs) at masters-level departments, and 37% (4.9 SEs) at bachelors-level departments.

Table S.13 and Figure S.13.5 in Chapter 1 showed that the number of part-time faculty in doctoral-level statistics departments in fall 2015 was estimated at 128 faculty with a SE of 20; this estimate represents an increase of about 22% (1.2 SEs) over fall 2010. The number of part-time faculty in doctoral-level statistics departments remained relatively stable over the three CBMS surveys 2000-2010. From Table F.1 we see that the number of part-time faculty in masters-level statistics departments in fall 2015 was estimated at 27 with a SE of 8; this number is almost identical to the 29 part-time masters-level statistics faculty estimated in fall 2010.

From Table F.1 we see that, in fall 2015, 71% of part-time faculty in doctoral-level statistics departments had a doctoral degree (compared to 41% in doctoral-level mathematics departments); a similar pattern occurred in the 2010 CBMS survey.

Non-doctoral faculty

Data on non-doctoral faculty, faculty without a doctoral degree, can be found in Table S.14 in Chapter 1, and in Tables F.1 and F.1.1 in this chapter, where the tables label faculty as “having a doctoral degree” and “having other degree” (which we will refer to as “non-doctoral”). The general trend, from fall 2010 to fall 2015, was a decrease in the numbers of non-doctoral full-time mathematics and statistics faculty. The increase in estimated numbers of doctoral faculty may be related to the increased number of new Ph.D.s; as noted in Table S.15 of Chapter 1, according to the National Center for Educational Statistics, the number of Ph.D.s who completed their degree from mathematics and statistics departments between

July 1, 2010 - June 30, 2015 was 1,862 greater than the number of Ph.D.'s who completed their degree between July 1, 2005-June 30, 2010, a 26% increase in the number of new Ph.D.s. The percentage of full-time non-doctoral faculty was generally larger in mathematics departments than in statistics departments. From Table S.14 in Chapter 1 we saw that in fall 2015, the percentage of full-time mathematics faculty with a doctorate was estimated at 83% of all mathematics faculty, up from 82% in fall 2010, and the estimated percentage of full-time statistics faculty with a doctorate was 96% of all statistics faculty, up from 94% in 2010.

The estimated percentage of non-doctoral faculty was much larger among part-time faculty than among full-time faculty, particularly in mathematics departments, and the number of doctoral part-time faculty increased significantly in doctoral-level and bachelors-level mathematics departments. From Table F.1.1 we see that doctoral faculty were estimated to be 25% of all part-time mathematics faculty in fall 2015 (and 22% in fall 2010), and doctoral faculty were estimated to be 72% of part-time statistics faculty (and 70% in fall 2010). By Table F.1, in doctoral-level mathematics departments, doctoral part-time faculty comprised an estimated 41% of part-time faculty in fall 2015, up from 34% in 2010; the estimated number of doctoral part-time faculty in doctoral-level mathematics departments increased by 59% (8.7 SEs) from fall 2010 to fall 2015. In masters-level mathematics departments, doctoral part-time faculty comprised an estimated 23% of part-time faculty in fall 2015, up from 20% in 2010; the estimated number of doctoral part-time faculty in masters-level mathematics departments increased by 25% (1.2 SEs) from fall 2010 to fall 2015. In bachelors-level mathematics departments, doctoral part-time faculty comprised an estimated 21% of part-time faculty in fall 2015, up from 19% in 2010; the estimated number of doctoral part-time faculty in bachelors-level mathematics departments increased by 50% (3.2 SEs) from fall 2010 to fall 2015. In doctoral-level statistics departments, doctoral part-time faculty were estimated to comprise 71% of part-time faculty in fall 2015, down from 80% in 2010; the estimated number of doctoral part-time faculty in doctoral-level statistics departments increased by 8% (0.4 SEs) from fall 2010 to fall 2015.

From Table F.1.1 we see that most of the non-doctoral full-time faculty were other full-time faculty, and the number of other full-time faculty with a doctorate, who are not postdocs, increased significantly, perhaps due to the growing number of new Ph.Ds. From Table F.1 we see that the estimated number of other full-time faculty with a doctorate, who are not postdocs, in doctoral-level mathematics departments increased from 738 to 1,186 faculty, a 61% increase, from fall 2010 to fall 2015, and over the same time period, the estimated number of other full-time faculty with a doctorate, who are not postdocs, in masters-level mathematics departments increased 66%, the estimated number of other full-time faculty with a doctorate, who are not postdocs, in bachelors-level mathematics departments increased 62%, and the estimated number of other full-time faculty with a doctorate, who are not postdocs, in doctoral-level statistics departments increased from 113 to 216 faculty, almost doubling.

It follows from Table F.1.1 that, in fall 2015, the percentage of women among all full-time mathematics faculty with a doctorate was estimated at 26%, a percentage that is less than 31%, the estimated percentage of women among all full-time mathematics faculty. In fall 2015, the percentage of women among all full-time statistics faculty with a doctorate was 26%, while women comprised 27% of all full-time statistics faculty.

Gender

Table S.15 in Chapter 1 notes that according to the National Center for Educational Statistics, from July 1, 2010 - June 30, 2015, 31% of the Ph.D.s that were awarded went to women; and, according to the Annual Surveys, the percentage of women receiving Ph.D. degrees in the mathematical sciences has remained close to 30% each year over the last fifteen years. The 2015 CBMS survey shows that the percentages of women faculty in most categories continue to grow, though the numbers of women faculty (and of male faculty) are not up in a number of categories (e.g. the total estimated number of tenured, and of tenure-eligible, mathematics faculty decreased from 2010 to 2015 (Table S.15 of Chapter 1)). Perhaps the most interesting change is the increase in the estimated number of tenured women at doctoral-level mathematics departments (see Table F.1).

Table S.15 of Chapter 1 showed that the estimated total number of female full-time mathematics faculty in four-year mathematics departments combined increased by about 9% (4.8 SEs) from fall 2010 to fall 2015. This table further estimated that in fall 2015, women comprised 31% of all full-time mathematics faculty, 22% of all tenured mathematics faculty, 36% of all tenure-eligible mathematics faculty, and 22% of all mathematics postdocs, all of these estimated percentages, except the percentage of women postdocs, are a few percentage points above the percentages estimated in 2010. In fall 2010, these percentages of women faculty were estimated at 29% of all full-time faculty, 21% of all tenured faculty, and 34% of all tenure-eligible faculty, and 23% of all postdocs. Tables F.1, F.1.1, and F.2 in this chapter provide more detail on estimated numbers of women faculty in mathematics departments.

Table S.15 in Chapter 1 showed that the estimated number of women in doctoral-level and masters-level statistics departments combined increased by 20% (4 SEs) from fall 2010 to fall 2015. In statistics departments, in fall 2015 women were estimated to comprise 27% of all full-time faculty, 20% of tenured faculty, 35% of tenure-eligible faculty, and 19% of all postdocs; all of these percentages, except the percentage of tenure-eligible faculty and the percentage of women postdocs. were higher than in fall 2010, when the percentages of women faculty were estimated at 26% of all full-time faculty, 16% of tenured faculty, 38% of tenure-eligible faculty, and 28% of all postdocs. Figure S.15.1 in Chapter 1 gave a bar graph displaying the percentages of tenured and tenure-eligible women in mathematics and statistics departments in fall 2010 and fall 2015; from this figure one can see the changes in these categories of faculty, and that, in 2015, the distributions in mathematics departments and statistics departments look more similar than they did in 2010. Tables F.1, F.1.1, and F.3 in this chapter provide more detail on estimated numbers of women faculty in statistics departments.

Tables F.1, F.2, and Figure F.3.1 provide data on the estimated numbers of women in different levels of mathematics departments and different types of appointments. In doctoral-level mathematics departments, the most significant change was an increase in the estimated number of tenured women faculty in fall 2015 (while the estimated number of all doctoral-level tenured faculty declined), which was up 21% (7.5 SEs) over fall 2010. From fall 2010 to fall 2015, in doctoral-level mathematics departments, the estimated number of tenure-eligible women was down 4% (1 SE), the number of other full-time women faculty was up 20% (6.2 SEs), and the number of postdoc women was up 4% (0.3 SEs). In masters-level mathematics departments, the most significant change was the increase in the estimated number of other full-time women faculty in fall 2015, which was up 33% (4 SEs) over fall 2010. The estimated number of tenured women faculty in masters-level mathematics departments was identical in fall 2010 and 2015, the estimated number of tenure-eligible women was down 11% (1.5 SE) from fall 2010, and estimated number of postdoc women faculty, which is still very small, dropped from 7 in fall 2010 to 3 in fall 2015. In bachelors-level departments, the most significant change was the increase in the estimated number of other full-time women faculty in fall 2015, which was up 32% (4.6 SEs) over fall 2010. From fall 2010 to fall 2015, in bachelors-level departments, the estimated number of tenured women faculty declined by 10% (2.6 SEs), the estimated number of tenure-eligible women faculty was down 2% (0.4 SE), and the estimated number of postdoc women faculty went from 0 postdocs to 51 postdocs, with SE 13.

Tables F.1 and F.3 and Figure F.3.1 in this chapter provide data on the estimated numbers of women in different levels of statistics departments and different types of appointments.

In doctoral-level statistics departments, the most significant changes were an increase in the estimated number of other full-time women faculty in fall 2015, which was up 62% (6.4 SEs) over fall 2010, and an increase in the estimated number of tenured women faculty in fall 2015, which was up 44% (5.2 SEs) over fall 2010. From fall 2010 to fall 2015, the estimated number of tenure-eligible women faculty in doctoral-level statistics departments was down 15% (2.6 SE), and the estimated number of women postdocs was up 22% (1.3 SEs). These changes follow an estimated 4% decrease in the number of tenured women, and a 17% increase in the number of tenure-eligible women, from 2005 to 2010 [CBMS2010 Table F.3, p. 106]. In masters-level statistics departments, the most significant change was the 39% (3.3 SEs) decrease, from fall 2010 to fall 2015, in the estimate of other full-time women faculty. From fall 2010 to fall 2015, in masters-level statistics departments, the other types of appointments did not change significantly: the estimated number of tenured women faculty was down 27% (0.9 SEs) and the estimated number of tenure-eligible women increased by 6% (0.2 SEs).

Table F.1.1 states that in fall 2015 women comprised an estimated 42% of the part-time positions across all levels of mathematics departments combined (this percentage is down from 44% in fall 2010); by Table S.15 of Chapter 1, in fall 2015, women comprised 31% of full-time positions. In fall 2015, women comprised 30% of the part-time positions across both levels of statistics departments combined (this percentage is up from 24% in fall 2010). From Table F.1 we deduce that the estimated percentage of part-time positions occupied by women in fall 2015 was 44% in bachelors and masters-level mathematics departments, and 35% in doctoral-level departments.

It is interesting to compare the estimated percentages of women at doctoral-level mathematics departments to that at doctoral-level statistics departments; we note that women comprise a higher percentage of both tenured and tenure-eligible positions in doctoral-level statistics departments than in doctoral-level mathematics departments. From Table F.1 we see that, in fall 2015, women were estimated to comprise 14% of tenured faculty in doctoral-level mathematics department faculty, and 21% of tenured faculty in doctoral-level statistics department faculty; women were 26% of tenure-eligible mathematics faculty and 32% of tenure-eligible statistics faculty. The percentage of women in postdoc positions is about the same in mathematics and statistics departments: 20%

of mathematics postdoc faculty and 19% of statistics postdocs.

Age distribution

Table S.16 in Chapter 1 presented the estimated age distribution of tenured, and of tenure-eligible, faculty broken down by gender, for all levels of mathematics departments (combined) in fall 2015, and Table S.17 in Chapter 1 presented this same data for doctoral and masters-level statistics departments (combined). Tables S.16 and S.17 also showed the average ages within each type of appointment (tenured or tenure-eligible) and each gender in fall 2005, 2010, and 2015, and, for each age group, the total percentages across all types of appointments in fall 2015, which are displayed in Figure S.16.1 and S.17.1 of Chapter 1. Table F.4 of this chapter presents the finer estimated breakdown of faculty ages by level of mathematics and statistics department, and Figures F.4.1, F.4.2, and F.4.3 display these distributions of ages, broken down by gender, for doctoral-level, masters-level, and bachelors-level mathematics departments, respectively. The percentages within each level of department total 100%, except for possible round-off errors. The standard errors of the percentages in Table S.16 and F.4 are all less than 0.5%, but are as high as 3% for doctoral-level statistics departments in some entries of Tables S.17 and F.5. The SEs are very high for the estimates of Table F.4 for masters-level statistics departments, making the estimates for masters-level statistics departments very unreliable.

When the data in mathematics departments were aggregated, as they were in the Chapter 1 tables, it appeared from Table S.16 that across all levels of mathematics department faculty combined, from 2005 to 2015, the estimated average ages of both tenured men, and of tenured women, rose slightly; furthermore, the estimated average age of tenured men appeared to be approximately 4 years greater than that of tenured women in mathematics departments. The average age of tenure-eligible men and women in mathematics departments both appeared to decline from fall 2005 to fall 2015.

In statistics departments, from Table S.17 of Chapter 1, it appeared that the estimated average age of tenured men rose over the last 10 years (and was roughly comparable to the average age of tenured men in mathematics departments), and that the estimated average age of tenured women in statistics departments in fall 2015, while above the average age in 2005, was slightly less than the average age in 2010 (perhaps due to the large (31% (3.6 SEs)) increase in tenured female statistics faculty in all levels of statistics departments combined (Table F.3) from fall 2010 to fall 2015). The average age of tenured women in statistics departments appeared to be about 3 years less than the average age of tenured women in mathematics departments, again reflecting the large number of women among new Ph.D.s in statistics reported in the Annual Surveys over the last 15 years. The estimated average ages of tenure-eligible men and of tenure-eligible women in statistics departments were slightly larger in 2010 than in 2005, and slightly smaller in 2015 than in 2010; the estimated average ages of tenure-eligible men and of tenure-eligible women in statistics departments were about 2 years less than the comparable average ages in mathematics departments, perhaps reflecting greater use of postdoc appointments in mathematics.

From Tables S.16 and S.17 in Chapter 1 we also note that the estimated percentage of tenured plus tenure-eligible faculty age 65 or more continues to increase. In mathematics departments, in fall 2000, this percentage was estimated at 5%, in fall 2005 at 8%, in fall 2010 at 12%, and, in fall 2015, at 13%. Similarly, in statistics departments, in fall 2000, it was estimated at 6%, in fall 2005 at 8%, in fall 2010 at 10%, and, in fall 2015, at 14%. The average age of tenured men in mathematics rose from an estimate of 52.4 in fall 2000 to 54.9 in fall 2015. Table S.20 in Chapter 1 recorded the number of deaths and retirements in the year preceding each of the CBMS surveys of 2000, 2005, 2010, and 2015; the numbers of reported deaths and retirements increased significantly in each of the three levels of mathematics departments and in the doctoral statistics departments from 2009-10 to 2014-15; the largest change was observed for the bachelors-level mathematics departments, where the number of deaths and retirements reported in 2014-15 was more than double the number reported in 2009-10.

The estimated distributions of the age groups for tenured and tenure-eligible faculty (combined) in mathematics departments, broken down by gender, in fall 2015 was displayed in Figure S.16.1 in Chapter 1. One notes that the distribution of women's ages appears more skewed to lower ages for women than the distribution of men's ages, and the distribution for men is slightly skewed toward higher ages. The analogous data for statistics departments appeared in Figure 17.1, where the distribution of women's ages is even more skewed toward lower ages, and the distribution of men's ages appears slightly bimodal. The shapes of these distributions is similar to the shapes observed in the 2010 survey.

Table F.4 in this chapter can be used to estimate age distributions across different levels of departments. We note, again, that the standard errors for the masters-level statistics department are rather large, so those estimates may be unreliable. Generally, the trends observed for all departments combined appear in most levels of departments. For example, in each level of mathematics and statistics departments (with the exception of bachelors-level mathematics departments from 2010 to 2015), the estimated average age of tenured men increased from 2005 to 2010 and from 2010 to 2015; further, the estimated average age of tenured men is greater than the estimated average age of tenured women. One difference in the age distributions is that the estimated percentage of faculty age 65 or more in fall 2015 in mathematics departments is 18% at the doctoral-level departments, 13% at the masters-level departments, and 10% at the bachelors-level departments; moreover, the percentage of faculty age 34 or less in fall 2015 is estimated at 10% at the doctoral and masters-level departments, and 15% at the bachelors-level departments. This pattern can also be noted from the graphs of the age distributions for the three levels of mathematics that appear in Figures F.4.1 (doctoral-level mathematics), F.4.2 (masters-level mathematics), and F.4.3 (bachelors-level mathematics). Over the past 15 years, from 2000 to 2015 the average age of tenured men at doctoral–level mathematics departments increased from an estimated 52.1 in 2000 to 55.9 in 2015.

Race, ethnicity, and gender

Table S.18 in Chapter 1 gave estimated percentages in various racial/ethnic groups of full-time faculty in all levels of mathematics departments combined, by gender, and by type of appointment in fall 2015; Table S.19 gave the same data for doctoral and masters-level statistics departments combined. Table F.5 in this chapter presents these percentages broken down by the three levels of mathematics department (and for doctoral and masters-level of statistics departments combined), and by gender, for all types of appointments combined. Table F.6 in this chapter presents the distribution of racial/ethnic groups for part-time mathematics and statistics faculty, broken down by level of mathematics department (and for both levels of statistics departments combined), and by gender. The standard errors for percentages in Tables S.18, S.19, F.5, and F.6 round to 1% or less, except that for some of the entries of Table F.5 for statistics departments the SEs are as large as 3%.

The Annual Surveys follow the federal classification for racial and ethnic groups. However, in the text of this report some of the more cumbersome federal classifications will be shortened. For example, "Mexican-American/Puerto Rican/other Hispanic" will be abbreviated to "Hispanic". Similarly, the federal classifications "Black, not Hispanic" and "White, not Hispanic" will be shortened to "Black" and "White", respectively, and "American Indian or Alaskan Native and Native Hawaiian/Pacific Islander" will be shortened to "AIAN & NHPI". For a small percentage of the faculty, race and ethnicity data were listed as "unknown" by the responding departments, and these faculty are listed as "unknown".

The estimated percentages of faculty in various racial/ethnic groups in all level of mathematics departments combined, presented in Tables S.19 in CBMS2010 and Table S.18 of Chapter 1, look quite similar. The estimated percentage of the category White men was slightly lower in fall 2015 than in fall 2010 (it declined from 2005 to 2010, also), and the categories White women, Asian men, and Asian women faculty were slightly higher in fall 2015 than in fall 2010 (the estimated percentage of White women faculty also increased from fall 2005 to fall 2010). Table S.18 showed that, in fall 2015, 77% of all full-time mathematics faculty were classified as White, slightly less than the same percentage in fall 2010 (79%); the percentage of female White faculty increased slightly from 23% in fall 2010 to 24% fall 2015. There are entries less than 1% in the Black and Hispanic faculty categories for tenure-eligible faculty and postdocs in mathematics departments, suggesting that the percentages of these under-represented groups in the tenured categories are not likely to increase soon.

The estimated percentages of faculty in various racial/ethnic groups in doctoral and masters-level statistics departments combined, observed in Table S.19, were also quite similar in the 2010 and 2015 CBMS surveys. The estimated percentages of Asian men and women were both higher in fall 2015 than in fall 2010, giving a combined total estimate of Asians as 33% of statistics faculty in 2015 (compared to 28% in 2010). The percentage of White men in statistics departments was estimated at 49% in 2010, and 45% in 2015, and the percentage of White women in statistics departments was estimated at 15% in both 2010 and 2015.

Table F.5 in this chapter breaks these numbers down by level of department, but aggregates over type of appointment. Comparing Table F.5 to the corresponding tables in previous CBMS surveys, we note that in the doctoral-level mathematics departments, the estimated percentages of faculty in the categories Asian men, Asian women, and Hispanic men were slightly larger in fall 2015 than in fall 2010, while the percentage of faculty in the category White men, that was estimated at 69% in fall 2000, 66% in fall 2005, and 59% in fall 2010, was estimated at 55% in fall 2015; furthermore, Black and Hispanic faculty, that were each estimated at 1% in fall 2000, were estimated at 1% and 4%, respectively, in fall 2015. At masters-level mathematics departments, the estimated percentage of faculty in the category White men, that was 58% in fall 2000, had dropped to 46% in fall 2015, and the percentages of Black and Hispanic faculty, that were estimated at 2% and 6%, respectively, in fall 2000, were estimated at 3% and 4%, respectively, in fall 2015. At bachelors-level departments, the percentage of faculty in the category

TABLE F.6 Percentages of part-time faculty belonging to various ethnic groups, by gender and type of department, in fall 2015. Except for round-off, the percentages within each departmental type sum to 100%.

	Percentage of part-time Faculty					
	Asian %	Black, not Hispanic %	Mexican American/ Puerto Rican/ other Hispanic %	White, not Hispanic %	AiAN or NHPI[1]	Unknown %
PhD Mathematics Departments						
All part-time men	8	2	2	47	0	4
All part-time women	5	1	1	28	0	2
MA Mathematics Departments						
All part-time men	5	3	4	38	0	7
All part-time women	2	1	2	34	0	5
BA Mathematics Departments						
All part-time men	3	3	1	45	0	4
All part-time women	2	1	1	35	1	4
All Statistics Departments						
All part-time men	11	2	1	55	0	3
All part-time women	8	1	1	18	0	0

[1] Includes the federal categories *American Indian or Alaskan Native* (AIAN) and *Native Hawaiian or Other Pacific Islander* (NHPI).

Note: Zero means less than one-half of 1%.

White men, that was estimated at 60% in fall 2000, had dropped to 53% in fall 2015, and the estimated percentages of faculty in the categories Black and Hispanic faculty, that were estimated at 3% and 1%, respectively, in fall 2000, were estimated at 3% and 2%, respectively, in fall 2015. At the masters and doctoral-level statistics departments combined, the percentage of faculty in the category White men, that was estimated at 66% in fall 2000, had dropped to 45% in fall 2015, and the percentages of faculty in the categories Black and Hispanic faculty, that were estimated at 1% and 3%, respectively, in fall 2000, were estimated at 1% and 3%, respectively, in fall 2015. The estimated distributions from the 2000 survey can be found in CBMS2000 Table F.6 (mathematics departments) and F.7 (statistics departments), p.104-5.

Of the non-White racial/ethnic groups, the estimated percentage of faculty in the category Asian faculty varies the most across the various levels of departments. According to Table F.5, in fall 2015, the percentage of Asian faculty was estimated at 20% in doctoral-level mathematics departments, 17% in masters-level mathematics departments, and 10% in bachelors-level mathematics departments, and 33% in statistics departments. In fall 2000 these percentages were estimated at 14% in doctoral-level departments, 10% in masters-level departments, 7% in bachelors-level departments and 19% in statistics departments.

Table F.6 shows the estimated racial/ethnic distribution of part-time faculty. These percentages are not very different from the distribution of full-time faculty; for example, at doctoral-level mathematics departments in fall 2015 the estimated percentages of full-time Black and Hispanic faculty were 1% and 4%, respectively, and for part-time faculty these percentages were both 3%; for full-time Asian faculty the estimated percentage was 20% and for part-time faculty it was 13%.

Chapter 5

First-Year Courses in Four-Year Colleges and Universities

The tables in this chapter explore the mathematics and statistics courses of four-year colleges and universities that are taught generally to beginning students. Tables S.5, S.6, S.7, S.8, and S.12 from Chapter 1, are broken down by the level of department in this chapter, to provide more information about the following courses, which tend to be the focus of the early college experience:

1. Precollege and Introductory-Level Mathematics (Appendix I)
2. Mainstream Calculus (Tables FY.1)
3. Non-Mainstream Calculus (Table FY.2)
4. Introductory Statistics (Tables FY.3-FY.9).

Previous CBMS surveys collected data on the appointment type of faculty who taught introductory level courses, but this data was not collected in 2015; course enrollments for individual courses are available in Appendix I. Mainstream Calculus courses are the calculus courses needed for the mathematics major, or for applications in the physical sciences or engineering. Other calculus courses, which tend to be for business, social science, or life science majors, are labeled Non-Mainstream Calculus.

Beginning courses build the interest and skills that students need for further study of mathematics and statistics, and the many other disciplines that use mathematics or statistics. These courses constitute a substantial portion of four-year mathematics and statistics departments' course enrollments. Hence these courses merit the careful consideration of the mathematical sciences community. The issues addressed in this chapter are the course enrollments, the appointment type of the course instructors, and pedagogy used in teaching Introductory Statistics.

Standard errors: As the estimates produced from the survey data are broken down more finely, the estimates are made over smaller sets of departments, and the standard errors typically increase, sometimes to magnitudes that make the estimates rather uncertain. This phenomenon occurs particularly in the masters-level mathematics and statistics departments, which are smaller in number, and possibly less homogeneous, than the other levels of departments. In this chapter, data are broken down quite finely, and the standard errors become an issue.

In the text that follows, the standard error (SE) in many of the estimates is provided along with the estimate (e.g. enrollment of 255,000 (SE 23,000)); the standard errors for all CBMS2015 tables can be found in Appendix VIII. The change in an estimate from an estimate in a previous survey is often expressed both as percentage change, and as the number of SEs that change represents (e.g. "increased 21% (1.7 SEs)").

Highlights of Chapter 5

A. Enrollments

- The largest estimated percentage growth in mathematics course enrollment from 2010 to 2015 occurred in precollege-level courses, which increased 21% (1.7 SEs) from fall 2010 to fall 2015. The largest estimated total mathematics enrollments in fall 2015 occurred in the introductory-level courses, as was observed, also, in the three previous CBMS surveys, and introductory courses had the second largest growth in estimated enrollment from fall 2010 to fall 2015, up 14% (1.6 SEs) (see Chapter 1, Table S.4). Chapter 3, Table E.2, indicates that much of the increase occurred at the doctoral-level mathematics departments, where the percentage increase in enrollments in introductory mathematics courses was 36% (1.6 SEs) (compared to increases of 6% at masters-level and 4% at bachelors-level mathematics departments).
- Mainstream Calculus I (non-distance learning) had estimated total enrollment, in fall 2015, of roughly 255,000 (SE 23,000), up 9% (0.9 SEs) from fall 2010, up 27% (2.3 SEs) from fall 2005 (Chapter 1, Table S.5), and up 34% (2.8 SEs) from fall 2000 (CBMS2005, Chapter 1, Table S.7, p.17). By Table FY.1, which breaks down Table S.5 of Chapter 1 by level of department, we see that the enrollment gains took place at the masters and doctoral-level departments, and enrollments declined at the bachelors-level departments. From Table FY.1 we see that across all levels of departments combined 57% of the estimated enrollments were taught in lecture/recitation format, and 53% of the estimated enrollments were at the doctoral-level departments.

- Introductory-level statistics course enrollments (excluding distance learning enrollments) in four-year mathematics departments were estimated at 235,000 (SE 18,630) in fall 2015, up by 8% (0.9 SEs) from fall 2010, up by 62% (4.8 SEs) from 2005 (Chapter 1, Table S.4), and up 73% (5.3 SEs) since 2000 (CBMS2005, Chapter 1, Table S.6, p.15). Table FY.3, which breaks down Chapter 1, Table S.7 by level of mathematics department, shows that, in fall 2015, slightly over half of the total estimated enrollments in all of the introductory-level statistics courses in four-year mathematics departments occurred at the bachelors-level departments, particularly course (F1), Introductory Statistics (no calculus prerequisite, for non-majors/minors), where an estimated 104,000 (SE 11,000) of the estimated 188,000 four-year mathematics department enrollments in course (F1) occurred. Comparing to CBMS2010 Table FY.6 p. 123, we see that all of the (small) estimated growth in enrollment from 2010 to 2015 in introductory-level statistics courses taught in mathematics departments occurred at the masters and doctoral-level mathematics departments (enrollments in course (F1) at bachelors-level departments actually declined from fall 2010 to fall 2015, but only by 0.5 SEs).
- Introductory-level statistics course enrollments in statistics departments were estimated at 90,000 (SE 3,000) in fall 2015, up by 17% (4.3 SEs) from fall 2010, up by 70% (12 SEs) from 2005 (Chapter 1, Table S.4), and up 67% (12 SEs) since 2000 (CBMS2005, Chapter 1, Table S.6, p.15). By Chapter 1, Table S.8, from fall 2010 to fall 2015, the estimated enrollments in Introductory Statistics (no calculus prerequisite, for non-majors/minors) (course (E1)) taught in statistics departments was 66,000 (SE 2,000), up by 26% (6 SEs) over 2010. Table FY.4 breaks down Chapter 1, Table S.8, by level of statistics department, and shows that, in fall 2015, an estimated 82% of introductory statistics courses were taught by the doctoral-level statistics departments.
- In fall 2015, across all levels of mathematics departments combined, by Table FY.3, an estimated 22% of the enrollments in Introductory Statistics (no calculus prerequisite (course (F1)) were in sections with lecture/recitation format (and 78% were in sections that meet as a class), while in statistics departments, by Table FY.4, an estimated 61% of the analogous course (E1) enrollments were in sections with lecture/recitation format (and 38% were in sections that meet as a class). In the bachelors-level mathematics departments, where the majority of course (F1) enrollments are taught, by Table FY.3, 17% of the course (F1) enrollments are in the sections with lecture/recitation format (and 83% of the enrollments are in sections that meet as a class).
- Table FY.9 contains estimates made by mathematics and statistics departments of the enrollments in introductory statistics courses taught outside the mathematical sciences departments of their institution. These crude estimates suggest that in fall 2015 there may be a little less than 100,000 such enrollments in introductory statistics courses taught outside of mathematical sciences departments, compared to the estimates from Chapter 1, Table S.2 of 627,000 enrollments in introductory statistics courses across all mathematical sciences departments (including distance learning enrollments) (280,000 at two-year colleges, 253,000 at four-year mathematics departments, and 94,000 at statistics departments).

B. Appointment type of instructors

- By Table FY.1, the estimated percentage of sections of Mainstream Calculus I at doctoral-level mathematics departments taught by tenured or tenure-eligible (TTE) faculty, across all formats combined, was estimated at 27% (SE 1.8) in fall 2015 (compared to 31% in fall 2010 (CBMS2010 Table FY.3 p. 119)); in bachelors-level mathematics departments this percentage was estimated at 72% (SE 3.7) (compared to 63% in fall 2010).
- By Table FY.3, the estimated percentage of sections of Introductory Statistics (no calculus prerequisite (course (F1) on the four-year mathematics department questionnaire), across all formats combined, taught by TTE faculty declined at each level of mathematics department from fall 2010 to fall 2015; by Table FY.4 the same phenomenon was observed for statistics departments for the analogous course (E1) on the statistics department questionnaire (for 2010 data see CBMS2010 Table FY.6, p. 123 and Table FY.9, p. 129).
- By Table FY.3, in fall 2015, the estimated percentage of sections of Introductory Statistics (course (F1)) in doctoral-level mathematics departments, taught by other full-time (OFT) faculty was 34% (SE 7) (compared to 25% in 2010), and by Table FY.4, in doctoral-level statistics departments the estimated percentage of sections of the similar course (E1) taught by OFT faculty, in fall 2015, was 20% (SE 1) (compared to 10% in 2010).
- By Table FY.8 over all levels of mathematics departments combined (and very close to the estimates at the bachelors-level departments, where there are the most enrollments, and relatively consistent across the three different levels of departments), an estimated 64% (SE 4.5) of departments indicated that course (F1) instructors in mathematics

departments typically had no graduate degree in statistics, 21% (SE 4.4) had a Master's degree in statistics, and 15% (SE 3.5) had a Ph.D. in statistics.

C. Average Section Size

- The estimated average size of Mainstream Calculus I sections increased slightly, from fall 2010 to fall 2015, at the doctoral and masters-level mathematics departments; for example, by Table FY.1, at doctoral-level mathematics departments, in fall 2015, the average lecture section enrolled an estimated 98 (SE 7.6) students, compared to 71 students in fall 2010 (CBMS2010, Table FY.3, p. 119).
- The estimated average size of introductory statistics sections taught in statistics departments was slightly larger than the average size of the corresponding course/format section taught in mathematics departments; for example, by Table FY.3, the estimated average size of sections of course (F1) in doctoral-level mathematics departments over all formats combined, in fall 2015, was 42 (SE 3.7), and, by Table FY.4, the estimated average size of sections of the corresponding course (E1) in doctoral-level statistics departments, over all formats combined, was 58 (SE 2.6).

D. Pedagogy in Introductory Statistics

- Tables FY.5 and FY.6 compare ways course (F1) in mathematics departments and course (E1) in statistics departments were taught. The tables break Chapter 1, Table S.12 down by level of department. Generally, Table S.12 shows that in fall 2015 (as in fall 2010) statistics departments were making more use than mathematics departments of the current recommendations for teaching introductory statistics including: use of real data, modern technology, applets, classroom response systems (such as clickers), and in-class activities that encourage student involvement. Tables FY.5 and FY.6 show there were some differences across levels of departments.
- Table FY.7 presents data on the estimated percentages of mathematics and statistics departments that covered certain topics in courses (F1) and (E1) in fall 2015. As one example, it shows that resampling techniques were covered in 22% (SE 5.1) of course (F1) across all levels of mathematics departments, and 39% (SE 2.9) of course (E1) across all levels statistics departments; the percentage was smaller (9% (SE 5)) at doctoral-level mathematics departments, and (8% (SE 4.1) at masters-level statistics departments.

A. Course Enrollments: (Tables FY.1-FY.4, Appendix I)

First, we consider enrollments in four-year mathematics departments, and we note that the enrollments in Chapter 3, Table E.2 include distance learning enrollments, whereas the tables of this chapter and Chapter 1 generally do not. Appendix I, Tables A.1, A.2, A.3 give the enrollments (with distance learning enrollments included) in fall 2000, 2005, 2010, and 2015 for each of the courses in the four-year mathematics and statistics questionnaires; they also present the non-distance learning enrollments in fall 2010 and fall 2015 (except for advanced-level courses). The Appendix I tables also give the enrollments broken down by level of department (bachelors, masters, or doctoral level) for enrollments in fall 2015; comparable breakdowns for fall 2010 are given in the corresponding table of the CBMS 2010 report. In the discussion that follows, we present enrollments without distance learning enrollments, as was done in the CBMS 2010 report in this chapter, whenever these are available for some preceding years; we occasionally use enrollments with distance learning included when necessary to compare to several previous years. Questions about issues in introductory-level courses, which were asked in previous CBMS surveys, were not repeated in the 2015 survey.

Precollege-level courses: (Appendix I, Table A.1)
The largest percentage growth in mathematics course enrollment was in precollege-level courses, which increased 21% (1.7 SEs), from an estimated enrollment of roughly 201,000 in fall 2010 to an estimated enrollment of 244,000 (with SE 26,000) in fall 2015 (see Chapter 1, Table S.4). Beginning with the 2010 CBMS survey, enrollments in individual precollege-level courses were not collected.

Introductory-level courses: (Appendix I, Table A.1)
The largest estimated total mathematics enrollments in fall 2015 occurred in the introductory-level courses, as was observed, also, in the three previous CBMS surveys, and introductory-level courses had the second largest growth in estimated enrollment from fall 2010 to fall 2015, up 14% (1.6 SEs) (see Chapter 1, Table S.4). Chapter 3, Table E.2, indicates that much of the increase in introductory-level mathematics enrollments occurred at the doctoral-level mathematics departments, where estimated enrollment in introductory-level courses (including distance learning enrollments) went from 299,000 in fall 2010, to 408,000 (SE 54,000) in fall 2015, an increase of 36% (1.6 SEs) (compared to increases of 6% at masters-level and 4% at bachelors-level mathematics departments).

From Appendix I, Table A.1, we see that, of the introductory-level mathematics courses, the course titled College Algebra had the largest estimated course

TABLE FY.1 Percentage of sections (excluding distance-learning sections) in Mainstream Calculus I and Mainstream Calculus II taught by various types of instructors in four-year mathematics departments in fall 2015, by size of sections and type of department. Also average section sizes and enrollments (not including distance-learning enrollments). This table can be compared to Table FY.3, p. 119 of CBMS2010.

	Percentage of sections taught by																				
	Tenured/ tenure- eligible [1] %			Other full-time %			Part-time %			Graduate teaching assistants %			Unknown %			Average Section Size			Enrollment (1000s)		
Course & Department Type	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA
Mainstream Calculus I																					
Lecture with separate recitation	28	32	75	48	26	18	12	24	1	7	4	0	5	14	6	98	45	26	93	40	12
Sections that meet as a class	26	62	72	31	26	8	12	7	10	27	0	0	3	5	10	32	30	23	39	18	51
Other sections	27	0	35	32	0	65	7	100	0	34	0	0	0	0	0	32	0	9	2	0	0
Total Mainstream Calculus I	27	44	72	38	25	11	12	18	9	19	2	0	4	11	9	60	38	24	134	58	63
Mainstream Calculus II																					
Lecture with separate recitation	33	66	65	52	11	23	5	17	0	5	6	0	6	0	12	90	37	22	54	13	5
Sections that meet as a class	27	60	69	38	18	15	8	4	6	25	0	0	3	18	9	38	28	20	21	7	24
Other sections	38	NA	100	25	NA	0	0	NA	0	38	NA	0	0	NA	0	29	NA	10	1	0	0
Total Mainstream Calculus II	30	64	69	44	14	17	6	12	5	15	4	0	4	7	10	64	33	20	76	21	29
Total Mainstream Calculus I & II	28	50	71	40	22	13	10	16	7	18	3	0	4	10	9	62	37	23	210	79	92

Note: 0% means less than one half of 1%. 0 enrollment means under 500. Inconsistencies in column and row sums are due to round-off.

NA = Not applicable.

[1] In 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously. In 2015 the word "permanent" was deleted.

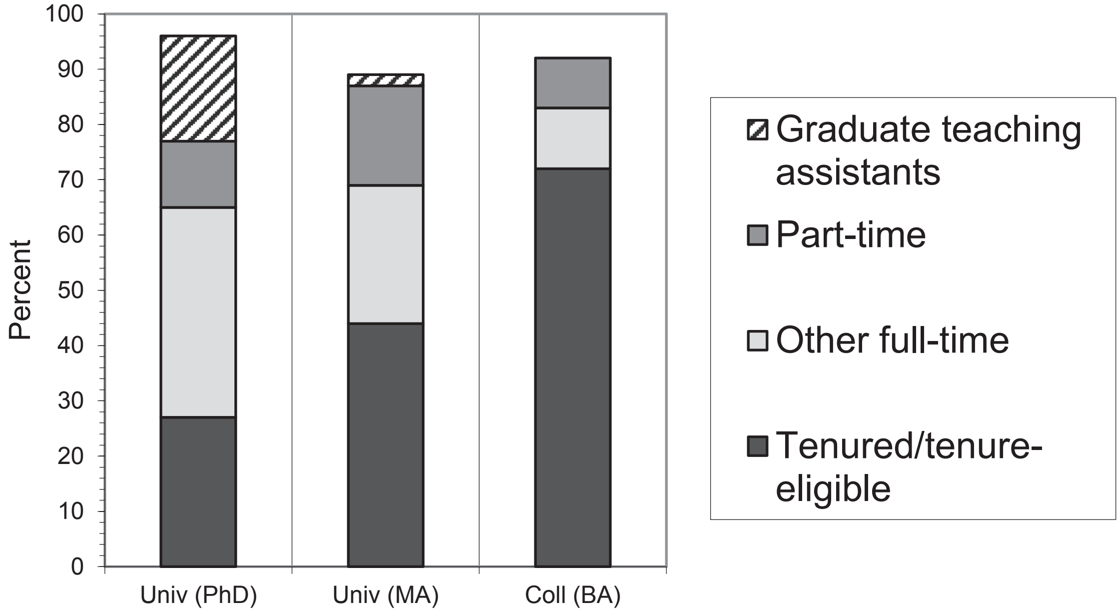

FIGURE FY.1.1 Percentage of sections (excluding distance learning) in Mainstream Calculus I in four-year mathematics departments by type of instructor and by type of department in fall 2015. (Deficits from 100% represent unknown instructors.) This figure can be compared to Figure FY.3.1, p. 120, in CBMS2010.

enrollment for each level of department in fall 2015. The introductory-level mathematics course with the second highest estimated enrollment in fall 2015 at doctoral-level mathematics departments was "Other" followed closely by Elementary Functions (which includes Precalculus and Analytical Geometry) and Mathematics for the Liberal Arts; at masters-level and bachelors-level departments, the course with the second largest enrollment was Mathematics for the Liberal Arts. These patterns also held in fall 2010, except that "Other" in doctoral-level departments had smaller enrollment (15,000 in 2010, compared to 62,000 in 2015) (CBMS2010, Appendix I, Table A.1, p. 185). Each specific introductory-level course had larger estimated enrollment in 2015 than in 2010 across all levels of departments combined (though not a significantly larger enrollment, as the SEs are relatively large for individual courses), except for Business Math and Math for Elementary Teachers, which had slightly smaller estimated enrollments in fall 2015 than in fall 2010.

College Algebra, Trigonometry, Precalculus

The total enrollments, over all levels of departments combined, in the cluster of the four courses that were listed on the four-year mathematics questionnaire as: College Algebra, Trigonometry, College Algebra and Trigonometry, and Precalculus (Elementary Functions) generally have been rising, except in the 2005 CBMS survey, where they showed a decline. The total enrollments in these four courses at all four-year mathematics departments (combined) were roughly 368,000 in fall 1995, 386,000 in 2000, 352,000 in 2005, 431,000 in 2010, and 482,000 in 2015. Hence there has been a 37% increase in the estimated total enrollment in these four courses since 2005, and a 31% increase since 1995. In fall 2015, the sum of the estimated enrollments in these four classes represented 20% of all doctoral-level mathematics department (non-distance learning) estimated enrollments in mathematics courses, 28% of all masters-level mathematics department (non-distance learning) estimated enrollments in mathematics courses, and 31% of all bachelors-level mathematics departments (non-distance learning) estimated enrollments in mathematics.

Mathematics for the Liberal Arts

Enrollments in Mathematics for the Liberal Arts have been steadily increasing, from an estimated enrollment (including distance learning enrollments) of 86,000 in fall 2000 to 171,000 (SE 21,900) in fall 2015, almost doubling over the past 15 years (an increase of 3.9 SEs from fall 2000 to fall 2015). Much of the increase occurred at the doctoral level, where estimated enrollments went from 43,000 in fall 2010 to 57,000 in fall 2015. The estimated enrollment at doctoral-level departments in the category of introductory-level courses, "Other", increased from an estimated enrollment of 15,000 in fall 2010 to 62,000 in fall 2015. The increased enrollment in these two categories of introductory-level courses at doctoral-level mathematics departments, suggests that doctoral-level departments are creating enrollments in introductory-level courses other than the traditional college algebra related courses.

Introductory courses for pre-service elementary teachers:

Estimated enrollments in introductory courses designed for pre-service elementary teachers, which had been increasing (in fall 1995 the estimated enrollment was roughly 59,000, in 2000 it was 68,000, in 2005 it was 72,000, and in 2010 it rose to 80,000), decreased in fall 2015 to 72,000 (SE 9,500, so not a significant change).

Mainstream Calculus: (Table FY.1)

Mainstream Calculus I had (non-distance learning) total enrollment, across all levels of mathematics departments combined, in fall 2015, of roughly 255,000 (SE 23,000), up 9% (0.9 SEs) from fall 2010, up 27% from fall 2005 (Chapter 1, Table S.5), and up 34% from fall 2000 (CBMS2005, Chapter 1, Table S.7, p.17). By Table FY.1, which breaks down Table S.5 of Chapter 1 by level of department, and comparing to CBMS2010 Table FY.3, p. 119, we see that the enrollment gains occurred at the masters and doctoral-level departments (from 2010 to 2015 Mainstream Calculus I estimated enrollment was up 41% (1 SE) at masters-level departments, up 22% (1.8 SEs) at doctoral-level departments), and estimated enrollment was down 23% (2.3 SEs) at bachelors-level departments. From Table FY.1 we also see that, in fall 2014, 53% of the estimated enrollments in Mainstream Calculus I were at the doctoral-level departments.

Mainstream Calculus II, the second course in the calculus sequence for STEM majors, had (non-distance learning) total enrollment in fall 2015 of roughly 125,000 (SE 10,650) (Chapter 1, Table S.5). The CBMS 2010 survey reported estimated enrollments of 128,000, the 2005 survey reported enrollments of 85,000 (Chapter 1, Table S.5), and the 2000 survey reported enrollments of 87,000 (CBMS2005, Chapter 1, Table S.7, p. 17). Hence, in fall 2015, the estimated enrollment in Mainstream Calculus II was up 44% (3.6 SEs) over fall 2000. Comparing Table FY.1 to CBMS2010 Table FY.3, p. 119, we see that the estimated enrollment in Mainstream Calculus II, from fall 2010 to fall 2015, declined at the masters and bachelors-level departments (down 34% (3.3 SEs) at the bachelors-level departments), and increased 25% (1.8 SEs) at the doctoral-level departments.

Generally, Calculus has been taught in a lecture/recitation format or in sections that meet as a class (and are not broken down into smaller sections). Recently other formats, such as self-paced laboratory sections, have been introduced. The CBMS surveys have considered the enrollments in each type of format. In the 2015 CBMS survey calculus sections were broken down into three kinds of formats: lecture/recitation, sections that meet as a class, and other. The estimated enrollments in each format, broken down by the level of the mathematics department is also given in Table FY.1 for both Mainstream Calculus I and II; Table FY.1 can be compared to Table FY.3, p. 119 in CBMS2010, where course sections were broken down slightly differently (lecture/recitation, other sections with enrollments of 30 or less, and other sections with enrollments more than 30). In fall 2015, 57% of the total estimated Mainstream Calculus I enrollments were in the lecture/recitation format. From fall 2010 to fall 2015, the enrollments in the lecture/recitation format of both Mainstream Calculus I and Mainstream Calculus II appeared to be growing at the doctoral and masters-level departments, and declining at the bachelors-level departments. There was very little reporting of “other” type of format in both Mainstream and Non-Mainstream Calculus; for Mainstream Calculus I, in fall 2015, doctoral-level departments reported an estimated enrollment of 2,000 (SE 1,800) in “other” formats of Mainstream Calculus I, and for other levels of departments, the estimates were less than 500 enrollments.

Non-Mainstream Calculus: (Table FY.2)

Non-Mainstream Calculus is the flavor of calculus that is not a part of the calculus sequence for mathematical and physical science majors, and tends to be for business, social science, or life science majors. Non-Mainstream Calculus I had (non-distance learning) enrollment in fall 2015 of roughly 91,000 (SE 10,500), down slightly from the fall 2010 estimate of 99,000, and from the fall 2005 estimate of 108,000 (Chapter 1, Table S.6); the fall 1995 estimate was 97,000 (CBMS2005, Chapter 1, Table S.8, p. 19). By Table FY.2, which breaks down Table S.6 of Chapter 1 by level of department, and comparing to CBMS2010, Table FY.5, p. 121, we see that the Non-Mainstream estimated enrollments in fall 2015 were distributed roughly the same way in fall 2015 as in fall 2010, with 63% of the enrollments at the doctoral-level departments in fall 2015.

Non-Mainstream Calculus II, III, etc. had (non-distance learning) enrollment in fall 2015 of roughly 16,000 (SE 4,300) (Chapter 1, Table S.6). The fall 2015 estimate was halfway between the 2005 estimate of 10,000 and the 2010 estimate of 22,000 (Chapter 1, Table S.6), and the 1995 survey reported estimated enrollments of 14,000 (CBMS2005, Chapter 1, Table S.8, p.19). By Table FY.2 the estimated enrollment in Non-Mainstream Calculus II, III, etc. declined 50% (4 SEs) from fall 2010 to fall 2015 at the doctoral-level departments, and declined 80% (7 SEs) at the bachelors-level departments; the masters-level departments reported the largest estimated enrollments.

TABLE FY.2 Percentage of sections (excluding distance-learning sections) in Non-Mainstream Calculus I and in Non-Mainstream II, III, etc. taught by various types of instructors in mathematics departments in fall 2015, by size of sections and type of department. Also average section size and enrollments (not including distance-learning enrollments). This table can be compared to Table FY.5, p. 121 in CBMS2010.

	Percentage of sections taught by																				
	Tenured/ tenure- eligible [1] %			Other full-time %			Part-time %			Graduate teaching assistants %			Unknown %			Average Section Size			Enrollment (1000s)		
Course & Department Type	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA
Non-Mainstream Calculus I																					
Lecture with separate recitation	25	33	56	51	23	44	14	44	0	2	0	0	8	0	0	96	56	19	26	3	1
Sections that meet as a class	15	38	39	16	32	29	10	24	30	47	0	0	13	6	2	38	32	29	29	14	17
Other sections	0	NA	NA	56	NA	NA	0	NA	NA	44	NA	NA	0	NA	NA	61	NA	NA	2	0	0
Total Non-Mainstream Calculus I	17	37	40	26	31	30	11	26	28	35	0	0	11	5	2	54	34	29	57	17	17
Total Non-Mainstream Calculus II, III, etc.	32	32	35	29	14	11	19	55	17	15	0	0	4	0	37	41	39	22	6	8	1
Total Non-Mainstream Calculus I, II, III, etc.	19	36	39	27	26	28	12	34	27	32	0	0	10	4	5	52	35	28	63	25	18

Note: 0 means less than one half of 1% in columns 1 through 18. Inconsistences in row and column sums are due to round-off.

NA = Not applicable.

[1] In 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously. In 2015 the word "permanent" was deleted.

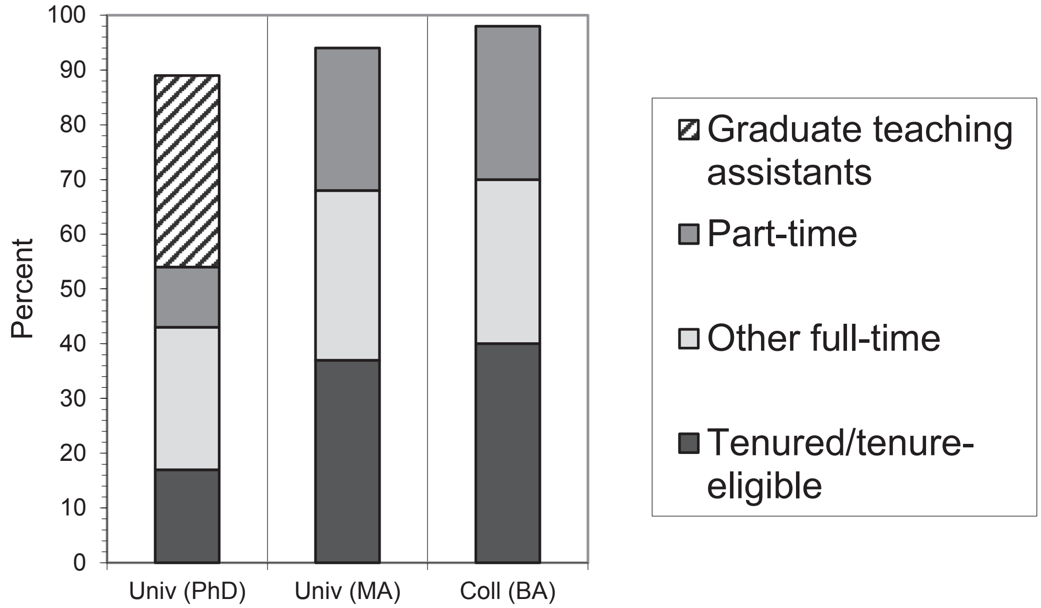

FIGURE FY.2.1 Percentage of sections (excluding distance-learning sections) in Non-Mainstream Calculus I in four-year mathematics departments taught by various kinds of instructors, by type of department in fall 2015. (Deficits from 100% represent unknown instructors.) This Figure can be compared to Figure FY.5.1, p. 122, in CBMS2010.

The estimated enrollments in each of the three formats described above for Mainstream Calculus I are broken down by the level of the mathematics department for Non-Mainstream Calculus I in Table FY.2. Table FY.2 can be compared to Table FY.5, p. 121 in CBMS2010, where course sections were broken down slightly differently. From fall 2010 to fall 2015, the enrollments in the lecture/recitation format of Non-Mainstream Calculus I at bachelors-level departments appeared to be declining (from 2010 to 2015 down 80% (13 SEs)).

In comparing fall 2015 Non-Mainstream Calculus estimated enrollments to those obtained in fall 2010, one should keep in mind that there was an error in the 2010 questionnaire. The questionnaire asked for enrollments in Non-Mainstream Calculus I (broken down by three formats), followed by a request for "Non-Mainstream Calculus I, II, III, etc." enrollments (not broken down by formats). The intention had been to combine all Non-Mainstream Calculus enrollments above Non-Mainstream Calculus I (as was done in 2015), and hence Non-Mainstream Calculus I should not have been included in the second list of courses. From other data provided, it was clear that some departments listed Non-Mainstream Calculus I enrollments in both rows, and looking at the data, and with some follow-up correspondence with some of the departments, the data was interpreted as best it could be. The 2010 enrollment data on Non-Mainstream Calculus II, III, etc., as interpreted, showed that the Non-Mainstream Calculus II, III, etc. enrollment (excluding distance learning courses) of roughly 22,000 in fall 2010 was double the fall 2005 enrollment (excluding distance learning courses) in Non-Mainstream Calculus II (CBMS2005, Table S.8, p.19). The fall 2015 estimate was 15,000, suggesting that the 2010 estimate was too large.

More information about Calculus instruction can be found in the MAA Progress Through Calculus National Survey Summary [MAA:PtC].

Introductory Statistics: (Table FY.3, FY.4 and FY.9)

The 2015 four-year mathematics CBMS questionnaire listed five introductory statistics courses for non-majors/minors: (F1) Introductory Statistics (no calculus prerequisite), (F2) Introductory Statistics (calculus prerequisite), (F3) statistics for pre-service elementary (K-5) or middle grade (6-8) teachers, (F4) statistics for pre-service secondary teachers, and (F5) other introductory probability and statistics courses. Courses (F3) and (F4) were included in the CBMS mathematics survey for the first time in 2015, and the 2010 CBMS mathematics questionnaire included a course (F3) titled Probability and Statistics (no calculus prerequisite) that was deleted from the 2015

TABLE FY.3 Percentage of sections (excluding distance-learning sections) in Introductory Statistics courses (for non-majors) taught by various types of instructors in mathematics departments in fall 2015, by size of sections and type of department. Also average section size and enrollments (not including distance-learning enrollments). Comparable 2010 data is in CBMS2010, Table FY.6, p. 123.

	Percentage of sections taught by																				
	Tenured/ tenure-eligible [1] %			Other full-time %			Part-time %			Graduate teaching assistants %			Unknown %			Average Section Size			Enrollment (1000s)		
Course & Mathematics Department Type	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA
Introductory Statistics (F1) (non-Calculus)																					
Lecture with separate recitation	17	49	43	52	39	19	3	8	19	7	0	0	20	4	19	141	41	31	15	9	18
Sections that meet as a class	13	46	42	31	38	16	17	16	34	23	0	0	16	0	8	30	39	26	26	34	85
Other sections	9	NA	38	91	NA	49	0	NA	13	0	NA	0	0	NA	0	2	NA	12	0	0	0
Total Introductory Statistics (non-Calculus)	13	46	42	34	38	16	16	14	32	21	0	0	17	1	9	42	39	27	41	43	104
Introductory Statistics (F2) (Calculus prerequisite for non-majors/minors)																					
Lecture with separate recitation	54	86	41	29	7	0	9	0	59	8	0	0	0	7	0	53	79	27	2	5	3
Sections that meet as a class	37	71	69	24	11	11	17	17	12	15	0	0	8	0	8	33	31	27	5	8	11
Other sections	100	0	100	0	NA	0	0	NA	0	0	NA	0	0	NA	0	34	NA	30	0	0	0
Total Introductory Statistics (Calculus)	43	74	63	24	10	8	15	14	22	13	0	0	6	1	6	37	40	27	7	13	14
Statistics for Pre-service Teachers (F3,F4)	23	76	29	27	0	0	12	27	0	38	0	71	0	0	0	25	23	3	1	1	0
Probability & Statistics (non-Calculus) (F5)	46	32	27	0	34	31	54	13	29	0	0	0	0	21	13	34	38	31	3	2	6
Total, all introductory statistics courses for non-majors	20	52	44	30	31	16	18	14	30	19	0	1	13	2	9	40	39	27	53	58	123

Note: 0% means less than one half of 1%. 0 enrollment means under 500. Some row and column sums appear inconsistent due to round-off.

NA = Not applicable.

[1] In 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously. In 2015, the word "permanent" was deleted.

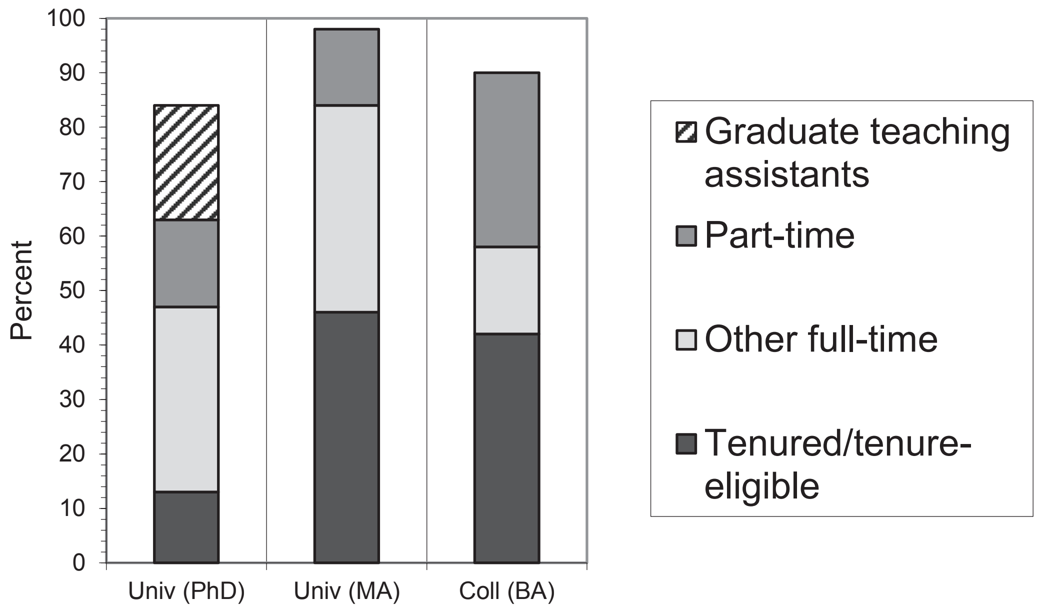

FIGURE FY.3.1 Percentage of sections (excluding distance-learning sections) in Introductory Statistics (non-Calculus) in four-year mathematics departments, by type of instructor and type of department in Fall 2015. (Deficits from 100% represent unknown instructors.) This Figure can be compared to FIgure FY.6.1, p. 124, in CBMS2010.

list of courses. The list of introductory courses in CBMS 2015 questionnaire for statistics departments was the same list as on the mathematics department questionnaire; on the statistics department questionnaire these courses were labelled (E1)-(E5) (the list of introductory courses on the statistics department questionnaire was the same in the 2010 and 2015 CBMS surveys). Courses (F2) and (E2), introductory statistics courses for non-majors with a calculus prerequisite, were added to the list of courses in the CBMS surveys in 2010. By Table FY.3, in fall 2015, in mathematics departments, course (F2) had 15% of the enrollments in courses (F1) and (F2), combined, while in statistics departments, by Table FY.4, course (E2) had 22% of the enrollments in courses (E1) and (E2) combined.

From Figure F.2.3 in Chapter 1 we see that statistics enrollments have been steadily increasing in four-year and two-year mathematics departments, and in statistics departments; statistics enrollments grew sharply from 2005 to 2010, and grew, but less rapidly, from 2010 to 2015; see also Chapter 3, Table E.2 (Table E.2 includes distance learning enrollments) that shows that the enrollment growth in introductory statistics occurred at the doctoral and masters-level mathematics departments, and the doctoral-level statistics departments (see also Chapter 3, Figure E.2.3).

The estimated total enrollment in courses (F1)-(F5) in four-year mathematics departments, in fall 2015, was 235,000 (SE 19,000) (Chapter 1, Table S.4). The estimated total enrollment in courses (F1)-(F4) on the CBMS2010 four-year mathematics questionnaire (these courses do not have all the same titles in 2010 and 2015), in fall 2010, was 218,000 (Chapter 1, Table S.4). Comparing the estimated enrollments in course (F1), which had the same description in the 2005, 2010 and 2015 surveys, we see by Chapter 1, Table S.7 that (F1) enrollment was estimated at 122,000 in 2005, 174,000 in 2010, and 188,000 (SE 15,100) in 2015, while course (F2), which appeared with the same description in 2010 and 2015, had an estimated enrollment of 23,000 in 2010 and 34,000 in 2015 (SE 5,790). Table FY.3, which breaks down Chapter 1, Table S.7, by level of department, shows that, in fall 2015, slightly over half of the total of all the introductory statistics courses estimated enrollments in four-year mathematics department occurred at the bachelors-level departments, particularly course (F1), where an estimated 104,000 (SE 11,500) of the estimated 188,000 four-year mathematics department enrollments occurred (55%). By CBMS2010, Table FY.6, p.123, in fall 2010, bachelors-level departments taught 63% of the enrollments in courses (F1) at four-year mathematics departments. In fall 2015, bachelors-level mathematics departments enrolled an estimated 123,000 (SE 12,900) students in all the introductory-level statistics courses (Table FY.3), while in fall 2010, the estimate was 130,000 (CBMS2010, Appendix I, Table A.2 p. 189).

TABLE FY.4 Percentage of sections (excluding distance-learning sections) in Introductory Statistics courses (for non-majors) taught by various types of instructors in statistics departments in fall 2015, by size of sections and type of department. Also average section size and total (non-distance-learning) enrollments. This table can be compared to Table FY.9, p. 129, in CBMS2010.

	Percentage of sections taught by															
	Tenured/ tenure-eligible[1] %		Other full-time (with PhD) %		Other full-time (without PhD) %		Part-time %		Graduate teaching assistants %		Unknown %		Average Section Size		Enrollment (1000s)	
Course & Statistics Department Type	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA
Introductory Statistics (non-Calculus for non-majors/minors) (E1)																
Lecture with separate recitation	6	8	9	26	9	18	6	21	38	3	32	26	57	96	35	5
Sections that meet as a class	17	40	16	4	9	35	11	15	41	1	6	5	66	53	18	7
Other sections	0	NA	3		3	NA	42	NA	52	NA	0	NA	20	NA	1	0
Total Introductory Statistics (non-Calculus)	9	31	11	10	9	30	9	16	40	1	23	11	58	65	54	12
Introductory Statistics (Calculus prerequisite for non-majors/minors) (E2)																
Lecture with separate recitation	14	17	24	17	7	8	12	0	16	0	27	58	73	57	10	1
Sections that meet as a class	31	41	22	0	6	48	8	4	31	0	0	7	54	68	5	2
Other sections	5	NA	33	NA	2	NA	0	NA	60	NA	0	NA	26	NA	1	0
Total Introductory Statistics (Calculus)	18	33	25	5	6	36	9	3	29	0	14	23	59	65	16	3
Statistics for Pre-service Teachers (E3,E4)	100	0	0	0	0	100	0	0	0	0	0	0	36	5	0	0
Probability & Statistics (non-Calculus) (E5)	6	0	19	0	6	0	3	100	33	0	33	0	102	40	4	0
Total, all Introductory Probability & Statistics courses	11	31	14	9	8	32	9	14	37	1	21	13	59	65	74	15

Note: 0% means less than one half of 1%. 0 enrollment means under 500. Row and column sums may appear inconsistent due to round-off.

NA = Not applicable.

[1] In 2010, the CBMS survey added the word "permanent" to the description "tenured/tenure eligible" that was used previously. In 2015, the word "permanent" was deleted.

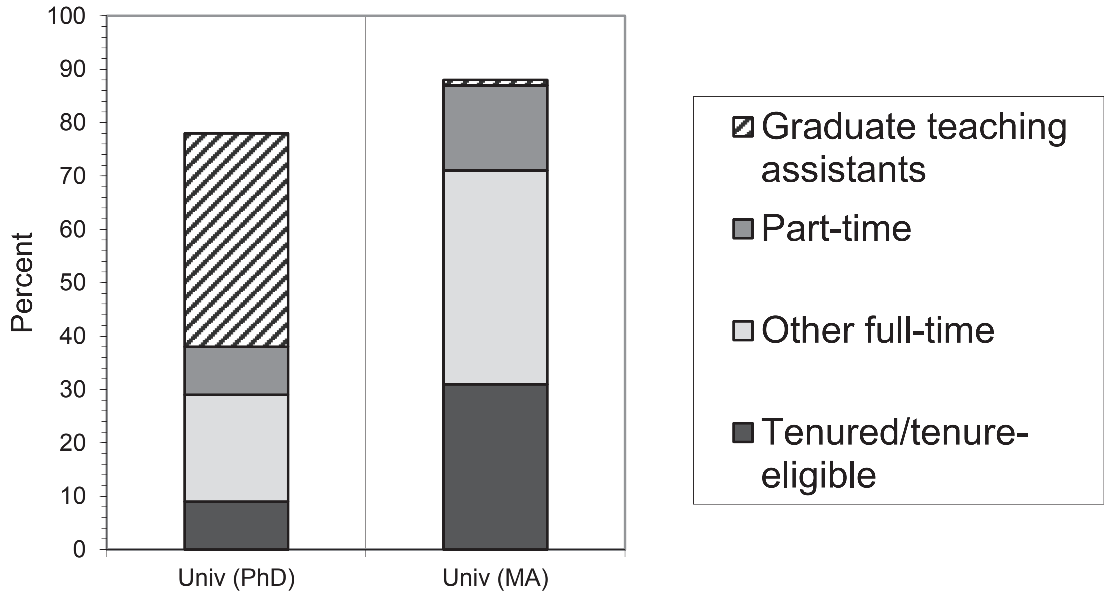

FIGURE FY.4.1 Percentage of sections (excluding distance-learning sections) in Introductory Statistics (non-Calculus) taught in statistics departments in fall 2015, by type of instructor and type of department. (Deficits from 100% represent unknown instructors). This Figure can be compared to Figure FY.9.1, p. 128, in CBMS2010.

Estimated enrollments in courses (F1) and (F2) were also broken down by the format of the section (lecture/recitation, sections that meet as a class, and other), a different format breakdown than in the 2010 survey. By Table FY.3, in mathematics departments, in fall 2015, across all levels of departments combined, 22% of the (F1) estimated enrollments were in the lecture/recitation format, and the bachelors-level departments had the greatest number of these enrollments. Comparing Table FY.3 to Table FY.6, p. 123 of CBMS2010, we see that enrollments in the lecture/recitation format sections of course (F1) at doctoral-level mathematics department increased (from 6,000 in 2010 (16% of total enrollments) to 15,000 (SE 4,600) in 2015 (37% of total enrollments)), while enrollments in the lecture/recitation format sections of course (F1) at bachelors-level mathematics departments decreased (from 34,000 in 2010 (31% of total enrollments) to 18,000 (SE 3,200) in 2015 (17% of total enrollments)).

The estimated total enrollment in courses (E1)-(E5) in statistics departments, in fall 2015, was 90,000 (SE 3,000) (Chapter 1, Table S.8). The estimated total enrollment in courses (E1)-(E5) at statistics departments, in fall 2010, was 77,000 (SE 4,700) (CBMS2010, Appendix I, Table A.2, p. 189). Hence the estimated enrollment in introductory courses for non-majors/minors in statistics departments has increased 17% (4.3 SEs) from 2010 to 2015. The 2005 estimated enrollment was 53,000, and hence enrollments in 2015 increased 70% (12 SEs) from 2005.

Comparing the estimated enrollments in courses (E1) and (E2), we see, by Chapter 1, Table S.8, that (E1) enrollment was estimated at 42,000 in 2005, 56,000 in 2010, and 66,000 (SE 2,000) in 2015; hence estimated enrollments in course (E1) taught in statistics departments were up by 26% (6 SEs) over 2010. Course (E2) had an estimated enrollment of 16,000 in 2010 and 20,000 in 2015 (SE 1,000). Table FY.4 breaks down Chapter 1, Table S.8, by level of department, and shows that, in fall 2015, an estimated 82% of introductory statistics courses were taught at the doctoral-level statistics departments.

In fall 2015, in mathematics departments, where the majority of enrollments are taught at the bachelors-level departments, by Table FY.3, across all levels of departments combined, an estimated 22% of the enrollments in Introductory Statistics (no calculus prerequisite) (course (F1)) were taught in lecture/recitation format and 78% were taught in sections that meet as a class, whereas in statistics departments, by Table FY.4, an estimated 61% of the analogous course (E1) were taught in lecture/recitation format and 38% were taught in sections that meet as a class.

Finally, a new question included on the 2015 CBMS surveys of four-year mathematics and statistics departments asked responders to estimate the number of enrollments at their institution in Introductory Statistics courses (no calculus prerequisite) taught

TABLE FY.5 Percentage of mathematics departments using various practices in the teaching of Introductory Statistics (no calculus prerequisite) in fall 2015 by type of department. This table can be compared to Table FY.7, p. 125, in CBMS2010.

	Mathematics Departments			
	Univ (PhD)	Univ (MA)	College (BA)	All Depts. Combined
Percentage of departments that offer Introductory Statistics with no calculus prerequisite	50	78	83	78
Number of different kinds of introductory statistics courses for non-majors with no calculus prerequisite				
1	61	69	74	72
2	35	23	23	24
3	4	4	2	3
More than 3		4	0	1
Of those that offer the course, the percentage of departments in which the majority of sections use real data for the following percentages of class sessions:				
0-20%	21	29	28	28
21-40%	13	31	23	23
41-60%	26	19	18	19
61-80%	12	2	14	12
81-100%	29	18	18	19
Percentage of departments where the majority of sections use in-class demonstrations in the following percentages of class sessions:				
0-20%	21	23	18	19
21-40%	26	17	22	22
41-60%	20	33	21	23
61-80%	16	17	17	17
81-100%	18	9	21	19
Percentage of departments using the following kinds of technology in the majority of sections:				
Graphing calculators	57	77	66	67
Statistical packages	48	64	45	48
Educational software	29	55	52	50
Applets	16	30	24	24
Spreadsheets	66	72	67	68
Web-based resources	42	65	49	50
Classroom response systems	4	12	6	6
Online textbooks	41	48	39	41
Online videos	26	32	32	31
Percentage of departments where the majority of sections require assessments beyond homework, exams, and quizzes	19	22	45	39

TABLE FY.6 Percentage of statistics departments using various practices in the teaching of Introductory Statistics for non-majors/minors (no calculus prerequisite) in fall 2015 by type of department. This table can be compared to Table FY.8, p. 127, in CBMS2010.

	Statistics Departments		
	Univ (PhD)	Univ (MA)	All Depts. Combined
Percentage of departments that offer Introductory Statistics for non-majors/minors with no calculus prerequisite	97	85	94
Number of different kinds of introductory statistics courses for non-majors with no calculus prerequisite			
1	17	38	23
2	26	23	26
3	21	23	22
More than 3	35	15	30
Of those that offer the course, the percentage of departments in which the majority of sections use real data the following percentages of the time:			
0-20%	14	20	15
21-40%	12	20	14
41-60%	16	10	15
61-80%	16	40	21
81-100%	42	10	35
Percentage of departments where the majority of sections use in-class demonstrations in the following percentages of class sessions:			
0-20%	8	30	13
21-40%	18	40	23
41-60%	24	10	21
61-80%	7		5
81-100%	44	20	39
Percentage of departments using following kinds of technology in the majority of sections			
Graphing calculators	46	50	47
Statistical packages	65	75	68
Educational software	53	55	53
Applets	45	27	41
Spreadsheets	52	64	55
Web-based resources	74	45	68
Classroom response systems	55	33	50
Online textbooks	51	45	50
Online videos	38	27	35
Percentage of departments where the majority of sections require assessments beyond homework, exams, and quizzes	35	25	32

TABLE FY.7 Of departments that offered Introductory Statistics (no calculus prerequisite) in fall 2015, the percentage that cover the following topics, by type of department.

	Mathematics Depts				Statistics Depts		
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total
Conditional probability	92	90	72	76	85	75	83
Simulation to explore randomness	50	84	45	51	76	67	73
Resampling techniques	9	34	21	22	50	8	39

outside of the mathematical sciences departments. These estimates are summarized in Table FY.9, which is broken down by level of department, and used to project national enrollments outside of mathematical science departments. The estimates obtained from statistics departments are from colleges with separate statistics departments; as such colleges would be expected to also have mathematics departments, adding the estimates in FY.9 obtained for both types of departments together would result in duplicating the counts of some students. However, using these crude estimates suggests that there may have been a little less than 100,000 such enrollments in introductory statistics courses taught outside of mathematical sciences departments; this estimate can be compared to the estimates from Chapter 1, Table S.2: 627,000 enrollments in introductory statistics courses across all mathematical sciences departments (including distance learning enrollments), of these, 280,000 (SE 60,000) occurred at two-year colleges (45%), 253,000 (SE 20,000) at four-year mathematics departments (40%), and 94,000 (SE 3,000) at statistics departments (15%).

B. Appointment Type of First Year Course Instructors (Tables FY.1-FY.4, FY.8)

Each CBMS survey report has attempted to answer the question: “who is teaching the course?” The CBMS 2015 survey divided faculty at four-year institutions into four categories: tenured or tenure-eligible (TTE), other full-time faculty (OFT) who are full-time but not TTE (including postdocs and faculty with renewable appointments), part-time faculty (PT), and graduate teaching assistants (GTAs). A course was to be reported as being taught by a GTA if and only if the GTA was the “instructor of record” for the course. GTAs who ran discussion or recitation sections as part of a lecture/recitation course were not included in this category.

Related data has been presented in earlier chapters. Chapter 1, Table S.4, gave the estimated percentages of course instructors at each appointment type, who were teaching the various levels of mathematics and statistics courses in fall 2005, 2010 and 2015, while Chapter 1 Table S.5 (Mainstream Calculus), Table S.6 (Non-Mainstream Calculus), Table S.7 (introductory-level statistics courses in mathematics departments), and Table S.8 (introductory-level statistics courses in statistics departments) gave the percentages of the appointment type of instructors, broken down by the format of the course (lecture/recitation, sections that meet as a class, and other) in fall 2015, and the percentages of the appointment types over all sections of the course for fall 2005, 2010, and 2015. In Chapter 3, Table E.5 (calculus-level courses), Table E.6 (introductory statistics courses), Table E.7 (lower-level computer science courses), Table E.8 (middle-level computer science courses), and Table E.9 (advanced-level mathematics and statistics courses), gave the estimated number of sections taught by each appointment type of course instructors in fall 2010 and fall 2015. In this chapter, data on first-year courses will be broken down by course, section format, and the level of the department.

As was noted in Chapter 1, in CBMS surveys of four-year departments, prior to 2010 the TTE category was labeled “tenured/ tenure-eligible” on the survey questionnaire. In the 2010 survey the word “permanent” was an added description, since the instructions for the questionnaire told departments at institutions that did not recognize tenure (estimated at 7.9% (SE 2.5) of all four-year mathematics departments in the CBMS 2015 survey) to place permanent faculty in the TTE category. In the 2010 survey, the addition to of the label “permanent” to the description of the TTE category on the questionnaire may have led some respondents to add to the TTE category instructors who should have been classified as OFT instructors, namely those instructors at institutions that DO recognize tenure, who have teaching positions that are regarded as permanent, although these faculty do not have tenure and are not eligible for tenure. The 2010 survey instructions did not define “permanent” beyond the situation where the institution does not recognize tenure, and it seems quite possible that some departments interpreted "permanent faculty" to have this additional meaning, and some of the data in 2010 suggested that some faculty who should have been counted as OFT were listed as TTE because they were "permanent". Hence, the word "permanent" was deleted from the TTE description on the 2015 instrument (returning to the description used in 2005 and previously), and this change may explain some of the decrease in the estimated numbers of TTE faculty (and increase in OFT faculty) in the tables observed from 2010 to 2015.

The 2015 CBMS survey followed the practice established in the 2005 survey of presenting findings in terms of percentages of "sections" offered in four-year institutions (in CBMS2000 and earlier, the data were presented in terms of percentages of enrollments). In analyzing the 2010 survey data, it seemed that the notion of "section" varied somewhat among different departments, particularly for lower-level classes that were taught with a laboratory component. A further, and possibly related problem, experienced in the 2015 survey, was the inconsistent numbers of faculty and sections reported by some departments; this problem had occurred in past surveys, and was resolved by creating the category of "unknown" instructors. The 2015 survey defined more clearly what constitutes a "section", and provided a place to enter enrollments that were not taught in either the lecture/recitation or the sections that meet as a class format. Further, the 2015 survey collected data on the rank of the instructor for only calculus-level mathematics classes, introductory statistics classes, and computer science classes; no data on the rank of the instructor in precollege or introductory-level mathematics classes was collected; in advanced-level mathematics and statistics classes, the survey gathered the number of sections with a TTE instructor, and listed the rest as "other".

Mainstream Calculus: (Table FY.1)

Table FY.1 presents data on the appointment type of the instructor in Mainstream Calculus I and II in fall 2015; the data for Mainstream Calculus I, broken down by level of department, is displayed in Figure FY.1.1. These data can be compared with CBMS2010, Table FY.3, p. 119, and Figure FY.3.1, p. 120. For Mainstream Calculus I, at doctoral-level mathematics departments, over all formats of the sections combined, an estimated 27% (SE 1.8) of sections were taught by TTE faculty (compared to 31% in 2010), while at masters-level departments 44% (SE 6.3) of the sections were taught by TTE faculty (compared with 63% in 2010), and at bachelors-level departments 72% (SE 3.7) were taught by TTE faculty (compared with 63% in 2010). Of the Mainstream Calculus I sections taught using the lecture/recitation format, in doctoral-level departments, the estimated percentage of sections that were taught by TTE faculty in fall 2015 was 28% (SE 3.6), about the same as in fall 2010, but in masters-level departments, in fall 2015, was 32% (SE 3.7) (compared with 82% in fall 2010), and in bachelors-level departments, in fall 2015, was 75% (SE 4.8) (compared with 50% in fall 2010). With the overall growth in numbers of OFT faculty, the estimated percentage of sections of Mainstream Calculus I taught by OFT faculty, across all formats combined, increased at doctoral and masters-level mathematics departments from fall 2010 to fall 2015: at doctoral level departments it was 38% (SE 1.8) in 2015 (compared 30% in 2010), and at masters-level departments it was 25% (SE 6.3) in 2015 (compared to 13% in 2010). The estimated percentage of sections taught by PT faculty was about the same in 2010 and 2015 at doctoral- and masters-level departments, and decreased at bachelors-level department. The estimated percentage of sections of Mainstream Calculus I at doctoral-level mathematics departments taught by GTAs, in fall 2015, across all formats combined, was 19% (SE 4.2), about the same as in fall 2010.

Table FY.1 also shows that the estimated distribution of appointment types of faculty teaching Mainstream Calculus II in fall 2015 was similar to that in fall 2010, except at the ranks of TTE and OFT faculty at doctoral-level departments. At doctoral-level departments, in fall 2015, across all formats combined, an estimated 30% (SE 2.9) of Mainstream Calculus II sections were taught by TTE faculty (compared with 45% in 2010), and an estimated 44% (SE 2.1) of Mainstream Calculus II sections were taught by OFT faculty (compared with 26% in 2010). The fall 2010 estimates can be found at CBMS2010, Table FY.3, p. 119.

For further discussion of the declining number of TTE faculty teaching Calculus, see David Bressoud's Launchings blog http://launchings.blogspot.com/ for October 2017.

Non-Mainstream Calculus: (Table FY.2)

Table FY.2 presents data on the appointment type of instructors of Non-Mainstream Calculus, and Figure FY.2.1 displays the estimated percentages of various appointment types of faculty teaching Non-Mainstream Calculus I, in fall 2015, broken down by level of department. At the doctoral-level departments, in fall 2015, an estimated 17% (SE 3.1) of the sections of Non-Mainstream Calculus I were taught by TTE faculty (compared to 22% in 2010), while at the bachelors and masters-level this percentage was about 40%; these estimated percentages are not very different from those estimated in 2010. The estimated percentages of sections of Non-Mainstream Calculus I taught by OFT faculty were about the same in 2015 as in 2010 at doctoral-level departments, but slightly larger in 2015 than in 2010 at the masters and bachelors-level departments. At doctoral-level departments GTA's taught 35% (SE 6.2) of the sections of Non-Mainstream Calculus I (compared to 25% in 2010), across all formats, almost double the percentage of GTAs teaching Mainstream Calculus I. Table FY.2 and Figure FY.2.1 can be compared to CBMS2010, Table FY.5, p. 121 and Figure FY.5.1, p. 122.

Introductory Statistics (Tables FY.3, FY.4, and FY.8)

Table FY.3 presents data on the appointment type of the instructors in the five introductory statistics courses in mathematics departments of four-year colleges and universities, in fall 2015; the estimated percentages of sections of Introduction Statistics (no calculus prerequisite (course (F1)) taught by various appointment types of mathematics faculty, broken down by level of the mathematics department are displayed in Figure FY.3.1. Table FY.3 can be compared to CBMS2010, Table FY.6, p. 123, which presents data on a slightly different set of courses, using slightly different formats. The percentage of sections of Introductory Statistics (no calculus prerequisite (course (F1) on the questionnaire)), across all formats combined, taught by TTE faculty declined slightly at each level of mathematics department from fall 2010 to fall 2015: at doctoral-level departments, in fall 2015, an estimated 13% (SE 3.4) of sections were taught by TTE faculty (the 2010 estimate was 22%), at masters-level departments the fall 2015 percentage was 46% (SE 5) (the 2010 estimate was 50%), and at bachelors-level departments the fall 2015 percentage was 42% (SE 3.3) (the 2010 estimate was 49%). Table FY.3. and Figure FY.3.1 can be compared to Table FY.4 and Figure FY.4.1, which presents the same data for courses taught in statistics departments. At doctoral-level mathematics departments, in fall 2015, by Table FY.3 an estimated 21% (SE 6.9) of the sections of Introductory Statistics (no calculus prerequisite–course (F1) on the mathematics questionnaire), across all formats combined, were taught by GTAs, compared to 29% in Fall 2010; Table FY.4 shows that in statistics departments, in fall 2015, this percentage for course (E1) on the statistics questionnaire was 40% (SE 2.9) (24% in fall 2010 by CBMS2010 Table FY.9, p. 129). Further, the estimated percentage of sections of Introductory Statistics (course (F1)) in doctoral-level mathematics departments, in fall 2015, taught by OFT faculty was 34% (SE 7.1), and in doctoral-level statistics departments the estimated percentage of sections of course (E1) taught by OFT faculty, in fall 2015, was 20% (note that in Table FY.4 OFT statistics faculty are divided into those with a Ph.D., and those without a Ph.D.).

Table FY.4 presents data concerning the appointment type of the instructor of the five introductory statistics courses (courses (E1)-(E5) on the statistics questionnaire) taught in statistics departments, in fall 2015; the estimated percentages of sections of Introduction Statistics (no calculus prerequisite (course (E1)) taught by various appointment types of faculty, broken down by level of department, are displayed in Figure FY.4.1. The data show that, in fall 2015, at doctoral-level departments, the largest percentage of sections was taught by GTAs. In Table FY.4, the OFT faculty are broken down into those with a Ph.D., and those without a Ph.D. In the course, Introductory Statistics (calculus prerequisite (courses (E2)), there was less use of GTAs than in course (E1); at the doctoral-level statistics departments, an estimated 18% (SE 2.4) of sections for course (E2) were taught by TTE faculty, 31% of sections by OFT faculty (25% (SE 2.2) of sections by OFT faculty with a Ph.D.),

TABLE FY.8 Of mathematics departments that offered Introductory Statistics (no calculus prerequisite) in fall 2015, the percentage whose instructors typically received the following highest degree in statistics, by type of mathematics department.

	No graduate degree in statistics	Masters degree in statistics	PhD degree in statistics
Mathematics Departments			
Univ (PhD)	52	29	18
Univ (MA)	48	35	17
Coll (BA)	68	18	14
Total Math Depts	64	21	15

and 29% (SE 3.3) by GTAs. This data can be compared to the data obtained in fall 2010 (CBMS2010 Table FY.9, p. 129), which shows that for course (E2), a greater percentage of sections were taught by GTAs and by OFT faculty, and a smaller percentage by TTE faculty, in fall 2015 than in fall 2010 in doctoral-level statistics departments.

The 2015 CBMS survey questionnaire for four-year mathematics departments contained a new additional question inquiring about the highest degree in statistics held by mathematics faculty teaching Introductory Statistics (no calculus prerequisite (course (F1)). Departments were asked the following: "the instructors teaching introductory statistics course (F1) typically have received the following highest degree in statistics (check one): no graduate degree, a Master's degree, or a Ph.D." The responses from this question are summarized in Table FY.8, which is broken down by level of department. Over all mathematics departments combined (and very close to the estimates at the bachelors-level departments, where there are the most enrollments, and relatively consistently across the three different levels of departments), an estimated 64% (SE 4.5) had no graduate degree in statistics, 21% (SE 4.4) had a Master's degree in statistics, and 15% (SE 3.5) had a Ph.D. in statistics.

C. Average Section Sizes (Tables FY.1-FY.4)

The tables FY.1-FY.4 also contain the average section sizes for each of the courses discussed above, broken down by the level of the department, and by the format of the class. The average size of Mainstream Calculus I sections increased slightly at the doctoral and masters-level departments from fall 2010 to fall 2015; for example, by Table FY.1, at doctoral-level mathematics departments, in fall 2015, the average lecture section enrolled an estimated 98 (SE 7.6) students, compared to 71 students in fall 2010 (CBMS2010, Table FY.3, p. 119). The estimated average size of Mainstream Calculus I sections, over all formats, in fall 2015, was 60 (SE 5.0) at the doctoral-level departments, 38 (SE 6.8) at the masters-level departments, and 24 (SE 0.8) at the bachelors-level departments. The average size of Mainstream Calculus II sections was generally about the same size as Mainstream Calculus I sections.

By Table FY.2 the estimated average sizes of Non-Mainstream Calculus I and II sections in fall 2015 were quite similar to that of Mainstream Calculus I and II, and also very nearly that observed in fall 2010 (CBMS2010, Table FY.5, p. 121). Non-Mainstream Calculus I at doctoral-level departments in the "other" (not lecture/recitation or sections that meet as a class) format, in fall 2015, had an estimated average section size of 61 (SE 37.3) (compared to an estimated 32 (SE 1.7) for the Mainstream version), suggesting that, at some doctoral-level mathematics departments, perhaps some different kinds of format were used for larger groups of students in some Non-Mainstream calculus sections.

The estimated average sizes of introductory statistics sections taught in mathematics departments, in fall 2015, are given in Table FY.3, and were about the same sizes as the estimates for Mainstream Calculus I sections. One anomaly is Introductory Statistics (no calculus prerequisite (courses (F1)) at the doctoral-level mathematics departments, where the average size of lecture sections is estimated at 141 students (SE 24.5). In fall 2015, the estimated average sizes of introductory statistics sections taught in statistics departments were slightly larger than the average sizes of the corresponding courses/formats sections in mathematics departments; for example, by Table FY.3, the estimated average size of sections of course (F1) in doctoral-level mathematics departments over all formats combined, in fall 2015, was 42 (SE 3.7), and, by Table FY.4, the estimated average section size of the corresponding course (E1) in doctoral-level statistics departments over all formats combined was 58 (SE 2.6). By Table FY.4, at doctoral-level statistics departments, in fall 2015, the estimated average section size of Introductory Statistics (no calculus prerequisite (course (E.1)) in lecture format was 57 (SE 3.7) and in the sections that meet as a class format the estimated average section size was 66 (SE 3.0).

D. Pedagogy in Introductory Statistics (Tables FY.5, FY.6, and FY.7)

As we have noted, statistics course enrollments have increased in two-year and four-year mathematics departments, and in statistics departments. There has been considerable interest in how these courses are taught, particularly since they are taught primarily outside of statistics departments, and since the focus of these courses has been shifting from an emphasis on probability theory to the analysis of data (see e.g. [GAISE}, [Moore]). The CBMS 2015 survey pedagogy questions focused on the statistics course, "Introductory Statistics (no calculus prerequisite) for non-majors/minors" (course (F1) in the Four-Year Mathematics Questionnaire, and course (E1) in the Four-Year Statistics Questionnaire). The same questions were used in both instruments, so that the results (Table FY.5 for mathematics departments and Table FY.6 for statistics departments) can be compared. This data was discussed in Chapter 1, (see Table S.12 (and Figures S.12.1 and S.12.2)); in this chapter, Table S.12 is broken down by level of mathematics department in Table FY.5, and by level of statistics department in Table FY.6. Furthermore, these same questions (with some small changes) appeared in the CBMS 2010 survey, and the responses from fall 2010 appear in CBMS2010, Tables FY.7, p. 125, and FY.8, p. 127. The questions in this part of the

TABLE FY.9 Of departments that offered Introductory Statistics (no calculus prerequisite) in fall 2015 and where a similar course is offered outside the mathematical sciences departments, the average estimated fall 2015 enrollment of all similar courses and an estimate of the total national enrollment.

	Mathematics Depts				Statistics Depts		
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total
Average estimated outside enrollment	710	196	68	134	306	496	328
Estimated outside national enrollment	34369	20217	34988	89574	6038	1296	7334

Note: The estimates for statistics departments are for colleges with separate statistics departments. Since such colleges would be expected to also have mathematics departments, adding statistics for both types of departments together would result in duplicating the counts of some students.

survey are in Section G of the statistics questionnaire, and in Section H of the mathematics questionnaire (the questionnaires appear in Appendices IV and VI).

Generally, the results of the CBMS survey showed that in fall 2015 (as in fall 2010) statistics departments were making more use than mathematics departments of the current recommendations for teaching introductory statistics including: use of real data, modern technology, applets, classroom response systems (such as clickers), and in-class activities that encourage student involvement. Table FY.5 shows that at least one version of course (F1) was offered, in fall 2015, at an estimated 50% (SE 4.5) of the doctoral-level mathematics departments, about 75% (SE 5.5) of the masters-level mathematics departments, and 83% (SE 5.8) of the bachelors-level mathematics departments, and each of these percentages is slightly less than estimated in 2010. Table FY.6 shows that at least one version of course (E1), was offered, in fall 2015, at 97% (SE 1.6) of the doctoral-level statistics departments and 85% (SE 5.1) of the masters-level statistics departments, about the same percentages as estimated in 2010. The remaining table entries are percentages of sections from departments that offer these courses. The data in Table FY.5 and Table FY.6 are estimates obtained from the survey responder (not the course instructor).

As an addition to the questions asked in the 2010 CBMS survey, in 2015 departments were asked how many different kinds of introductory courses for non-majors with no calculus prerequisite they offered, and from Table FY.5 we see that, across all levels of mathematics departments combined, in fall 2015, an estimated 72% (SE 5.4) offered only one such course, and almost none offered more 3 or more such courses. However, in statistics departments, Table FY.7 shows that, in fall 2015, an estimated 52% offered three or more such courses. Hence, although we have seen that mathematics departments had more enrollments in these course than statistics departments had, in fall 2015, statistics departments typically offered more varieties of this course than did mathematics departments.

The survey asked the responder to estimate the percentage of class sessions in most sections, in which real data were used; responders could choose between the percentage intervals: 0-20%, 21-40%, 41-60%, 61-80%, and 81-100%. As noted in Chapter 1, the response chosen most often by mathematics department responders was 0-20% (chosen by 28% (SE 6)), whereas in statistics departments, 81-100% was chosen most often (by 35% (SE 3)); Chapter 1, Table S.12 and Figure S.12.1 display the distributions of the percentages of mathematics and statistics departments that chose each of these intervals. The graph for mathematics departments' responses was skewed toward the lower percentages, whereas the graph for the statistics departments' responses was skewed toward the higher percentages, indicating that these courses taught in statistics departments were more likely to put emphasis on the use of real data, than these courses taught in mathematics departments; the graphs have very similar shapes to those obtained in 2010 [CBMS2010, Figure S.13.A.1, p.31]. In Table FY.5 the responses in Table S.12 are broken down by level of mathematics department, and, among doctoral-level departments the interval chosen most often was 81-100% (chosen by 29%), among masters-level departments it was 21-40% (chosen by 29%), and among bachelors-level departments it was 0-20% (chosen by 28%). By Table FY.6 among doctoral-level statistics departments, the interval chosen most often was 81-100% (chosen by 42%) and among masters-level departments it was 61-80% (chosen by 40%).

The survey asked the responder to estimate the percentage of class sessions in most sections, in which in-class demonstrations and/or in-class problem solving activities/discussions took place, with the same interval choices available for responses. As noted in Chapter 1, the distributions are displayed in Figure S.12.2. The distribution for in-class demonstrations/problem solving activities for mathematics departments was roughly bell-shaped, whereas the distribution for statistics department had the largest percentages of responses in the 81-100% interval; these distributions can be compared to those obtained in 2010 [CBMS2010, Figure S.13.A.2, p. 31]. Tables FY.5 and FY.6 break the responses down by level of department, and the three levels of mathematics departments had rather similar responses, whereas the masters-level statistics departments responses were skewed toward the low percentage intervals and the doctoral-level statistics departments were more skewed toward the high percentage intervals. The responses from 2015 are similar to the responses in 2010 (CBMS2010, Tables FY.7, p.125, and FY.8, p. 127).

Departments were asked about the use of the following kinds of technology in most sections of their introductory statistics courses: graphing calculators, statistical packages, educational software, applets, spreadsheets, web-based resources (including data sources or data analysis routines) and classroom response systems (e.g. clickers), online textbooks, and online videos (the last two options were added to the 2015 survey). The percentages of mathematics and statistics departments using each of these kinds of technology, in fall 2015, is given in Chapter 1, Table S.12, and broken down by level of department in Tables FY.5 and FY.6; these tables can be compared to the responses obtained in 2010 (CBMS2010, FY.7, p. 125, and FY.8, p. 127). The data show that generally less sophisticated technology, like graphing calculators and spreadsheets, were more popular in Introductory Statistics taught in mathematics departments than in statistics departments, but all the other kinds of technology (particularly statistical packages, applets, classroom response systems) were said to be used in higher percentages of statistics departments', rather than in mathematics departments', Introductory Statistics courses. For example, in fall 2015, across all levels of mathematics departments combined, 48% (SE 5.5) departments were using statistical packages in the majority of their sections, whereas across all levels of statistics departments combined, the estimated percentage was 68% (SE 3.2). Moreover, in fall 2015, across all levels of mathematics departments combined, 24% (SE 4.2) were using applets, whereas across all levels of statistics departments combined, the estimated percentage was 41% (SE 2.8). In fall 2015, across all levels of mathematics departments combined, an estimated 67% (SE 4.7) of departments were using graphing calculators in the majority of their sections, whereas, across all levels of statistics departments combined, the estimated percentage was 47% (SE 3.2). The biggest difference in the responses from mathematics departments in 2015 and 2010 was in the use of educational software. Across all levels of mathematics departments combined, in fall 2015, an estimated 50% (SE 4.8) departments responded that educational software was used in the majority of the sections of their course (F1), whereas in fall 2010, the estimated percentage was 19% (the biggest changes occurring at the bachelors and masters-level departments). In statistics departments, there was a smaller percentage of departments using statistical packages in 2015 than in 2010 (estimated 68% (SE 2.8) of departments in 2015, and 87% in 2010), and a greater use of classroom response systems (estimated 50% (SE 3.2) of departments in 2015, and 29% in 2010). Tables FY.5 and FY.6 show that there are some differences across levels of departments; for example, by Table FY.5 in mathematics departments, in fall 2015, educational software was used in 52% (SE 5.9) of bachelors-level departments and 55% (SE 6.7) of masters-level departments, but in only 29% (SE 6.6) of doctoral-level mathematics departments.

The final question on teaching methods in Introductory Statistics asked each department about the percentage of sections of the course that required assessments beyond homework, tests and quizzes (assessments such as projects, oral presentations or written reports); here the percentages were about the same across all levels of mathematics departments combined, and all levels of statistics departments combined, and may, again be compared to the 2010 survey results, where mathematics departments reported 45% of sections and statistics departments reported 36% of sections (CBMS2010, FY.7, p. 125, and FY.8, p. 127). In fall 2015, this percentage was larger at the bachelors-level mathematics departments than at the other levels of mathematics departments: 19% (SE 5.4) at doctoral-level departments, 22% (SE 8.1) at masters-level departments, and 45% (SE 5.8) at bachelors-level departments.

A new question, added to the CBMS 2015 survey, inquired about certain specific topics that might be covered in the Introductory Statistics course ((F1) or (E1)) in fall 2015. Table FY.7 summarizes the data from mathematics and statistics departments, broken down by level of department. Responders were asked to check which (if any) of the following topics were covered in the course: conditional probability, simulation to explore randomness, and resampling techniques (such as bootstrapping and randomization tests). Conditional probability was covered in an estimated 76% (SE 3.7) of the (F1) courses in mathematics departments, across all levels of departments combined (but in about 90% of the courses in the doctoral and masters-level mathematics departments);

it was covered in an estimated 83% (SE 2.5) of the (E1) courses in statistics departments, across all levels of statistics department combined. Simulation to explore randomness was covered in an estimated 51% (SE 4.7) of mathematics courses, and 73% (SE 2.5) of statistics courses. Resampling techniques were covered in 22% (SE 5.1) of mathematics courses, and 39% (SE 2.9) of statistics courses; in this case, the percentage was smaller than the combined average of 22% at doctoral-level mathematics departments (where it was 9% (SE 5)) and at masters-level statistics departments (where it was 8% (SE 4.1)).

Chapter 6

Enrollment, Course Offerings, and Instructional Practices in Mathematics Programs at Two-Year Colleges

This chapter reports estimated enrollment and instructional practices in mathematics and statistics courses at public two-year colleges in the United States in fall 2015. The data in this chapter has been rounded. Also included are total enrollment for these two-year colleges, average mathematics class size, trends in availability of mathematics courses, enrollment in mathematics courses offered outside of the mathematics programs, and services available to mathematics students. Many tables contain data from previous CBMS surveys (1975, 1980, 1985, 1990, 1995, 2000, 2005, and 2010) and hence allow for historical comparisons. Further analysis of many of the items discussed in this chapter can be found in Chapters 1 and 2 where they are discussed from a comprehensive point of view in comparison to similar data for four-year colleges and universities.

The Table display code in Chapter 6 is TYE, for "Two-Year Enrollment," because this chapter addresses issues related to enrollment.

In earlier CBMS surveys, computer courses taught outside two-year college mathematics departments, and the faculty who taught them, were considered part of the "mathematics program." By 1995, computer science and data processing programs at two-year colleges, for the most part, were organized separately from the mathematics program. Hence, in 1995, 2000, 2005, 2010 and again in this 2015 report, information about computer science courses and their faculty are not included in mathematics program data. In 1995, enrollment data were collected about computer courses taught within the mathematics program and can be found in those reports. But because such courses had become rare, the 2005, 2010 and 2015 surveys contained no specific data about these computer courses taught within the mathematics departments, though some, no doubt, were reported by mathematics programs under the "Other Courses" category. Furthermore, the enrollment tables that follow have been adjusted to eliminate all specific computer science enrollments that appeared in previous CBMS reports. This adjustment allows for a more accurate comparison of mathematics program enrollments over time. There are also instances where "na" will be displayed in a table, indicating that similar data was not collected or was not available.

In contrast to previous surveys, CBMS2005, CBMS2010, and CBMS2015 include data about public two-year colleges only. The two-year college data in this report were estimated from a stratified random sample of 222 institutions chosen from a sample frame of 1,030 public two-year colleges. Survey forms were returned by 108 colleges for the enrollment data and 11 more colleges answered additional questions (119 of 222 colleges = 54% of the sample). The Two-Year College Committee instigated intense follow-up efforts to increase the survey return rate. For comparison purposes, the survey return rate for two-year colleges for CBMS2010 was 51% (105 of 205 colleges), CBMS2005 was 54% (130 of 241 colleges), CBMS2000 was 60% (179 of 300 colleges), and CBMS1995 was 65% (163 of 250 colleges). The return rate for all institutions, two-year and four-year, in CBMS2015 was 64% (332 of 518 institutions). For more information on the sampling and projection procedures used in this survey, see Appendix II. A copy of the two-year college survey questionnaire for CBMS2015 may be found in Appendix VI.

The terms "full-time permanent," "full-time continuing" and "other full-time" faculty occasionally are used in this chapter and other chapters. For a detailed explanation of these terms, see the first page of Chapter 7.

In the text that follows, the standard error (SE) in many of the estimates is provided along with the estimate (e.g. estimate 4,596 (SE 58)). The standard errors for all CBMS2015 tables can be found in Appendix VIII. The change in an estimate from the estimate in a previous survey is often expressed both as percentage change, and as the number of SEs that change represents (e.g. "increased 22% (1.2 SEs)").

Highlights of Chapter 6

Enrollments, Class Size, and Course Offerings in Mathematics Programs

- From 2010 to 2015, public two-year colleges experienced an overall total enrollment decrease of 14%, an estimated total of 6,216,000 students, based on National Center for Education Statistics (NCES) projections updated in 2016 for fall 2015. This decrease can be viewed in comparison with an overall increase at four-year colleges of 1%, an estimated total of 10,546,000 students. From 2005 to 2010, the overall total enrollment increase at public two-year colleges was 17%, compared with an overall enrollment increase at four-year colleges of 23%. Enrollment in two-year colleges in fall 2015 constituted about 37% of the total undergraduate enrollment in the United States, a four percent drop compared with 2010. For details, see the discussion before and after Table S.1 in Chapter 1 and Table TYE.1 in this chapter.

- The fall 2015 enrollment in mathematics and statistics courses in mathematics programs at public two-year colleges received from the CBMS2015 survey was estimated to be 2,012,000 (SE 118,000) students. This total includes 94,000 (SE 23,000) dually enrolled students and 225,000 (SE 25,000) distance learning enrollments. Enrollment in mathematics and statistics at two-year colleges in fall 2015 constituted approximately 42% of the total mathematics and statistics undergraduate enrollment in postsecondary institutions. See Table S.1 in Chapter 1 and Tables TYE.2 and TYE.12 in this chapter.
- Table TYE.2 shows that two-year college mathematics and statistics on-campus and distance enrollment decreased 4% (1 SE) from 2010 to 2015 (the decrease was 5% (1 SE) when dual enrollment students are excluded in Table S.1). This can be compared to the growth from 2005 to 2010 of 21% (19% when dual enrollment students are excluded in Table S.1). During the same period, four-year institutions had an enrollment increase in mathematics courses of 13% (2 SEs, excluding dual enrollment), compared to the growth from 2005 to 2010 of 26%. See Table S.1 in Chapter 1 and the discussion before Table TYE.2 in this chapter.
- Dual enrollment, where students enroll in a course that earns credit in high school and a two-year college, increased 16% (1 SE) from 2010 to 2015 to an estimated 94,000 (SE 23,000) students, compared with a 93% increase from 2005 to 2010 to a total of 80,000 students. See Tables SP.16 and SP.17 in Chapter 2 and Table TYE.2 in this chapter.
- Approximately 41% of all two-year college mathematics and statistics enrollment in fall 2015 was in Precollege (remedial/developmental) courses, compared to 57% in fall 2010. See Table TYE.4.
- Enrollment in precollege mathematics courses (Arithmetic, Pre-algebra, Elementary and Intermediate Algebra, and Geometry) at two-year colleges was estimated to be 782,000 students (SE 65,000) in 2015. This represents a 32% (6 SEs) decrease from 2010 to 2015, compared to a 19% increase from 2005 to 2010. The increase from 2000 to 2005 was 26% and from 1995 to 2000 was 5%. Four-year college Precollege enrollment increased 21% (5 SEs) to an estimate of 253,000 (SE 26,000) students from 2010 to 2015, compared with 4% increase from 2005 to 2010. See Table E.2 in Chapter 2 and Table TYE.4 in this chapter.
- Within the cohort of Precollege courses, all courses, except Geometry, showed a decrease in enrollment. Arithmetic/Basic Mathematics showed a 52% (5 SEs) decrease to 71,000 (SE 14,000) students from 2010 to 2015, compared with the 40% increase in enrollment seen from 2005 to 2010. A decreasing enrollment trend in Arithmetic was also present between 1990 and 2005. See Table TYE.3.
- Pre-algebra courses showed a 44% (6 SEs) decrease to 127,000 (SE 16,000) students from 2010 to 2015, compared with the 65% increase in enrollment seen from 2005 to 2010. From 2010 to 2015, Elementary Algebra experienced a 35% (6 SEs) decrease to 277,000 (SE 27,000) students (13% increase in 2005 to 2010) and Intermediate Algebra a 13% (2 SEs) decrease to 299,000 (SE 30,000) students (2% increase in 2005 to 2010). See Table TYE.3 and the discussion before Tables TYE.3 and TYE.11.
- The trend of an increasing enrollment in Precalculus level courses (College Algebra, Trigonometry, College and Trig, Mathematical Modeling, Elementary Functions) seen in 2010, continued in 2015 representing 23% of all mathematics enrollments, a total of 445,000 (SE 39,000) students, and a 21% (2 SEs) increase from 2010. The enrollment growth in this group grew 15% between 2005 and 2010 and 17% from 2000 to 2005. See Table TYE.4.
- Within the cohort of Precalculus level courses, College Algebra enrollment increased 27% (2 SEs) to 292,000 (SE 29,000) students, bypassing the number of students enrolled in Elementary Algebra (277,000; SE 27,000) and nearly reaching the number of students in Intermediate Algebra (299,000; SE 30,000) for the first time. Precalculus/Elem Functions/Analytic Geometry increased 35% (2 SEs) from 2010 to 2015 to a total of 87,000 (SE 13,000) students. See Table TYE.3.
- Enrollment in all calculus-level courses (Mainstream Calculus I, II, and III and Non-mainstream Calculus I and II together) showed an 11% (1 SE) increase from 2010 to 2015 (total 152,000 students; SE 15,000), compared with the 29% increase between 2005 and 2010 and a 9% increase between 2000 and 2005. From 2010 to 2015, Mainstream Calculus I, II, and III experienced a 9% (1 SE) increase to a total of 119,000 students and Non-mainstream Calculus I and II increased 18% (1 SE) to 26,000 students. Calculus I had enrollment of 66,000 students and Non-mainstream Calculus I had enrollment of 26,000 students (each with SE 7,000). See Tables TYE.3 and TYE.4.

- Among college-level, transferable mathematics and statistics courses, notable enrollment increases occurred in Probability (833%; 28,000 students; SE 15,000), Finite Mathematics (124%; 40,000 with SE 19,000), and Elementary Statistics (87%; 251,000 students; SE 55,000). When Elementary Statistics and Probability are combined, the increase was 104% for a total of approximately 279,000 students. See Tables TYE.3 and TYE.3.1.
- With the exception of the precollege mathematics courses mentioned above, enrollment increased in 2015 compared with 2010 for every course except Introduction to Mathematical Modeling, Non-mainstream Calculus II, Mathematics for Elementary Teachers I and II, and "Other" mathematics courses. See Tables TYE.3, TYE.3.1 and TYE.3.2.
- Notable decreases in the percentage of two-year college mathematics programs teaching selected courses included Precollege courses, Introduction to Mathematical Modeling, Mainstream Calculus III, Finite Mathematics, Mathematics for Elementary School Teachers I and II. See Tables TYE.5 and TYE.6.
- The average size of classes taught on two-year college campuses was 22 (SE 2) students in 2015, compared to 24 students in 2010. The average section size decreased in Precollege level courses from 24 in 2010 to 19 (SE 4) in 2015. Average class size decreased in Precalculus level courses to 25 (SE 1) students and 26 (SE 5) students in Statistics and Probability. Average class size increased in Calculus level courses to 25 (SE 1) students in 2015, compared with 21 students in 2010. See Tables TYE.7 and TYE.8. For comparable four-year data, see Table E.12 in Chapter 3.
- The percentage of on-campus sections for all mathematics courses with an average size greater than 30 increased from 23% in 2010 to 25% (3 SEs) in 2015. The class size recommended by the American Mathematical Association of Two-Year Colleges (AMATYC) and the Mathematical Association of America (MAA) is 30 or less. See Tables TYE.7 and TYE.8. For comparable four-year data, see Tables E.12 and E.13 in Chapter 3.
- The average section size of all distance learning courses in fall 2015 was 21 (SE 1) students, with a range of 11-27 students. The percentage of departments with an average size greater than 30 in distance learning courses was 17% (4 SEs). CBMS2010 data displayed an average section size of 22 students with a range of 17-28 and 10% of 2010 sections with a size greater than 30. See Tables TYE.7.1 and TYE.8.1 and CBMS2010 for historical data.
- Thirty-six percent (36%; 4 SEs) of mathematics class sections were taught by part-time faculty in 2015, down ten points from 2010. The percentage of sections taught by part-time faculty varied significantly by course type, with part-time faculty teaching 46% (10 SEs) of Precollege courses, 33% (3 SEs) of Precalculus courses, 15% (2 SEs) of Mainstream Calculus, 29% (10 SEs) of Non-mainstream Calculus, and 21% (5 SEs) of Statistics and Probability. See Table TYE.9.

Instructional Practices and Curricular Changes in Mathematics Programs; Redesign of Mathematics Programs

- For the first time, CBMS2015 asked questions about the use of common department exams and homework management systems. Common department exams were most prevalent in Precollege level courses in 38-67% of sections. The use of homework management systems increased from 2010 to 2015 in the majority of courses and tended to be used in less in Calculus courses, Differential Equations, Linear Algebra and Discrete Mathematics. See Table TYE.10.
- Also for the first time, CBMS2015 asked questions about implementation of mathematics "Pathways," defined to be "a redesign of a mathematics sequence that provides students with an alternative course or sequence to/through developmental mathematics and to/through a college-level mathematics or statistics course." In fall 2015, 58% (5 SEs) of colleges reported having implemented a Pathways course sequence, enrolling a total of 193,000 students. Departments sometimes implemented multiple Pathways courses including Foundations (51%; 7 SEs), Quantitative Reasoning/Literacy (59%; 8 SEs), Statistics (63%; 6 SEs) and Other (32%; 9 SEs). See Table TYE.11 and the discussion before TYE.11.
- Significant changes were reported in content, delivery methods, and instructional strategies by mathematics programs in two-year colleges in Precollege, College-Level Non-STEM, and statistics courses in a range of 5-46% (1-7 SEs) mathematics programs. Notable changes in content included students solving contextually-based problems and courses including modeling. Colleges reported significant changes in Pre-college course delivery methods including emporium models, students completing prescribed models, and accelerated pace delivery methods. Notable changes in instructional strategies included use of computer programs or internet, group work, and active learning. These activities and percentages are listed in Table TYE.11.1. See the discussion before Table TYE.11.1 regarding Pathways and curricula redesign.

Distance Learning Courses and Practices

- Distance learning enrollment in mathematics and statistics grew to an estimated 225,000 (SE 25,000) students in fall 2015 and a total of 12% (1 SE) of all mathematics enrollments, increasing from 9% in fall 2010. The courses with the largest distance learning enrollment were College Algebra (38,000 students; SE 5,000), Elementary Algebra (38,000 students; SE 10,000), Intermediate Algebra (33,000 students; SE 5,000), and Elementary Statistics (31,000 students; SE 4,000). See Table E.4 in Chapter 3 and Tables TYE.2 and TYE.12 in this chapter.
- Precollege distance learning enrollments accounted for 11% of Precollege course enrollments in fall 2015. The number of students in the category of Precollege distance learning courses was approximately 89,000 students (SE16,000) in fall 2015. See Table E.4 in Chapter 3 and Table TYE.12 for individual course enrollment.
- Distance learning increases were also experienced in the category of Precalculus courses (College Algebra, Trigonometry, and Pre-calculus) with a total 54,000 students (SE 7,400) and Elementary Statistics with a total of 31,000 students (SE 4,000). See Table E.4 in Chapter 3 and Table TYE.12 for individual course enrollment. A discussion about the use of distance learning by mathematics departments is included in Chapter 2 before Table SP.8.
- Individual distance learning courses with a large percent of total enrollment were: Introduction to Mathematical Modeling (46%), Mathematics for Elementary School Teachers I and II (17% and 32% respectively), Business Math (21%), Elementary Statistics (12%), and Math for Liberal Arts (19%). Courses with percentage of enrollment in distance learning less than 2% were Geometry (0%), Mainstream Calculus II (1%), Differential Equations (1%), and Non-mainstream Calculus II (0%). Caution is needed when looking at percentages. While percentages may be large, total enrollments in some courses were small. See Table TYE.12 for a listing of distance enrollments for all courses.
- Table TYE.12.1 presents data on various distance learning practices. For example, 58% (5 SEs) of responding colleges awarded transfer credit for distance learning courses; 67% (5 SEs) of responding colleges reported that instructional materials were created by a combination of faculty design and commercially produced materials; 69% (6 SEs) of distance learning courses are taught completely online; 97% (3 SEs) of responding colleges reported that the course outlines for distance courses were the same as face-to-face courses. For other practices, see Table TYE.12.1. A discussion about the use of distance learning practices by mathematics departments is included in Chapter 2 before Table SP.8 in Chapter 2.
- Forty percent (40%; 6 SEs) of responding colleges reported that a “significant challenge” of distance learning courses is that “student success rates in online courses are lower than face-to-face courses with similar content.” “Maintaining a level of rigor in distance learning mathematics courses equivalent to face-to-face courses” was reported as “somewhat of a challenge” by 41% (5 SEs) of responding colleges. See Table TYE.12.2.
- For the first time, CBMS2015, asked two-year and four-year mathematics departments if, during the academic years 2013-15, the department had offered a MOOC (massive open online course) for credit. Out of all the institutions surveyed, one four-year (bachelors-level) mathematics department, one (doctoral-level) statistics department, and two two-year colleges responded “yes.” The two-year colleges reported teaching courses in statistics, developmental mathematics, and college-level courses below, and above, calculus-level courses. Given the few responses, and large SEs, estimates of the percentage of departments offering MOOCs and the enrollments in MOOCs are not included in this report.

Placement and Opportunities Available to Students

- Ninety-four percent (94%; 3 SEs) of two-year college mathematics programs offered diagnostic or placement testing available. Seventy-eight percent (78%) of those colleges required placement tests of first-time enrollees in fall 2015, compared to 100% in fall 2010. See Table TYE.13.
- Opportunities offered to students that displayed increases in CBMS2015 included honors sections, mathematics clubs and contests, programs to encourage women and minorities in mathematical studies, Outreach in K-12 schools, undergraduate student research and independent studies in mathematics. These are described in Tables SP.12 and SP.13 in Chapter 2 and Table TYE.13 in this chapter.
- The collection of Precollege, Statistics, Business and Technical Mathematics courses taught “outside” the mathematics program showed a 15% (1 SE) decrease from 2010 to 2015. These “outside” mathematics enrollments totaling about 129,000 (SE 24,000) students, at 32% (5 SEs) colleges, are not included in Table TYE. 2. See the discussion before Tables TYE.3 and TYE.5 and the discussion before Tables TYE.14, TYE.15 and TYE.16.

Topics of Special Interest in CBMS2015

- In each CBMS survey cycle, certain topics of special interest are chosen for data collection and comprehensive analysis from both two-year and four-year institutions. Special topics for two-year and four-year institutions are discussed in Chapters 2 and 6 of this report. Additional questions were added in CBMS2015 regarding the offering of Massive Open Online Courses (MOOCs), and distance learning courses and practices (Tables SP.8-SP.10 in Chapter 2 and Tables TYE.12, TYE.12.1, and TYE.12.2 in Chapter 6). Pre-service education of teachers (Tables SP.2, SP.3, and SP.4 in Chapter 2) and data on dual enrollment courses and faculty (Table SP.16 in Chapter 2) are discussed at the end of this chapter. Questions regarding mathematics Pathways and course redesign (Tables TYE.11 and TYE.11.1 in Chapter 6) were asked of two-year college respondents.

Enrollment, Class Size, and Course Offerings in Mathematics Programs

Number of two-year-college students

Approximately 6,216,000 students were enrolled in public two-year colleges in fall 2015 with 61% of students attending part-time. This estimate is based on an overall 2016 enrollment projection for public two-year colleges by the National Center for Educational Statistics (NCES). These enrollments constitute a 14% enrollment decrease from 2010-2015 for public two-year colleges. NCES projections indicated about a 1% increase in four-year college enrollments in the same time period and totaled 10,546,000 students. Enrollment in two-year colleges in fall 2015 constituted about 37% of the total undergraduate enrollment in the United States, a four percent drop compared with 2010. Data from the NCES indicated over 96% of two-year college enrollment in 2015 was at public institutions. See Tables TYE.1 and S.1 in Chapter 1.

Enrollment trends in mathematics programs

Enrollment in mathematics and statistics courses in mathematics programs at public two-year colleges was estimated to be 2,012,000 (SE 118,000) students in 2015. The 2,012,000 enrollments in mathematics includes approximately 225,000 (SE 25,000) students enrolled in distance learning courses and 94,000 (SE 23,000) dual-enrollment students and represents a decrease of 4% (1 SE) since 2010, compared to an increase of 19% from 2005 and 2010. The 4% enrollment decrease in mathematics and statistics courses from 2010 to 2015 is consistent with the decrease in two-year institutional enrollment mentioned above and with the decrease in the number of full-time mathematics faculty discussed in Chapter 7.

Dual enrolled students are high school students who take courses taught either in high school or a two-year college campus and receive course credit at the both the high school and at the two-year college. The estimated 94,000 dual enrollment students in mathematics represented almost 5% of total mathematics and statistics enrollments in fall 2015. The estimated 225,000 students in distance learning mathematics courses represented 12% of total math-

TABLE TYE.1 Total institutional enrollment (in thousands) and percentage of part-time enrollments in two-year colleges in fall for 1980 through 2010 and projected enrollments for fall 2015.[1] Enrollments include distance learning but not dual enrollments.

	1980	1985	1990	1995	2000	2005	2010	2015
Public + Private								
Number of students	4,525	4,531	5,240	5,492	5,948	6,488	7,684	6,491
Percentage part-time	61	63	64	64	63	59	56	61
Public only								
Number of students	4,328	4,270	4,996	5,277	5,697	6,184	7,218	6,216
Percentage part-time	63	65	66	65	65	61	59	61

[1] Data for the first three rows are from Table 303.70 for the NCES publication "Digest of Education Statistics: 2016." The full report has not been released, but selected tables are available. These data were downloaded in June 2017 from https://nces.ed.gov/programs/digest/d16/tables/dt16_303.70.asp?current=yes. Data for the percentage part-time for public institutions are from Projections of Education Statistics to 2024, Table 14, available from https://nces.ed.gov/pubs2016/2016013.pdf

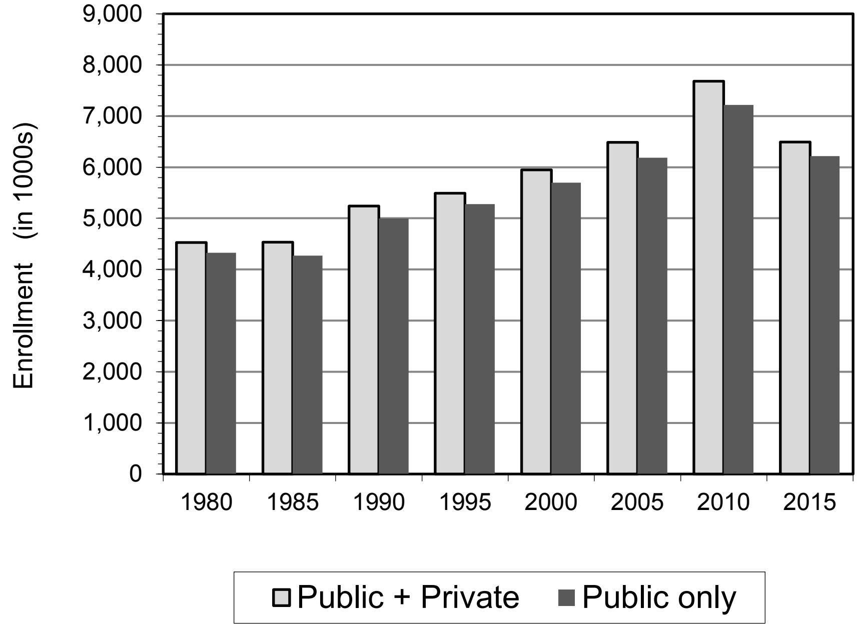

FIGURE TYE.1.1 Total enrollments (all disciplines) in public & private two-year colleges, and in public-only two-year colleges, in fall 1980 through fall 2015.

ematics and statistics enrollments in fall 2015. See Table TYE.2.

Table S.1 in Chapter 1 presents data on both two-year and four-year institutions' overall and mathematics and statistics enrollments, excluding dual enrollments. The estimated total of 1,918,000 (SE 115,000) two-year college enrollment shown in Table S.1 is a 5% (1 SE) decrease from fall 2010 to fall 2015. Two-year college mathematics and statistics enrollment (excluding dual enrollment) comprised 42% of all postsecondary mathematics and statistics enrollments in fall 2015. See Table S.1 in Chapter 1 and Tables SP.16 and SP.17 in Chapter 2 and Table TYE.2.

The fall 2015 enrollments in mathematics and statistics courses represent the second decrease in enrollment since CBMS began collecting data in 1985. From 1995 to 2010, mathematics and statistics enrollments had increased a total of 125% to a total of 2,105,000, with a decrease of 7% from 1995 to 2000. See Table S.1.1 In Chapter 1 and Table TYE.2.1.

It is difficult to draw specific conclusions about the reasons for the decrease in institutional and mathematics enrollment in two-year colleges in fall 2015. However, the reader may consider several economic and national factors that may have played a part in the decrease. Two-year colleges saw enrollment increases in fall 2010, given a downturn in the U.S. economy. In response to a more positive economic situation preceding fall 2015, two-year college enrollments decreased across the country. Other factors that may have influenced mathematics enrollments include national degree completion and "Guided Pathways" initiatives, changes in State legislation regarding decrease funding for developmental education and high school graduation requirements, and implementation of multiple placement measures/ procedures. More discussion about trends in specific course enrollment and implementation of mathematics "Pathways" can be found before Tables TYE.3, TYE.11, and TYE.11.1.

Two-year college mathematics and statistics enrollment from 2010 to 2015 can be considered in light of the pattern in the nation's four-year colleges and universities. Between 2010 and 2015, mathematics and statistics enrollment (excluding dual enrollments) at two-year colleges decreased 5% (1 SE) and four-year mathematics and statistics enrollment increased 13% (2 SEs). See Table S.1 in Chapter 1.

In addition to the tables that follow in this chapter, the reader should consult Chapter 1 in this report. Chapter 1 contains a detailed analysis of mathematics and statistics department enrollments at both two-year and four-year colleges from 2000 to 2015.

Enrollment trends in course groups and in specific courses

Tables TYE.3 and TYE.4 report mathematics enrollments in two-year colleges. Table TYE.3 reports

TABLE TYE.2 Enrollments in mathematics and statistics (no computer science) courses in mathematics programs at two-year colleges in fall 1985, 1990, 1995, 2000, 2005, 2010, and 2015.

	1985	1990	1995	2000	2005 [1]	2010 [1]	2015 [1]
Mathematics & Statistics enrollments in TYCs	936,000	1,295,000	1,456,000	1,347,000	1,739,000	2,105,000	2,012,000

[1] Data for 2005, 2010, and 2015 include only public two-year colleges. 2015 data include 94,000 dual enrollments from Table SP.18 and 225,000 distance enrollments from Table TYE.12.

Note: Data for 1990, 1995, and 2000 in Table TYE.2 differ from corresponding data in Table S.1 of Chapter 1 because the totals in TYE.2 do not include any computer science courses, while the totals in Table S.1 do.

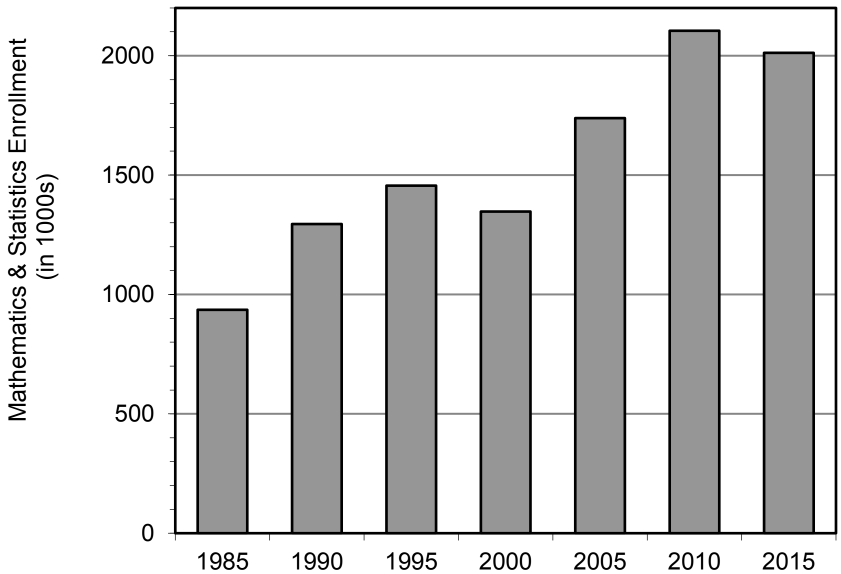

FIGURE TYE.2.1 Enrollments in mathematics and statistics courses (no computer science) in mathematics programs in two-year colleges in fall 1985, 1990, 1995, 2000, 2005, 2010, and 2015. (Data for 2005, 2010, and 2015 include only public two-year colleges. 2015 data include 94,000 dual enrollments from Table SP.16 and 225,000 distance enrollments from Table TYE.12.)

enrollment in individual mathematics courses. Table TYE.4 reports enrollment for categories of courses. Table TYE.4 is constructed from Table TYE.3 and reports headcounts and percentages from 2000 through 2015 for the following course groupings: Precollege, Precalculus, Calculus, Statistics and Remaining Courses. Each category consists of five or more specific courses from Table TYE.3.

In fall 2015, over 782,000 (SE 65,000) students enrolled in Precollege mathematics courses (Arithmetic, Pre-algebra, Elementary and Intermediate Algebra, and Geometry). Enrollment in these courses comprised 41% of mathematics program enrollment. This percentage had been at 57% since 2000. These percentages are calculated from Table TYE.4, which does not include the 94,000 students in dual enrollment courses. Precollege enrollment has varied over time as follows: down by 5% from 1995 to 2000, up 26% from 2000 to 2005, and up 19% from 2005 to 2010. Fall 2015 is the second time that Precollege enrollment showed a decrease, which was 32% (6 SEs). This two-year college decrease is contrasted to the 21% (5 SEs) increase of four-year college Precollege enrollment, a total of 253,000 (SE 26,000) students from 2010 to 2015. See Table E.2 in Chapter 3.

Within the Precollege courses, each course, except Geometry, experienced a decrease in enrollment from 2010 to 2015: Arithmetic & Basic Mathematics (down 52%; 5 SEs); Pre-algebra (down 44%; 6 SEs); Elementary Algebra (down 35%; 6 SEs); Intermediate Algebra (down 13%; 2 SEs); and Geometry (up 44%; 1 SE). See Tables TYE.3 and TYE.3.2 for enrollment in individual courses.

Approximately 129,000 (SE 24,000) students were enrolled in mathematics and statistics courses managed by departments "outside" the mathematics department (Developmental Education Division, Occupational Programs, Business or Other Divisions) in fall 2015, a decrease of 15% from 2010 to 2015. About one-third (32%; 5 SEs) of two-year colleges responding to the survey conducted part of their Precollege (remedial) mathematics program outside of the mathematics program in an alternate structure such as a developmental studies division or learning laboratory. These courses accounted for 101,000 students and 78% of the mathematics enrollment outside of the mathematics departments. These enrollments are not included in Tables TYE.3 and TYE.4. See the discussion for Tables TYE.14, TYE.15 and TYE.16 later in this chapter.

Precalculus level courses (College Algebra, Trigonometry, College Algebra & Trigonometry, Introduction to Mathematical Modeling, Precalculus), 445,000 (SE 39,000) students, accounted for 23% of 2015 enrollment, five percentage points up from enrollment reported in 2010. Precalculus courses, together with Precollege courses, accounted for 64% of mathematics and statistics enrollment at public two-year colleges in fall 2015, a decrease from 2010 of 11%. See Table TYE.4.

Within the cohort of Precalculus level courses, College Algebra enrollment increased 27% (2 SEs) to 292,000 (SE 29,000) students, bypassing the number of students enrolled in Elementary Algebra (277,000; SE 27,000) and nearly reaching the number of students in Intermediate Algebra (299,000; SE 30,000) for the first time. Other specific course enrollment changes in Precalculus level courses include Trigonometry (up 13% with 1 SE), College Algebra and Trigonometry combined (up 28% with 1 SE), Introduction to Mathematical Modeling (down 89% with 16 SEs), and Precalculus/Elem Functions/Analytic Geometry (up 35% with 2 SEs). See Tables TYE.3, TYE.3.1 and TYE.3.2 for enrollment in individual courses.

All calculus-level courses, Mainstream and Non-mainstream Calculus together, in Tables TYE.3 and TYE.4 displays an 11% (1 SE) increase in fall 2015 enrollment and a total of 152,000 (SE 15,000) students. When Differential Equations is included with Calculus courses, the increase is 10% from 2010 to 2015. Calculus I had enrollment of 66,000 students and Non-mainstream Calculus I had enrollment of 26,000 students (each with SE 7,000). Specific course group changes include: Mainstream Calculus I, II and III (9% with 1 SE); Non-mainstream Calculus I and II (18% with 1 SE); and Differential Equations (17% with 1 SE). See Tables TYE.3, TYE.3.1 and TYE.4.

In reading the enrollment tables, the reader is reminded that Mainstream Calculus consists of those calculus courses that lead to more advanced mathematics courses and usually is required of majors in mathematics, the physical sciences, and engineering. Non-mainstream Calculus includes the calculus courses most often taught for biology, behavioral science, and business majors. Additional calculus enrollment data and analysis can also be found in Chapter 1.

In reviewing this list of percentages of changes from 2010 to 2015, one needs to consider the actual number of students enrolled and standard error (SE) of a statistic. Table TYE.3 lists enrollment estimates in mathematics courses, rounded to the nearest thousands. Percentages can be misleading: an 822% increase in Probability enrollment represented a change of 25,000 students of a total enrollment of 28,000 (SE 15,000) students, while a 27% increase in College Algebra represented a change of 62,000 students of a total of 292,000 students (SE 29,000). Tables TYE.3.1 and TYE.3.2 list the percentage change for each course, computed before rounding enrollment estimates.

Summarizing the enrollment trends in mathematics course categories (see Table TYE.4), the trend in enrollments from fall 2010 to 2015 for courses offered within a two-year college mathematics department was upward in every category except Precollege level:

- Precollege level courses enrolled 368,000 less students in 2015 than in 2010 representing a 32% (6 SEs) decrease.
- Precalculus courses enrolled 77,000 more students in 2015 than in 2010 representing a 21% (2 SEs) increase.
- Mainstream and Non-mainstream Calculus and Differential Equations enrolled 15,000 more students in 2015 than in 2010 representing a 11% (1 SE) increase.
- Elementary Statistics and Probability enrolled 143,000 more students in 2015 than in 2010 representing a 104% (2 SEs) increase.
- Of special note is the 12% (1 SE) increase in the "Remaining" category of 28,000 students which included Linear Algebra, Discrete Mathematics, Probability, Finite Mathematics, and Business and Technical Mathematics.

In addition to considering the factors listed above related to the decrease in total mathematics and statistics enrollment in 2015, several factors may have impacted enrollment in individual course categories or courses in two-year colleges.

Implementation of mathematics "Pathways," defined as a redesign of a mathematics sequence that provides students with an alternative course or sequence to/through developmental mathematics and to/through a college-level mathematics or statistics course, may be related to decreased enrollments in traditional Precollege courses at some colleges and increased enrollment in College Algebra, Quantitative Literacy, Mathematics for Liberal Arts and Statistics courses. In addition, changes in placement policies are affecting the number of students who were previously placed into Precollege courses. Mathematics Pathways have been designed and implemented to create appropriate career course paths that decrease the number of developmental courses that students are required to take and increase students' enrollment and success in a college-level mathematics and path to graduation. If the goals of Pathways are achieved, enrollments in precollege mathematics courses should decrease and enrollments in college-level mathematics courses should increase. Table TYE.11 shows that 58% (5 SEs) of responding college implemented a Pathways course sequence. Table TYE.11.1 presents information about the changes in content, delivery methods, and instructional strategies between 2010 and 2015.

Trends in availability of courses in mathematics programs

Tables TYE.5 and TYE.6 should be considered together and represent the availability of fall 2010 and 2015 course offerings and percentage of two-year college mathematics programs teaching individual courses. The increases and decreases displayed in these tables mirror the increases and decreases in student enrollment presented in Tables TYE.3, TYE.3.1, TYE.3.2, and TYE.4.

In considering the availability of courses, the reader also should note that 32% (5 SEs) of two-year colleges in fall 2015 reported some or all of the Precollege (Arithmetic, Elementary Algebra, and Intermediate Algebra) mathematics courses at the college were organized separately from the mathematics department, totaling 129,000 (SE 24,000) students. This represents a 3% increase reported in 2010. See Table TYE.16. These "outside" courses are not included below in Tables TYE.3, TYE.4, TYE.5 and TYE.6 in reporting the availability of particular courses. The "outside" headcount enrollment is estimated in Tables TYE.14 and TYE.15 and also includes Business Mathematics, Statistics & Probability, and Technical Mathematics.

Table TYE.5 reports that the percentage of two-year college mathematics programs offering a course titled Arithmetic/Basic Mathematics course in 2015 was 36% (5 SEs), a decline from 50% in 2010. From 2010 to 2015, the percentage of mathematics programs offering a Pre-algebra course, which generally included arithmetic and basic algebra skills, dropped from 49% to 44% (5 SEs).

Table TYE.5 also shows the availability of Elementary Algebra within mathematics programs decreased in 2015 to 75% (5 SEs) from 82% in 2010. Intermediate Algebra, which is roughly equivalent to the second year of high school algebra, was offered in 72% (5 SEs) of mathematics departments in fall 2015, down from 88% in 2005 and 79% in 2010. CBMS2010 reported a sharp decrease from 19% in fall 2005 to 7%in fall 2010 and CBMS2015 reported a slight increase to 8% (2 SEs) in the percentage of two-year colleges offering high school level Geometry courses.

Data for courses directly preparatory for calculus are also presented in Table TYE.5. In fall 2015, the percentage of colleges offering a separate College Algebra course increased by three points to 79% (4 SEs). The percentage of colleges offering a separate Trigonometry course was up two points to 57% (5 SEs). The course College Algebra & Trigonometry (combined) experienced an eight-point increase to 20% (4 SEs) of colleges offering the course. Precalculus/Elementary Functions experienced a one percentage point increase in availability from 2010 to 2015 to 54% (6 SEs).

Comparing fall 2010 to fall 2015, the percentage of colleges offering the first semester of Mainstream Calculus rose one point to 80% (6 SEs), 66,000 students (7 SEs). The availability of Mainstream Calculus II was up four points to 65% (4 SEs). Mainstream Calculus III decreased by two points to 54% (4 SEs). In fall 2015, enrollment increased 30% to a total of 26,000 (SE 7,000) students in Non-mainstream Calculus I with 26% (4 SEs) of reporting colleges offering the course. See Tables TYE.3 and TYE.5.

Introductory Mathematical Modeling was a new course first surveyed in 2000. In that year, 12% of colleges reported offering the course. In fall 2005, this percentage had dropped to 5%. In 2010, while 9% of colleges reported offering the course, the actual total enrollment was 18,000. In fall 2015, five percent (5%, 3 SEs) of responding colleges reported offering this course with an enrollment of 2,000 students.

The CBMS1995 survey noted that many students at two-year colleges could not complete lower division mathematics requirements in certain majors because essential courses such as Linear Algebra, Mathematics for Liberal Arts, and Mathematics for Elementary School Teachers were offered at fewer than half of two-year college mathematics programs. Availability of those courses has had ups and downs since then. Comparing fall 2015 to fall 2010 course offerings, the percentage of colleges offering Linear Algebra increased five points to 25% (4 SEs), while Mathematics for Elementary School Teachers I

TABLE TYE.3 Enrollment in thousands in mathematics and statistics courses (not including dual enrollments; including distance enrollments) in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

Course Number	Type of course	2000	2005	2010	2015
	Precollege level				
1	Arithmetic & Basic Mathematics	122	104	146	71
2	Pre-algebra	87	137	226	127
3	Elementary Algebra (High School level)	292	380	428	277
4	Intermediate Algebra (High School level)	255	336	344	299
5	Geometry (High School level)	7	7	6	8
	Precalculus level				
6	College Algebra (above Intermediate Algebra)	173	206	230	292
7	Trigonometry	30	36	45	51
8	College Algebra & Trigonometry (combined)	16	14	11	13
9	Introduction to Mathematical Modeling	7	7	18	2
10	Precalculus/Elem Functions/Analytic Geometry	48	58	64	87
	Calculus level [1]				
11	Mainstream Calculus I	53	51	65	66
12	Mainstream Calculus II	20	19	29	34
13	Mainstream Calculus III	11	11	15	19
14	Non-mainstream Calculus I	16	21	20	26
15	Non-mainstream Calculus II	1	1	2	0
16	Differential Equations	5	4	6	7
	Other mathematics courses				
17	Linear Algebra	3	3	5	7
18	Discrete Mathematics	3	2	2	5
19	Elementary Statistics (with or w/o Probability)	71	111	134	251
20	Probability (with or w/o Statistics)	3	7	3	28
21	Finite Mathematics	19	22	18	40
22	Mathematics for Liberal Arts	43	59	91	97
23	Mathematics for Elementary School Teachers I [2]	18	29	21	12
24	Mathematics for Elementary School Teachers II [3]	na	na	8	3
25	Other Mathematics Courses for Teacher Preparation [3]	na	na	1	1
26	Business Mathematics (not transferable)	14	22	16	16
27	Business Mathematics (transferable)	19	17	4	10
28	Technical Math (non-calculus-based)	13	16	17	21
29	Technical Math (calculus-based)	2	1	1	3
30	Other Mathematics Courses (not transferable) [4]	14	28	33	31
31	Other Mathematics Courses (transferable) [3]	na	na	14	12
	Total all Two-year College math courses	1347	1696	2024	1918

Note: 0 means fewer than 500 enrollments and na means not available. Round-off may make column sums seem inaccurate.

[1] Mainstream calculus is for mathematics, physics, science & engineering. Non-mainstream calculus is for biological, social, and management sciences.

[2] In 2005 and earlier surveys there was a single course listed as *Mathematics for Elementary School Teachers* .

[3] This course was not listed in 2005 and earlier surveys.

[4] In 2005 and earlier surveys there was a single course listed as *Other Mathematics Courses* .

TABLE TYE.3.1 Enrollment in thousands in mathematics and statistics courses (not including dual enrollments; including distance enrollments) in mathematics programs at two-year colleges in fall 2010 and 2015 for those courses showing percentage increases from 2010 to 2015.

Course Number	Type of course	2010	2015	Percentage change 2015-2010*
	Precollege level			
5	Geometry (High School level)	6	8	44%
	Precalculus level			
6	College Algebra (above Intermediate Algebra)	230	292	27%
7	Trigonometry	45	51	13%
8	College Algebra & Trigonometry (combined)	11	13	28%
10	Precalculus/Elem Functions/Analytic Geometry	64	87	35%
	Calculus level [1]			
11	Mainstream Calculus I	65	66	0.4%
12	Mainstream Calculus II	29	34	17%
13	Mainstream Calculus III	15	19	22%
14	Non-mainstream Calculus I	20	26	30%
16	Differential Equations	6	7	19%
	Other mathematics courses			
17	Linear Algebra	5	7	45%
18	Discrete Mathematics	2	5	126%
19	Elementary Statistics (with or w/o Probability)	134	251	87%
20	Probability (with or w/o Statistics)	3	28	833%
21	Finite Mathematics	18	40	124%
22	Mathematics for Liberal Arts	91	97	7%
25	Other Mathematics Courses for Teacher Preparation [3]	1	1	29%
26	Business Mathematics (not transferable)	16	16	5%
27	Business Mathematics (transferable)	4	10	145%
28	Technical Math (non-calculus-based)	17	21	24%
29	Technical Math (calculus-based)	1	3	415%
	Total enrollment in all two-year college mathematics courses in Tables TYE.3.1 and 3.2	2024	1918	-5%

*Percentages were computed on enrollment values before rounding.

Note: 0 means fewer than 500 enrollments and na means not available. Round-off may make column sums seem inaccurate.

[1] Mainstream calculus is for mathematics, physics, science & engineering. Non-mainstream calculus is for biological, social, and management sciences.
[2] In 2005 and earlier surveys there was a single course listed as *Mathematics for Elementary School Teachers*.

[3] This course was not listed in 2005 and earlier surveys.

[4] In 2005 and earlier surveys there was a single course listed as *Other Mathematics Courses*.

TABLE TYE.3.2 Enrollment in thousands in mathematics and statistics courses (not including dual enrollments; including distance enrollments) in mathematics programs at two-year colleges in fall 2010 and 2015 for those courses showing percentage decreases from 2010 to 2015.

Course Number	Type of course	2010	2015	Percentage change 2015-2010*
	Precollege level			
1	Arithmetic & Basic Mathematics	146	71	-52%
2	Pre-algebra	226	127	-44%
3	Elementary Algebra (High School level)	428	277	-35%
4	Intermediate Algebra (High School level)	344	299	-13%
	Precalculus level			
9	Introduction to Mathematical Modeling	18	2	-88%
	Calculus level [1]			
15	Non-mainstream Calculus II	2	0*	-97%
	Other mathematics courses			
23	Mathematics for Elementary School Teachers I [2]	21	12	-45%
24	Mathematics for Elementary School Teachers II [3]	8	3	-58%
30	Other Mathematics Courses (not transferable) [4]	33	31	-6%
31	Other Mathematics Courses (transferable) [3]	14	12	-17%
	Total enrollment in all two-year college mathematics courses in Tables TYE.3.1 and 3.2	2024	1918	-5%

*Percentages were computed on enrollment values before rounding.

Note: 0 means fewer than 500 enrollments and na means not available. Round-off may make column sums seem inaccurate. Enrollment in non-Mainstream Calculus II was 60 students.

[1] Mainstream calculus is for mathematics, physics, science & engineering. Non-mainstream calculus is for biological, social, and management sciences.
[2] In 2005 and earlier surveys there was a single course listed as *Mathematics for Elementary School Teachers*.

[3] This course was not listed in 2005 and earlier surveys.

[4] In 2005 and earlier surveys there was a single course listed as *Other Mathematics Courses*.

decreased by 14% (5 SEs). Mathematics for Liberal Arts showed an 18% (5 SEs) increase in departments offering the course in the fall 2015, following the 12% decrease from fall 2005 to 2010. See Table TYE.5.

Availability of other courses important to baccalaureate degrees in science, technology, engineering, mathematics, and computer science, such as Differential Equations, Discrete Mathematics, Elementary Statistics, and Finite Mathematics, is reported in Table TYE.6. An increase in colleges offering these courses is seen in all courses except Finite Mathematics (decrease of 4%; 4 SEs) and Mathematics for Elementary School Teachers (decrease of 14%; 5 SEs). Elementary Statistics (with or without Probability) increased by ten points to a total of 83% (6 SEs) of two-year college mathematics programs teaching Statistics. See the discussion about Teacher Preparation at the end of this chapter.

Trends in average section size

The downward trend in the average number of students per on campus class section in two-year college mathematics courses exhibited in 1990 through 2005, shifted slightly upward in 2010 and downward again in 2015. The average class size in fall 2015 was 22 (SE 2) students, compared with 24 students in fall 2010. The Precollege and Precalculus course categories had average class size of 19 (SE 4) and 25 (SE 1) students, respectively in 2015. Calculus classes (Mainstream and Non-mainstream Calculus) had average class size of 25 (SE 1) students. Statistics and Probability had average class size of 26 (SE 5), about 4 students above the overall average of 22. See Table TYE.7. For a closer examination of individual course average section sizes in 2015, see Table TYE.8 displaying a range of 10–35 average section sizes of on-campus courses.

TABLE TYE.4 Enrollment in 1000s (not including dual enrollments; including distance enrollments) and percentages of total enrollment in mathematics and statistics courses by type of course in mathematics programs at two-year colleges in fall 1995, 2000, 2005, 2010, and 2015.

Course numbers [1]	Type of course	1995	2000	2005	2010	2015
1-5	Precollege Level	800 (56%)	763 (57%)	964 (57%)	1150 (57%)	782 (41%)
6-10	Precalculus Level	295 (21%)	274% 0%	321 (19%)	368 (18%)	445 (23%)
11-16	Calculus Level	129 (9%)	106% 0%	107 (6%)	138 (7%)	152 (8%)
19-20	Statistics, Probability	72 (5%)	74% 0%	118 (7%)	137 (7%)	280 (15%)
17-18 & 21-31	Remaining Courses	130 (9%)	130% 0%	186 (11%)	231 (11%)	259 (13%)
1-31	Total, all courses	1426 (100%)	1347% 1%	1696 (100%)	2024 (100%)	1918 (100%)

[1] For names of specific courses see Table TYE.3.

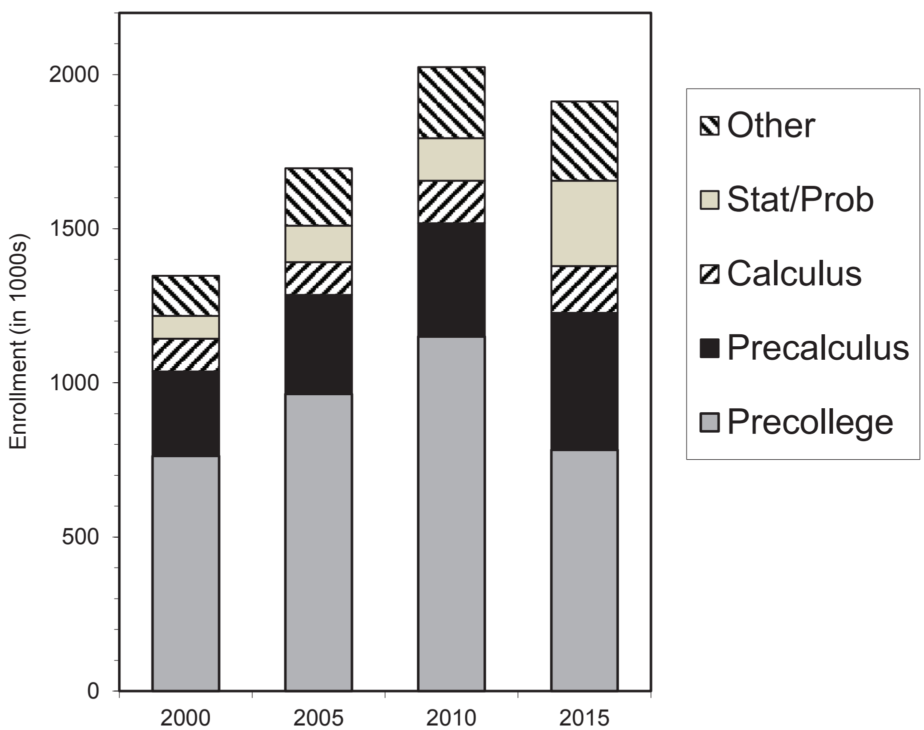

FIGURE TYE.4.1 Enrollment in 1000s (not including dual enrollments; including distrance enrollments) in mathematics and statistics courses by type of course[1] in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

[1]For names of specific courses in each course grouping, see Table TYE.3.

TABLE TYE.5 Percentage of two-year college mathematics programs teaching selected mathematics courses in fall 2010 and in fall 2015.

Course number	Type of course	Fall 2010	Fall 2015
1	Arithmetic & Basic Mathematics	50	36
2	Pre-algebra	49	44
3	Elementary Algebra (High School level)	82	75
4	Intermediate Algebra (High School level)	79	72
5	Geometry (High School level)	7	8
6	College Algebra (above Intermediate Algebra)	76	79
7	Trigonometry	55	57
8	College Algebra & Trigonometry (combined)	12	20
9	Introduction to Mathematical Modeling	9	5
10	Precalculus/ Elementary Functions/ Analytic Geometry	53	54
11	Mainstream Calculus I	79	80
12	Mainstream Calculus II	61	65
13	Mainstream Calculus III	56	54
14	Non-mainstream Calculus I	25	26
15	Non-mainstream Calculus II	5	0
16	Differential Equations	21	25
17	Linear Algebra	19	24
18	Discrete Mathematics	11	12
19	Elementary Statistics (with or w/o Probability)	73	83
20	Probability (with or w/o Statistics)	5	5
21	Finite Mathematics	27	23
22	Mathematics for Liberal Arts	44	62
23	Mathematics for Elementary School Teachers I	55	41
24	Mathematics for Elementary School Teachers II	27	17
25	Other Mathematics Courses for Teacher Preparation	2	4
26	Business Mathematics (not transferable)	20	25
27	Business Mathematics (transferable)	6	12
28	Technical Mathematics (non-calculus-based)	26	38
29	Technical Mathematics (calculus-based)	3	9
30	Other Mathematics Courses (not transferable)	19	23
31	Other Mathematics Courses (transferable)	18	10

In 2005, the lower cut-off of 30 students per class was chosen to make data for two-year colleges directly comparable to that collected for four-year institutions and to coincide with the recommendation from the Mathematical Association of America (MAA) and endorsement by the American Mathematical Association of Two-Year Colleges (AMATYC) that undergraduate class size not exceed 30 students. In fall 2015, 75% of all class sections in two-year colleges met the goal of the two professional societies of class size less than or equal to 30 (25% of colleges with class size >30; 3 SEs; see Table TYE.7). At four-year colleges and universities, the average class size for freshman/ sophomore level courses through calculus ranged from 12-37 students, depending on course type. At PhD-granting institutions, these numbers ranged from 21-55 students. See Tables E.12 in Chapter 3 for four-year institutional data.

Given the increasing enrollments in distance learning courses (see Table.TYE.12), CBMS2010 and CBMS2015 collected data on the average section size of distance learning classes. As reported in Tables TYE 7.1 and 8.1, average section size for all distance learning courses was 21 (SE 1) students, ranging from 9-22 students, with 17% (4 SEs) of departments having an average size greater than 30. Average sections sizes in Precollege distance courses (course numbers 1-5) ranged from 18-23 students. Precalculus (course numbers 6-10) average section sizes ranged from 13-23 students. Mainstream Calculus and Non-mainstream Calculus distance learning average section sizes ranged from 11-17 students. Comparing the section sizes of distance learning by course category to face-to-face section sizes, distance learning section size was less than or equal to face-to-face in courses, except Intermediate Algebra, Introduction to Mathematical Modeling, and Technical Mathematics. See Tables 7.1 and 8.1.

Trends in the use of part-time faculty

In fall 2015, sixty-seven percent (67%; 20,247 persons) of those who taught mathematics courses in two-year colleges were part-time faculty (Table TYF.1 in Chapter 1). However, this is a statement that requires some explanation. The relevant issue, as seen in the faculty data in Table TYF.1 in Chapter 7, is who is included in the various categories. When faculty of every sort are included, such as part-time faculty paid by third parties and full-time (permanent, continuing, and other) faculty, part-time faculty in fall 2015 made up the 67% of the total mathematics faculty. The comparable figure in 2010 was 70%. If the 2,359 (SE 528) third-party-payee part-time faculty members are excluded, 65% of the faculty had part-time status in fall 2010.The comparable figure for 2010 was 68%. See Table TYF.1.

TABLE TYE.6 Percentage of two-year college mathematics programs teaching selected mathematics courses in the fall terms of 2000, 2005, 2010, and 2015.

		Percentage of two-year colleges teaching course			
Course number	Type of course	2000	2005	2010	2015
11	Mainstream Calculus I	94	82	79	80
16	Differential Equations	59	25	21	25
17	Linear Algebra	39	19	19	24
18	Discrete Mathematics	19	12	11	12
19	Elementary Statistics (with or w/o Probability)	83	78	73	83
21	Finite Mathematics	32	28	27	23
22	Mathematics for Liberal Arts	50	56	44	62
23	Mathematics for Elementary School Teachers I [1]	49	59	55	41
28	Technical Mathematics (non-calculus-based)	36	35	26	38
29	Technical Mathematics (calculus-based)	9	5	3	9

[1] In 2005 and earlier there was a single course listed as *Mathematics for Elementary School Teachers;* the enrollment for that course is listed here.

Though making up about two-thirds (67%) of total faculty by headcount, part-time faculty taught slightly more than one-third (36%; 4 SEs) of mathematics program class sections in fall 2015, down ten percentage points from 2010 (46%). See Table TYE.9. For historical reference, in fall 2000, 46% of class sections were taught by part-time faculty. In fall 1995, this figure was 38%.

Concerning the instructional issue of which types of courses are taught most often by part-time faculty, the pattern in fall 2015 continued from fall 2010. Once again in fall 2015, it was more likely that a part-time faculty member was teaching a course below calculus, than a calculus course. In particular, forty-six percent (46%; 10 SEs) of all precollege level sections were taught by part-time faculty, down twelve points compared with 2010. Fifteen percent (15%; 2 SEs) of Mainstream Calculus sections were taught by part-time faculty, up four points from 2010. Twenty-nine percent (29% with 10 SEs) of Non-mainstream Calculus sections were taught by part-time faculty, up two points from 2010. See Tables TYE.9 and TYE.9.1.

TABLE TYE.7 Average on-campus section size by type of course in mathematics programs at two-year colleges in fall 2005, 2010, and 2015. Also percentage of sections with enrollment above 30 in fall 2010 and 2015.

			2010		2015	
Course numbers [1]	Type of course[2]	2005 average section size	Average section size	Percentage of sections with size > 30	Average section size	Percentage of sections with size > 30
1-5	Precollege Level	23.9	24.0	20%	19.2	19%
6-10	Precalculus Level	23.6	26.0	34%	24.7	31%
11-16	Calculus Level	20.0	21.0	25%	25.4	34%
19-20	Elem. Statistics, Probability	25.9	28.0	38%	25.5	33%
1-31	Total, all courses	23.0	24.0	23%	21.7	25%

[1] For names of specific courses see Table TYE.3.

[2] For specific course section size see Table TYE.8.

TABLE TYE.7.1 Average distance learning section size by type of course in mathematics programs at public two-year colleges in fall 2015. Also percentage of departments with enrollment above 30 in fall 2015.

Course number [1]	Type of course[2]	2015 average section size	Percentage of 2015 departments with average size > 30
1-5	Precollege Level	22.6	18%
6-10	Precalculus Level	20.1	9%
11-16	Calculus Level	18.7	18%
19-20	Statistics, Probability	22.5	21%
1-31	Total, all courses	20.7	17%

[1] For names of specific courses see Table TYE.3.

[2] For specific course section size see Table TYE.8.1.

TABLE TYE.8 Average on-campus section size for public two-year college mathematics program courses in fall 2015.

Course number	Type of course	Average section size	Course number	Type of course	Average section size
1	Arithmetic & Basic Mathematics	20	17	Linear Algebra	23
2	Pre-algebra	24	18	Discrete Mathematics	27
3	Elementary Algebra (High School level)	23	19	Elementary Statistics (with or w/o Probability)	25
4	Intermediate Algebra (High School level)	15	20	Probability (with or w/o Statistics)	35
5	Geometry (High School level)	30	21	Finite Mathematics	28
6	College Algebra (above Intermediate Algebra)	25	22	Mathematics for Liberal Arts	20
7	Trigonometry	24	23	Mathematics for Elementary School Teachers I	19
8	College Algebra & Trigonometry (combined)	25	24	Mathematics for Elementary School Teachers II	19
9	Introduction to Mathematical Modeling	10	25	Other Mathematics Courses for Teacher Preparation	16
10	Precalculus/Elem Functions/Analytic Geometry	26	26	Business Math (not transferable)	19
11	Mainstream Calculus I	26	27	Business Math (transferable)	24
12	Mainstream Calculus II	26	28	Technical Math (non-calculus-based)	15
13	Mainstream Calculus III	24	29	Technical Math (calculus-based)	20
14	Non-mainstream Calculus I	26	30	Other Mathematics Courses (not transferable)	22
15	Non-mainstream Calculus II	26	31	Other Mathematics Courses (transferable)	21
16	Differential Equations	22			

Instructional Practices and Curricular Changes in Mathematics Programs

Reflecting on historical CBMS survey data regarding instructional practices displayed in Table TYE.10, CBMS2005 presented the percentage of class sections in mathematics courses at public two-year colleges that employed the instructional practices of using graphic calculators, writing assignments, computer assignments group projects, online resource systems, and standard lecture methods. At that time, the predominant instructional method was the standard lecture format. Reflecting changes in mathematics instruction practices, CBMS2010 responders were asked to report on faculty use of computer algebra systems, commercially produced electronic instructional packages, and the standard lecture method.

In CBMS2015, responders were asked to report on sections with common department exams and the use of homework management systems (Table TYE.10). Historical data is not available on instructional practices as each CBMS survey focuses on specific practices at the time of each survey.

Regarding the 2015 data collected, the following observations can be made from data in TYE.10:

- Common Department exams were most prevalent in Precollege level courses with a range of 45-67% and in 39-65% of Statistics and Probability sections of on-campus sections.
- The use of Homework Management systems was prevalent in most courses, particularly Precollege level, Non-Mainstream Calculus, Finite Math and Statistics and Probability.

TABLE TYE.8.1 Average distance learning section size for public two-year college mathematics program courses in fall 2015.

Course number	Type of course	Average section size	Course number	Type of course	Average section size
1	Arithmetic & Basic Mathematics	18	17	Linear Algebra	17
2	Pre-algebra	20	18	Discrete Mathematics	24
3	Elementary Algebra (High School level)	23	19	Elementary Statistics (with or w/o Probability)	19
4	Intermediate Algebra (High School level)	22	20	Probability (with or w/o Statistics)	26
5	Geometry (High School level)	NA	21	Finite Mathematics	23
6	College Algebra (above Intermed. Alg.)	20	22	Mathematics for Liberal Arts	20
7	Trigonometry	15	23	Mathematics for Elementary School Teachers I	14
8	College Algebra & Trigonometry (combined)	13	24	Mathematics for Elementary School Teachers II	13
9	Introduction to Mathematical Modeling	23	25	Other Mathematics Courses for Teacher Preparation	NA
10	Precalculus/Elem Functions/Analytic Geometry	20	26	Business Math (not transferable)	19
11	Mainstream Calculus I	17	27	Business Math (transferable)	18
12	Mainstream Calculus II	14	28	Technical Math (non-calculus-based)	16
13	Mainstream Calculus III	11	29	Technical Math (calculus-based)	27
14	Non-mainstream Calculus I	24	30	Other Mathematics Courses (not transferable)	17
15	Non-mainstream Calculus II	NA	31	Other Mathematics Courses (transferable)	21
16	Differential Equations	17			

NA = Not applicable.

In Table TYE.10, the reader will note the small number of percentages in some categories and with the number of sections taught in each modality totaling more than 100% for every course. A possible reason for the incomplete data may be that department chairs (or persons completing the survey) were not always sure which instructional practice is used by instructors, and/or that it was difficult to collect such data. In spite of the gaps, the writers of this summary felt that the data in the table should be presented as collected. This situation was also experienced in the 2010 survey data.

Data and analysis on how first-year courses were taught at four-year institutions can be found in Chapter 5 of this report in Tables FY.2 through FY.10. Additional Information about instructional strategies employed at four-year institutions can be found in Chapter 1, Tables S.6-S.8 and Table SP.26 in Chapter 2.

Redesign of mathematics programs and Pathways

Strategies to improve success/completion rates and to update the curriculum were a result of nationwide discussions starting in 2009. Colleges experimented with accelerated, as well as slower-paced precollege courses, implemented learning communities, and created summer boot camps in Beginning and Intermediate Algebra. Some colleges began to rethink the curriculum, questioning historically traditional topics, wondering what to emphasize and de-emphasize, and considering new topics more relevant to how people use mathematics. These efforts and discussions led to curricular programs called mathematics "Pathways." By fall 2015, mathematics Pathway courses and course sequences could be found in

TABLE TYE.9 Number of sections and number and percentage of sections taught by part-time faculty in mathematics programs at public two-year colleges by type of course in fall 2010 and 2015 (excluding distance learning and dual enrollment sections).

		2010			2015		
Course number [1]	Type of course	Number of sections	Number of sections taught by part-time faculty	Percentage of sections taught by part-time faculty	Number of sections	Number of sections taught by part-time faculty	Percentage of sections taught by part-time faculty
1-5	Precollege level	45131	26069	58%	36108	16515	46%
6-10	Precalculus level	12588	3940	31%	15793	5173	33%
11-13	Mainstream Calculus	5155	558	11%	4396	666	15%
14-15	Non-mainstream Calculus	959	259	27%	882	254	29%
16-18	Advanced level	616	69	11%	761	62	8%
19-20	Statistics, Probability	4090	1573	38%	9661	1977	21%
21-27	Service courses	5673	2258	40%	7014	2053	29%
28-29	Technical mathematics	1533	264	17%	1433	501	35%
30-31	Other mathematics courses	2272	974	43%	1845	813	44%
1-31	Total, all courses	78018	35965	46%	77893	28014	36%

[1] For names of specific courses see Table TYE.3.

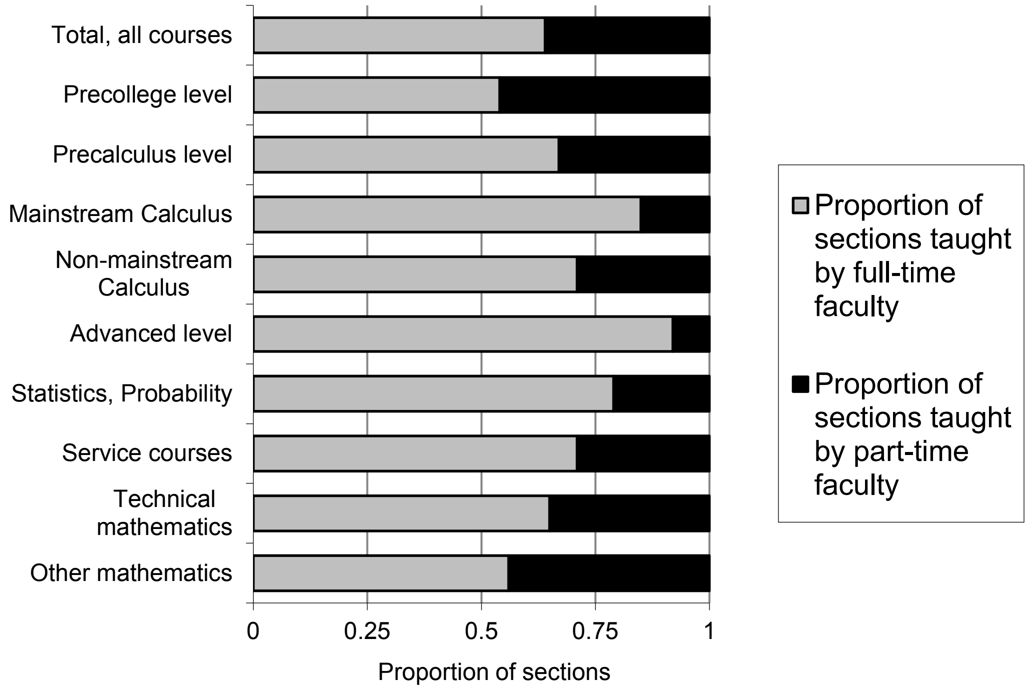

FIGURE TYE.9.1 Proportion of sections of mathematics and statistics courses taught by full-time and by part-time faculty in mathematics programs at public two-year colleges by type of course[1] in fall 2015.

[1]For names of specific courses see Table TYE 3

many two- and four-year colleges and deemed as an important topic to be surveyed in CBMS2015.

In this survey, Pathways is defined to be "a redesign of a mathematics sequence that provides students with an alternative course or sequence to/through developmental mathematics and to/through a college-level mathematics or statistics course." These curricular changes often involved revisions of course prerequisites in those courses. Availability of Pathways courses and sequences may be the cause of decreased enrollments in traditional Precollege courses at some colleges and increased enrollment in College Algebra, Quantitative Literacy, Mathematics for Liberal Arts and Statistics courses. See Tables TYE.3 and TYE.4.

Table TYE.11 reports that 58% (5 SEs) of responding two-year colleges implemented a Pathways course sequence in fall 2015. Some colleges implemented multiple courses and more than 193,000 students enrolled in Pathways courses. The following Pathways courses were implemented in the given percentage of mathematics departments: Foundations (51%; 7 SEs), Quantitative Reasoning/Literacy (59%; 8 SEs), Statistics (63%; 6 SEs), and Other courses (32%; 9 SEs).

Significant changes between 2010 and 2015 were found in the areas of content, delivery methods and instructional strategies in Precollege, College-level Non-STEM, STEM, and Statistics courses as presented in Table TYE.11.1. Many of these changes were the result of the redesign efforts mentioned above. Changes in content including students collecting and analyzing data, solving contextually-based problems, focus on quantitative reasoning and less symbol manipulation were reported in a range of 8-38% of courses in various courses. Alternative delivery methods, such as emporium models, modules, flipped classrooms, accelerated or slower pace courses were most prevalent in Precollege level courses. Group work, handheld devised, computer programs and the internet, spreadsheets, guided questioning and active learning strategies were reported in 5-46% of responding colleges.

The possible implementation of Pathways programs/courses at four-year institutions was not surveyed in CBMS2015. Table SP.26 in Chapter 2 reports that 58% (6 SEs) of four-year mathematics and statistics departments implemented inquiry-based classes, 58% (4 SEs) flipped classes, 66% (5 SEs) activity based

TABLE TYE.10 Percentage of on-campus sections using different instructional methods by course in mathematics programs at public two-year colleges in fall 2015.

		Percentage of sections taught that		
Course Number	Type of course	Have common Department exams %	Use a Homework Management system %	Total number of on-campus sections in fall 2015
1	Arithmetic & Basic Mathematics	67	72	3070
2	Pre-algebra	64	80	4986
3	Elementary Algebra (High School level)	61	68	10198
4	Intermediate Algebra (High School level)	38	43	17580
5	Geometry (High School level)	45	32	274
6	College Algebra (above Intermed. Algebra)	49	68	10333
7	Trigonometry	19	53	1900
8	College Algebra & Trigonometry (combined)	15	50	499
9	Introduction to Mathematical Modeling	5	47	116
10	Precalculus/Elem Functions/Analytic Geometry	31	61	2947
11	Mainstream Calculus I	12	36	2405
12	Mainstream Calculus II	14	32	1241
13	Mainstream Calculus III	14	33	749
14	Non-mainstream Calculus I	9	66	880
15	Non-mainstream Calculus II	0	0	2
16	Differential Equations	5	25	311
17	Linear Algebra	4	22	280
18	Discrete Mathematics	6	13	169
19	Elementary Statistics (with or w/o Probability)	39	55	8915
20	Probability (with or w/o Statistics)	65	65	745
21	Finite Mathematics	10	77	1291
22	Mathematics for Liberal Arts	43	57	3996
23	Mathematics for Elementary School Teachers I	27	30	514
24	Mathematics for Elementary School Teachers II	32	48	118
25	Other Mathematics Courses for Teacher Preparation	42	79	51
26	Business Math (not transferable)	24	38	670
27	Business Math (transferable)	14	23	373
28	Technical Math (non-calculus-based)	41	48	1265
29	Technical Math (calculus-based)	13	47	168
30	Other Mathematics Courses (not transferable)	58	75	1348
31	Other Mathematics Courses (transferable)	21	79	497

TABLE TYE.11 Percentage of mathematics programs at public two-year colleges which implemented a "Pathways"[1] course sequence, the types of courses implemented, and the Fall 2015 enrollment.

Pathways course	Percentage Yes	Percentage No	Fall 2015 Enrollment
Implemented a Pathways course sequence	58	42	
Implemented Pathways course in:			
a. Foundations	51	49	76338
b. Quantitative Reasoning/Literacy	59	41	45203
c. Statistics	63	37	56342
d. Other	32	68	14631

[1]Pathways is defined to be a redesign of a mathematics sequence that provides students with an alternative course or sequence to/through developmental mathematics and to/through a college-level mathematics or statistics course.

lessons, and 86% (3 SEs) used technology to develop conceptual understanding.

While the impact of mathematics Pathways needs to be studied as implementation and improvements continue across the country, possible decreases observed in CBMS2015 Precollege enrollment data and increases in College Algebra, Precalculus, and Statistics, might be related to Pathways initiatives and/or other curricular changes.

Distance learning courses and MOOCs

In CBMS2015, as in 2010 and 2005, distance learning was defined as "a course in which the majority of instruction occurs with the instructor and the students separated by time and/or place." The CBMS2005 survey inquired about the number of course sections taught via distance. In 2015 and 2010 data about distance learning courses was collected including information about both course enrollment and number of class sections. The change was motivated by the fact that distance-learning sections are not bound by room-size limits and can vary dramatically depending on local administrative practice. The comments that precede Table E.4 in Chapter 3 discuss the survey questions in CBMS2015 about distance learning for both four-year and two-year colleges. Additional discussion and tables about distance learning enrollments and instructional strategies for both two-year and four-year institutions are included in Chapter 2, Tables SP.8-SP.10.

Using enrollment data, not section counts, the fall 2015 data for two-year colleges (Table TYE.12 and Table E.4 in Chapter 5) reported that almost 12% (1 SE) mathematics students enrolled via distance (225,000 students of the total 1,918,000 students; SE 25,000), an increase of three points from 2010. Comparing 2015 to 2010, two-year colleges had increases in the number of students enrolled in distance learning courses in all Precollege courses, College Algebra, Precalculus, Mainstream Calculus I, II, and III, Statistics, and Mathematics for Liberal Arts.

Elementary Algebra and College Algebra had the largest student enrollment in fall 2015 distance learning enrollment of 38,000 students each (SE 10,000 and 5,000 respectively). Intermediate Algebra was next largest with 33,000 (SE 5,000) students, followed by Statistics with 31,000 (SE 4,000). Largest distance learning percentage of individual course enrollment in courses with greater than 10,000 students was reported in Mathematics for Liberal Arts (19%, 3 SEs), Arithmetic (13%; 5 SEs), Elementary Algebra (14%; 3 SEs), and College Algebra (13%; 1 SE). See Table TYE.12.

As reported in Tables TYE 7.1 and 8.1, the total average section size for all distance learning courses was 21 (SE 1) students, ranging from 11 to 27 students. Sections sizes in Precollege courses (course numbers 1-5) ranged from 18-23 students and averaged 23 (SE 1) students. Precalculus (course numbers 6-10) average section sizes ranged from 13-23 students and

TABLE TYE.11.1 Percentage of mathematics programs at public two-year colleges reporting significant change in last five years, by type of course, and by content, delivery methods, and instructional strategies.

Area of change and activity		Arithmetic, Pre-Algebra, Beginning Algebra, Intermediate Algebra	Statistics	College-Level Non-STEM: College Algebra, Math for Liberal Arts, Finite Math, Quantitative Reasoning	STEM: College Algebra/ Trigonometry, Precalculus, Calculus and above
Content					
i)	Students collect, organize, and analyze real data	12	36	20	13
ii)	Student solves contextually-based problems/applications	26	31	34	38
iii)	Course includes modeling	15	21	23	29
iv)	Course focuses on quantitative reasoning	27	23	36	16
v)	Course has less symbol manipulation and more emphasis on conceptual understanding	19	23	28	8
Delivery Methods					
i)	Emporium model	33	2	5	6
ii)	Students complete prescribed modules	36	4	3	7
iii)	Flipped Classroom	16	9	16	15
iv)	Accelerated pace	43	6	6	6
v)	Slower pace	11	1	5	2
Instructional Strategies routinely include:					
i)	Group work	35	30	35	24
ii)	Use of handheld devices	15	26	25	26
iii)	Use of computer programs or internet	46	31	36	34
iv)	Use of Excel spreadsheets	9	31	18	5
v)	Guided questioning and less lecturing	27	17	26	19
vi)	Active learning strategies	38	33	42	33

averaged 20 (SE 1) students. Mainstream Calculus and Non-mainstream Calculus section sizes ranged from 11-24 students and averaged 19 (SE 4) students. The percentage of distance learning courses with an average section size greater than 30 was 17% (4 SEs). Comparing the section sizes of distance learning courses to face-to-face section sizes, distance learning section size was less than the face-to-face courses, except for Intermediate Algebra, Introduction to Mathematical Modeling, Discrete Mathematics, and Technical Mathematics. See Tables 7.1 and 8.1.

CBMS2010 also collected data on characteristics of distance learning courses and programs in two-year colleges (see Table TYE.12.1 and Tables SP.9 and SP.10 in Chapter 2). Eighty-seven percent (87%; 4 SEs) of mathematics departments taught distance learning courses with 69% (6 SEs) of those courses taught completely online. Ninety-seven percent (97%; 3 SEs) of mathematics programs used the same course outlines for distance learning as face-to-face classes. Instructional materials were a combination of materials created by faculty and commercially produced products in 67% (5 SEs) of the departments. Distance learning students took the majority of tests at monitored testing sites at 47% (5 SEs) of the reporting colleges. Transfer credit for distance learning courses not taught by faculty at the reporting institution was awarded at 58% (5 SEs) of reporting colleges. Distance Learning instructors are evaluated in the same way that face-to-face instructors are evaluated at 93% (3 SEs) of responding colleges. See Table TYE.12.1.

A more detailed discussion about trends in distance learning enrollment in four-year institutions can be found in Table E.4 in Chapter 3 and in the discussion in Chapter 2 proceeding Tables SP.9 and SP.10. At four-year mathematics departments in fall 2010, the percentage of distance learning enrollments in Precollege level, College Algebra/Trigonometry/Pre-Calculus, Calculus I, and Statistics were 4%, 3%, 0.6%, and 6% respectively. In 2015, while the number of students enrolled in distance learning in four-year mathematics departments was less than at two-year colleges, data showed that percentage of distance learning enrollments in Precollege level, College Algebra/Trigonometry/Pre-Calculus, Calculus I, and Statistics were 3%, 5%, 3%, and 7% respectively in four-year mathematics departments.

Distance learning delivery and course design can present unique challenges for departments. “Maintaining a level of rigor in distance learning mathematics courses equivalent to courses offered face-to-face” was reported to be “somewhat of a challenge” by 41% (5 SEs) of two-year colleges and a “very significant challenge” by 17% (5 SEs). Forty percent (40%; 6 SEs) of colleges stated that “student success rates in online distance mathematics courses are lower than face-to-face courses” with similar content presented a “very significant challenge” to the department. See Table TYE.12.2.

The 2015 survey asked two-year and four-year mathematics departments if, during the academic years 2013-15, the department had offered a MOOC (massive open online course) for credit. Out of all the institutions surveyed, one four-year (bachelors-level) mathematics department, one (doctoral-level) statistics department, and two two-year colleges responded “yes.” The two-year colleges reported teaching courses in statistics, developmental mathematics, and college-level courses below, and above, calculus-level courses. The four-year mathematics departments taught one or more courses that were college-level, but below calculus, and statistics. The statistics department taught a course that required previous statistical knowledge. Given the few responses, and large SEs, estimates of the percentage of departments offering MOOCs and the enrollments in MOOCs are not included in this report. That is, given the rarity of such MOOCs, a different sample might show a different distribution of courses and different statistics.

Placement testing, Math Clubs, independent study, honors programs, programs for minorities, programs for women, and outreach projects in K-12 schools

Table TYE.13 reported that diagnostic or placement/diagnostic testing was available in 94% (4 SEs) of two-year colleges in fall 2015, up four points from 2010. Seventy-eight percent (78%; 4 SEs) of these colleges usually required such testing mandatory for first-time students, and 79% (4 SEs) of the colleges responding periodically assess the effectiveness of their placement tests. Advising by a member of the mathematics faculty occurred in 49% (6 SEs) of responding colleges, up seven points from 2010.

Tables TYE.13 in this chapter and Tables SP.14 and SP.15 in Chapter 2, report specific outside-of-class opportunities for two-year college mathematics students. Notable increases in participation occurred in opportunities for students to participate in various activities: mathematics clubs (32% in 2015; 5 SEs, compared to 31% in 2010) and lectures/colloquia not part of mathematics clubs (21% in 2015; 4 SEs, compared to 16% in 2010), undergraduate research activities (17% in 2015; 3 SEs, compared to 14% in 2010). Participation in mathematics contests was down one point to 40% (5 SEs) of colleges. Independent studies in mathematics increased five points to 41% (6 SEs). Since 1995, honors sections in mathematics programs have gone up and down, from 17% in 1995 to 20% in 2000 to 24% in 2005, back down to 20% in 2010 and up to 28% (4 SEs) in 2015. Special programs to encourage minorities in mathematics were reported in 15% (of two-year colleges in 2005 and down to 11% in 2010, and back up to 15% (3 SEs) in 2015.

TABLE TYE.12 Percentage of distance-learning enrollments (distance-learning courses are courses in which the majority of instruction occurs with the instructor and the students separated by time and/or place) among all enrollments (excluding dual enrollments) at public two-year colleges in fall 2010 and 2015, and total enrollments (in 1000s) in those courses.

		2010	2010	2010	2015	2015	2015
Course Number	Type of course	Total Enrollments [1] (1000s)	Distance Enrollments (1000s)	Percentage Distance Enrollments	Total Enrollments [1] (1000s)	Distance Enrollments (1000s)	Percentage Distance Enrollments
1	Arithmetic & Basic Mathematics	146	11	7%	71	9	13%
2	Pre-algebra	226	14	6%	127	9	7%
3	Elementary Algebra (High School level)	428	37	9%	277	38	14%
4	Intermediate Algebra (High School level)	344	25	7%	299	33	11%
5	Geometry (High School level)	6	0	0%	8	0	0%
6	College Algebra (above Intermed. Algebra)	230	32	14%	292	38	13%
7	Trigonometry	45	4	10%	51	4	9%
8	College Algebra & Trigonometry (combined)	11	1	12%	13	1	7%
9	Introduction to Mathematical Modeling	18	1	4%	2	1	46%
10	Precalculus/ Elementary Functions/ Analytic Geometry	64	3	5%	87	10	12%
11	Mainstream Calculus I	65	2	3%	66	4	6%
12	Mainstream Calculus II	29	0	1%	34	2	5%
13	Mainstream Calculus III	15	0	0%	19	1	4%
14	Non-mainstream Calculus I	20	2	8%	26	3	13%
15	Non-mainstream Calculus II	2	0	0%	0	0	0%
16	Differential Equations	6	0	2%	7	0	1%
17	Linear Algebra	5	0	4%	7	0	6%
18	Discrete Mathematics	2	0	12%	5	1	13%

Note: 0% means less than one-half of one percent.

[1] Does not include dual enrollments.

TABLE TYE.12 (continued) Percentage of distance-learning enrollments (distance-learning courses are courses in which the majority of instruction occurs with the instructor and the students separated by time and/or place) among all enrollments (excluding dual enrollments) at public two-year colleges in fall 2010 and 2015, and total enrollments (in 1000s) in those courses.

		2010	2010	2010	2015	2015	2015
Course Number	Type of course	Total Enrollments [1] (1000s)	Distance Enrollments (1000s)	Percentage Distance Enrollments	Total Enrollments [1] (1000s)	Distance Enrollments (1000s)	Percentage Distance Enrollments
19	Elementary Statistics (with or w/o Probability)	134	23	17%	251	31	12%
20	Probability (with or w/o Statistics)	3	0	7%	28	2	9%
21	Finite Mathematics	18	2	11%	40	4	11%
22	Math for Liberal Arts	91	15	17%	97	19	19%
23	Mathematics for Elementary School Teachers I	21	2	11%	12	2	17%
24	Mathematics for Elementary School Teachers II	8	2	20%	3	1	32%
25	Other Mathematics Courses for Teacher Preparation	1	0	0%	1	0	0%
26	Business Math (not transferable)	16	3	19%	16	3	21%
27	Business Math (transferable)	4	0	7%	10	1	11%
28	Technical Math (non-calculus)	17	1	7%	21	3	12%
29	Technical Math (calculus)	1	0	37%	3	0	6%
30	Other Math Courses (not transfer-able)	33	2	7%	31	2	7%
31	Other Math Courses (transferable)	14	3	19%	12	1	13%
	Total Enrollments	2024	188	9%	1918	225	12%

Note: 0% means less than one-half of one percent.

[1] Does not include dual enrollments.

TABLE TYE.12.1 Percentage of mathematics programs reporting use of distance learning in public two-year colleges in fall 2015.

A. Award transfer credit for distance learning not taught by faculty at your instituion	
a. Yes	58
b. No	42
B. Limit distance learning credits that can be counted toward graduation	
a. Yes	1
b. No	99
C. Department taught distance learning courses in 2013-2015	
a. Yes	87
b. No	13
D. Instructional materials created by:	
a. Faculty	14
b. Commercially produced materials	19
c. Combination of both	67
E. Format of majority of distance learning	
a. Complete online	69
b. Hybrid	22
c. Other	8
F. Requirements of distance learning faculty to meet with students	
a. Never	5
b. For scheduled meetings	12
c. Specified office hours per week	32
d. Not applicable	51
G. How distance learning students take majority of tests	
a. Not monitored	11
b. Online, but using monitoring technology	10
c. At monitored testing site	47
d. Combination of above	32
H. Distance learning practices	
a. Same exams as in face-to-face	67
b. Same outlines as in face-to-face	97
c. Same course projects	77
d. More course projects than in non-distance learning course	12
I. Distance learning instructors evaluated in same way	
a. Yes	93
b. No	7

TABLE TYE.12.2 Percentage of departments with distance learning that described various factors as significant challenges or somewhat of a challenge in fall 2015.

Type of course	No challenge	Somewhat of a challenge	Very significant challenge
A. Maintaining a standard and reliable network/user platform.	54	38	8
B. Maintaining a level of rigor in distance learning mathematics courses equivalent to courses offered face-to-face.	42	41	17
C. Faculty knowledge about technology.	56	35	8
D. Student success rates in online distance mathematics courses are lower than face-to-face courses with similar content.	22	38	40
E. Student success rates in online distance mathematics courses are higher than face-to-face courses with similar content.	62	33	4

Special programs to encourage women in mathematics increased nine points to 15% (3 SEs) in 2015.

Chapter 2 of this report also contains a comparison of academic services and other opportunities available to both four-year college students and to two-year college students in fall 2015. See Tables SP.12 and SP.13 in that chapter. In 2015, K-12 outreach opportunities increased again, up twelve points from 2010 to 46% (4 SEs), even though enrollment in the course Mathematics for Elementary School Teachers had decreased (see Table TYE.3). Similarly, opportunities for involvement with K-12 schools increased in four-year colleges from up one point to 50% (4 SEs) in 2015. Additional discussion about teacher training in two-year colleges appears at the end of this chapter and in Chapter 2, Tables SP.2, SP.3, and SP.12.

CBMS2015 and CBMS2010 did not attempt to survey the habits of mathematics students related to academic services or the amount of time spent by faculty in these areas. Data of this kind has been collected by other entities. One resource is the Community College Survey of Student Engagement (CCSSE), conducted under the auspices of the Center for Community College Student Engagement Leadership Program at The University of Texas at Austin since 2001. The 2016 CCSSE Survey collected data from 701 colleges in 46 states, the District of Columbia, three Canadian provinces, plus Micronesia, Guam, and the Marshall Islands. Additional information can be found at http://www.ccsse.org/survey/reports/2016/overview.cfm.

Mathematics Courses Taught Outside of the Mathematics Programs

Two-year colleges have a long history of offering mathematics courses in instructional units outside of the mathematics program. Tables TYE.14, TYE.14.1, TYE.15, and TYE.16 give the enrollment in mathematics courses offered outside of mathematics programs. These enrollments were estimated by mathematics program department chairs. Thus, the estimates may not be as accurate as the numbers given for enrollment within mathematics programs. These enrollments are not included in course enrollment data in earlier tables in CBMS2015.

In fall 2015, the total enrollment in a collection of mathematics courses taught outside the department was reported to be 129,000 (SE 24,000) students, a 15% (1 SE) decrease from 2010 to 2015, after a 19% decrease from 2005 to 2010. Seventy-eight percent (78%, 101,000 students) of those enrollments was in Precollege courses (Arithmetic/Pre-algebra, Elementary and Intermediate Algebra), similar to 2010. Statistics and Probability, Business Mathematics, and Technical Mathematics comprised the remaining 22% of the enrollment taught outside of mathematics departments (28,000 students with 9,000 SE). See Table TYE.14.

Eighty percent (80%) of the courses listed above were taught in a developmental education department or division (103,000 students) outside of the mathematics department. Arithmetic and Elementary Algebra and Technical Mathematics were taught within Occupational Programs and Elementary Statistics/Probability and Business Mathematics were taught in Business divisions. See Table TYE.15.

The largest component of the outside mathematics enrollment described above was in Precollege developmental courses. The structure of Precollege course offerings within a particular college is determined by the institution's philosophy concerning developmental education. A student might have taken all developmental courses (mathematics, reading, and writing) in a self-contained unit devoted to developmental

TABLE TYE.13 Percentage of two-year colleges offering various opportunities and services to mathematics students in fall 2005, 2010, and 2015.

Opportunity/Service	2005	2010	2015
A. Diagnostic or placement testing	97	90	94
a. Colleges that usually require placement tests of first-time enrollees	97	100	78
b. Colleges that periodically assess the effectiveness of their placement tests	81	75	79
B. Advising by a member of the mathematics faculty	40	42	49
C. Opportunities to compete in mathematics contests	37	41	40
D. Honors sections	24	20	28
E. Mathematics club	22	31	32
F. Special mathematics programs to encourage minorities	15	11	15
G. Lectures/colloquia for students, not part of math club	6	16	21
H. Special mathematics programs to encourage women	7	6	15
I. K-12 outreach opportunities	25	32	46
J. Undergraduate research opportunities	9	14	17
K. Independent mathematics studies	38	36	41
L. Other	4	13	5

TABLE TYE.14 Estimated enrollment (in 1000s) in mathematics and statistics courses taught outside of mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

		Enrollment (in 1000s)			
Course Number	Type of course	2000	2005	2010	2015
1-2	Arithmetic & Basic Math, Pre-algebra	43	60	48	38
3	Elementary Algebra (High School level)	27	65	38	36
4	Intermediate Algebra (High School level)	10	26	29	27
19-20	Elementary Statistics, Probability	7	12	12	13
26-27	Business Mathematics	18	15	19	7
28-29	Technical Mathematics	5	10	7	8
	Total	110	188	152	129

studies, or developmental courses were offered as part of the disciplinary curriculum.

The earliest CBMS survey for which "outside" Precollege mathematics enrollment data are available on a course-by-course basis was in 1990. The following percentages are obtained by using Table TYE.3 and Table TYE.14, tracing the pattern of enrollment outside the mathematics program from 1990 to 2015 in Arithmetic, Elementary Algebra and Intermediate Algebra as a percentage of the total enrollment in the course.

	1990	1995	2000	2005	2010	2015
Arithmetic/Pre-algebra	18%	19%	17%	20%	13%	19%
Elementary Algebra	13%	12%	12%	15%	9%	13%
Intermediate Algebra	9%	4%	4%	7%	8%	9%

Looking only at percentages of total enrollment is part of the story. From 2010 to 2015, actual enrollment changes in Arithmetic/Prealgebra, Elementary Algebra and Intermediate Algebra of -10,000, -2,000, and -2,000 students, respectively, along with overall enrollment decreases in these courses, further highlight the downturn in Precollege enrollments in fall 2015.

Fluctuations in the numbers of outside the mathematics department enrollment may be influenced by the fact that the mathematics department chairs, who do not manage these outside programs, were responsible for estimating the numbers.

Table TYE.16 shows 32% (5 SEs) of colleges reported some part of their precollege mathematics program was administered separately from the mathematics program, up from 29% in 2010, but the similar to 2005.

Topics of Special Interest for Mathematics Programs at Two-Year Colleges

In each CBMS survey cycle, certain topics of special interest are chosen for data collection and comprehensive analysis across both two-year and four-year colleges or for two-year or four-year institutions individually. Special topics for two-year and four-year institutions are discussed in Chapter 2 and/or 6 of this report. Additional questions were added in CBMS2015 regarding the various options available in

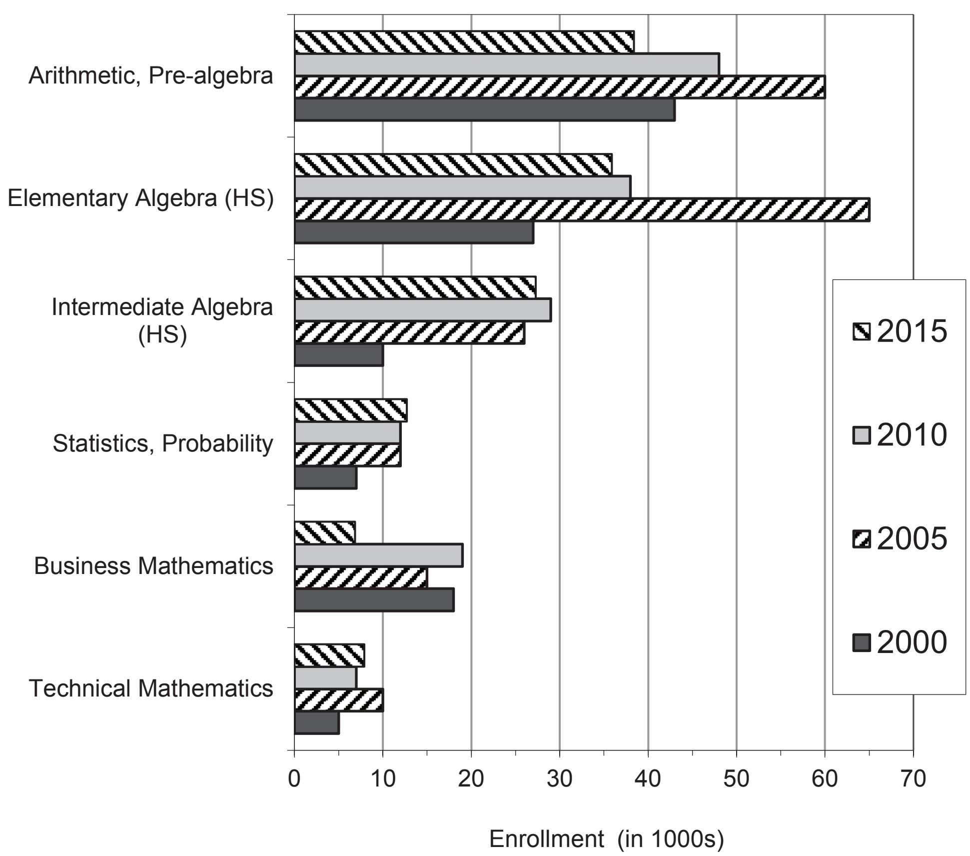

FIGURE TYE.14.1 Estimated enrollment (in 1000s) in mathematics and statistics courses taught outside of mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

mathematics Pathways and course redesign (Tables TYE.11 and TYE.11.1), and distance learning courses and practices (Tables SP.8-SP.10 in Chapter 2 and Tables TYE.12, TYE.12.1, and TYE.12.2). Pre-service education of teachers (Tables SP.2, SP.3, and SP.4 in Chapter 2) and data on dual enrollment courses and faculty (Table SP.19 in Chapter 2) are discussed below.

Scope and organization of pre-service mathematics education for K-8 teachers

CBMS2015 continued an inquiry begun in 2000 about the level of involvement of two-year college mathematics programs in the mathematical education of future mathematics teachers. These data are reported primarily among the special topics in Chapter 2, Tables SP.2 and SP.3.

In the last two decades, involvement in teacher education at two-year colleges has been active as more students turned to them to take required mathematics and education courses. Enrollment in the Mathematics for Elementary Teachers course fall 2010 and 2005 survey data confirm this involvement. However, fall 2015 saw student enrollment drop to 12,000 (SE 2,000; down from 21,000 students in 2010) in the course Mathematics for Elementary School Teachers 1 and a decrease of 5,000 students to 3,000 (SE 1,000) in fall 2015 in the second course, Mathematics for Elementary School Teachers II. See Table TYE.3.

Table TYE.5 shows that 41% (5 SEs) of two-year colleges offered the course Mathematics for Elementary School Teachers I in fall 2015, compared to 55% of two-year colleges in fall 2010. For the five-year CBMS intervals beginning in 1990 through 2015, the percentages of two-year colleges teaching the Mathematics for Elementary School Teachers I course are successively 32%, 43%, 49%, 59%, 55%, and 41%. The historical growth, and now decrease in 2015, in offerings for this course and other selected courses at two-year colleges, for the five-year CBMS intervals (2000-2015), is reported in TYE.6. As expected, a decrease in fall 2015 is reported in the percentage of colleges in Mathematics for Elementary School Teachers II from 27% in 2010 to 17% (4 SEs) in 2015.

Table SP.2 (Chapter 2) reports on "organized" programs at two-year colleges in which students can obtain their entire mathematics course requirement for teacher licensure. Although 2015 data present decreasing numbers, these data confirm that two-year colleges are involved in teacher education primarily at the K-8 level, though future secondary school teachers often take their lower division mathematics courses at two-year colleges. The single largest component is the program for pre-service elementary school teachers reported by 28% of two-year colleges in 2015, with a decrease from 41% in 2010. Pre-service middle school licensure-oriented programs reported a ten-point decrease to 14% of colleges. Between 5% and 16% of two-year colleges reported programs at the elementary or middle school levels for retraining by career switchers moving into teaching. Compared with 2010, all categories of Table SP.2 showed decreases in percentages of responding colleges.

TABLE TYE.15 Estimated enrollment (in 1000s) in mathematics courses taught outside of mathematics programs at public two-year colleges, by division where taught, in fall 2015.

		Mathematics Enrollment (in 1000s) in Other Programs			
Course Number	Type of course	Developmental Education Dept/Division	Occupational Programs	Business	Other Depts/ Divisions
1-2	Arithmetic & Basic Math, Pre-algebra	36	2	0	1
3	Elementary Algebra (High School level)	34	2	0	1
4	Intermediate Algebra (High School level)	27	0	0	1
19-20	Elementary Statistics, Probability	2	0	3	7
26-27	Business Mathematics	0	0	6	0
28-29	Technical Mathematics	4	3	0	1
	Total	103	6	10	10

Note: 0 means less than 500 enrollments and this may cause column sums to seem inaccurate.

Table SP.3 (Chapter 2) reports on other involvements two-year college mathematics programs have with K-8 teacher education. Thirty-five percent (35%) report that a faculty member is assigned to coordinate mathematics education for future K-8 teachers. About 55% of the reporting colleges designate special mathematics courses for future (preservice) K-8 teachers and 19% off a special mathematics course for preservice secondary teachers. Among mathematics departments, 9% offer mathematics pedagogy courses for future K-8 teachers and 6% of colleges offer such pedagogy courses outside the mathematics department.

The conclusion from Chapter 2 is that, given the large number of two-year colleges in the United States, even when the percentage of colleges involved in the education of future K-8 teachers is small and enrollments decreased in fall 2015, the impact of two-year colleges on the next generation of K-8 teachers is important.

Dual Enrollment and Credentials and supervision of dual enrollment faculty

Dual enrollment in CBMS2015 is defined as "a credit structure that allows high school students to receive simultaneous high school and college credit for courses that were taught at a high school by a high school teacher." Data in Chapter 2 (Tables SP.16 and SP.17) show how that by fall 2015, 94,000 (SE 23,000) students were dually enrolled, a 16% (1 SE) increase from 2010. Of special note in fall 2015 is the 86% increase of dual enrollment in College Algebra from fall 2010 to fall 2015. Precalculus experienced a 43% decrease dual enrollment from fall 2010 to fall 2015. Dual enrollment in Calculus decreased 42%, in contrast to dual enrollment in Statistics that increased 66% in fall 2015. Dual enrollment in "other" courses also decreased. Table SP.16 also includes data for spring 2015 enrollments. See Table TYE.3.1.

In some cases, a faculty member teaching a dual enrollment course was classified as a part-time faculty member at the two-year college that awarded college credit for the course, even though the salary was paid completely by a third party, e.g., the local school district. In 2015, two-year and four-year institutions assigned and paid their own faculty to teach courses in a high school that awards both high school and college credit in 44% (6 SEs) and 6% (2 SEs) of departments respectively. See Table SP.17 in Chapter 2.

As reported in Tables TYF.24 and TYF.25 in Chapter 7, among all survey respondents (including respondents from colleges that do not have dual enrollment arrangements), seven percent (7%; 3 SEs) of mathematics program heads in two-year colleges saw dual enrollment courses as a "major" problem, down four points from 2010. Another 36% (5 SEs) found dual enrollment arrangements "somewhat of a" problem, up twenty points from 2010.

TABLE TYE.16 Percentage of two-year colleges in which some of the precollege (remedial) mathematics course offerings are administered separately from, and not supervised by, the mathematics program – e.g. in a developmental studies department or program – by type of course in fall 2000, 2005, 2010, and 2015.

Mathematics Outside of the Mathematics Department		2000	2005	2010	2015
Percentage of Two-year Colleges with some precollege mathematics courses outside of mathematics department control		29	31	29	32
Course number	Type of Course				
1-2	Arithmetic & Basic Math, Pre-algebra	17	20	24	23
3	Elementary Algebra (High School level)	12	15	13	22
4	Intermediate Algebra (High School level)	4	7	7	16

Chapter 7

Faculty, Administration, and Special Topics in Mathematics Programs at Two-Year Colleges

This chapter continues the presentation of data and analysis about mathematics faculty and programs in public two-year colleges. It reports the estimated number, teaching conditions, education, professional activities, age, gender, and ethnicity of the faculty in these mathematics programs in fall 2015. Additional analysis of some items discussed in this chapter can be found in Chapters 1 and 2 where they are discussed from a comprehensive point of view in comparison to similar data for four-year colleges and universities. In particular, Chapter 2 discusses issues related to dual enrollment and distance learning courses. CBMS survey data has been collected since 1965. However, unlike surveys prior to 1995, the mathematics faculty surveyed in 1995, 2000, 2005, 2010, and 2015 do not include faculty who taught in computer science programs that were separate from mathematics programs. Also, CBMS2005, CBMS2010 and CBMS2015 include data regarding public two-year colleges only. A more detailed statement on this issue occurs at the beginning of Chapter 6. The estimated data in this chapter have not been rounded. Information on the sampling procedure used in the 2015 survey can be found in Appendix II. A copy of the CBBMS2015 two-year college survey questionnaire can be found in Appendix VI.

The term "full-time permanent" faculty is used frequently in this document. Two-year college faculty members in this category have an on-going stable relationship with the college's mathematics programs, are tenured and tenure-eligible faculty, including those on leave or on sabbatical. They occupy a recurring position in the college's budget and are subject to the college's long-term evaluation and re-appointment policy. These faculty are responsible for teaching, curriculum development, student advising, committee appointments, and other forms of college service.

Full-time faculty who are employed on a non-tenure track, sometimes continuing, are called "full-time continuing" faculty in this document. Two-year colleges often have their own individual classification for other non-tenure track full-time faculty. Data about this third classification of positions was collected for the first time in CBMS2015. This group is referred to as "other full-time" faculty in this document. Full-time "permanent" faculty are distinguished from "continuing" or "other" full-time faculty who are often meeting a short-term institutional need. Full-time faculty members teach full course assignments, distinguishing them from part-time or adjunct faculty.

The Table display code in this chapter is TYF, for "two-year faculty," since the chapter discusses issues related to faculty.

In the text that follows, the standard error (SE) in many of the estimates is provided along with the estimate (e.g. estimate 4,596 (SE 58)). The standard errors for all CBMS2015 tables can be found in Appendix VIII. The change in an estimate from the estimate in a previous survey is often expressed both as percentage change, and as the number of SEs that change represents (e.g. "increased 22% (1.2 SEs)").

Highlights of Chapter 7

Number of full-time permanent faculty and part-time faculty

- In fall 2015, the total estimated number of full-time faculty (permanent, continuing and other) in two-year colleges was 9,801 (SE 894). This number is a 10% (2 SEs) decrease of full-time faculty from 2010 to 2015. The decrease in faculty can be viewed in light of the 14% decrease in institutional enrollment in two-year colleges and the 4% (1 SE) decrease in mathematics and statistics enrollment (5%, 1 SE, decrease when dual enrollment is excluded) discussed in Chapter 6. See Table S.13 in Chapter 1, Table TYE.2 in Chapter 6, and Table TYF.1 in this chapter.
- It was estimated that there were 8314 (SE 840) full-time permanent faculty in public two-year college mathematics programs in the United States in fall 2015, compared with 9,790 in 2010. This 15% (2 SEs) decrease of 1476 persons can be compared to 11% increase in full-time permanent faculty experienced between 2005 and 2010, but with caution. As mentioned above, for the first time, CBMS2015 collected data on full-time faculty in three categories (permanent, continuing and other), instead of two (permanent and temporary) in CBMS2010. Full-time continuing and other faculty together totaled 1487 (SE 273) in fall 2015, compared with 1083 full-time continuing faculty in fall 2010 and

represented an increase of 37% (1 SE). See Table S.14 in Chapter 1 and Table TYF.1 in this chapter.

- In fall 2015, the estimated number of part-time faculty in two-year college mathematics programs was 20,247 (17,888, SE 1909, paid by two-year colleges and 2,359, SE 528, paid by third parties such as school districts). Part-time faculty represented 67% of the total number of faculty. This percentage was 70% from 2005 to 2010. When third party payees are omitted, part-time faculty represented 65% of the total number of faculty, also down three points from 2010. See Table TYF.1.
- In fall 2015, sixty-eight percent (68%; 5 SEs) of responding colleges reported the average teaching assignment to be 13-15 hours, compared to 76% in 2010. This decrease is accompanied by an increase in the percentage of two-year colleges reporting teaching assignments greater than or equal to 19 contact hours. The average weekly contact hours for full-time permanent faculty increased to 18 (SE 2) hours in fall 2015 in comparison to 15 hours in fall 2010. Sixty-four percent (64%; 2 SEs) of part-time faculty taught six or more hours in 2015, up ten points from 2010. See Table TYF.2. Thirty-six percent (36%; 4 SEs) of all sections were taught by part-time faculty in fall 2015, a ten-point drop from 2010. See Table S.5 in Chapter 1 and Table TYE.9 in Chapter 6.
- Table TYF.2 shows that 74% (3 SEs) of full-time permanent faculty taught extra hours for extra pay at their own college in fall 2015, up from 65% in 2010. Of those faculty who taught for extra pay, 38% (3 SEs) taught 1-3 extra hours and 39% (2 SEs) taught 4-6 hours. A notable change from 2010 to 2015 was the increase to 23% (2 SEs) from 14% in 2010 in the percentage of faculty teaching 7 or more hours for extra pay. See Table TYF.2.
- There were 612 (SE 132) faculty who were no longer part of the faculty in 2015-2016, compared to 459 who were no longer part of the faculty in 2010-2011. Reasons for these departures were not surveyed in 2015. See Table TYF.3.

Educational Credentials of Faculty in Mathematics Programs

- In fall 2015, a masters degree was the terminal degree for 80% (3 SEs) of the full-time permanent mathematics faculty members at two-year colleges, down three points from 2010. An additional 15% (2 SEs) full-time faculty held doctorates and 5% (3 SEs) held bachelors degrees. Of the total full-time permanent faculty, 73% (2 SEs) held degrees in an academic major in mathematics, 13% (2SEs) in mathematics education and 3% (1 SE) in statistics. See Tables TYF.4 and TYF.5.
- Among part-time faculty in fall 2015, seven percent (7%; 1 SE) held a doctorate (up two points from 2010), 76% (3 SEs) held a masters degree (up three points from 2010) and 17% (3 SEs) held a bachelors degree as their highest degree (down five points from 2010). A bachelors degree may be considered an appropriate or terminal degree for those teaching precollege courses or by accrediting agencies for faculty teaching highly specialized technical courses. See Table TYF.6.
- In fall 2015, fifty-eight percent (58%; 4 SEs) of part-time faculty held degrees in an academic major in mathematics, 19% (2 SEs) in mathematics education, and 3% (1 SE) in statistics. See Table TYF.7.

Gender, Ethnic Composition, and Age of Full-time Permanent Mathematics Program Faculty

- After the proportion of men and women among the full-time permanent faculty was evenly divided in 2005 and 2010, women comprised 52% (2 SEs) of full-time faculty and 53% (2 SEs) of part-time faculty in 2015. See Tables TYF.8, TYF.9, and TYF.17.
- In fall 2015, the percentage of ethnic minorities among full-time permanent faculty members in mathematics programs in two-year colleges was 23% (2 SEs), compared to 16% in 2010. The total number of ethnic minority faculty was 1876 (SE 289) faculty, up 310 persons from 2010. The majority of faculty represented in the ethnic groups was Asian/Pacific Islander (734 persons; SE 111), up three percentage points to 9% (1 SE). The percentage of women in each ethnic group is displayed in Table TYF.12. See Tables TYF.10, TYF.11, and TYF.12.
- The number of full-time permanent faculty under the age of 40 was 2045 (SE 292), 25% of the total 8314 in 2015, down eight percentage points from 2010, and represented a decrease of 1199 faculty. Ethnic minorities accounted for 26% (3 SEs) of full-time permanent faculty under age 40, 532 persons. The percentage of masters degrees awarded in the U.S. in 2014-15 to ethnic minorities increased to 29%, up seven percentage points from 2008-2009. See Tables TYE.10 and TYF.13.
- Among part-time faculty paid by two-year colleges, twenty-two percent (22%; 2 SEs) or 3935 faculty were ethnic minorities (Asian/Pacific Islander, Black or African American, Mexican American, Puerto Rican, or other Hispanic). Asian/Pacific Islanders represented the largest group of part-time faculty, seven percent (7%; 1 SE), and 1341 (SE 284) faculty. Fifty-three percent (53%; 2 SEs) of all part-time faculty were women in fall 2015. See Tables TYF.14 and TYF.15.
- Distribution of faculty by age is displayed in Table TYF.16. The percentage of faculty, 50-54 years of

age, increased to 16% (2 SEs) in 2015 from 11% in 2010 to a total of 1,357 (SE 220) persons. The percentage decrease in the number of full-time permanent faculty in the age group greater than 59 years was two points to 15% (1 SE) in 2015 and represented 1,219 (SE 153) persons. The average age was 47.7 (SE 0.5) in 2015 compared with 46.8 in 2010. See Table S.16 in Chapter 1 and Tables TYF.16 and TYF.17.

Demographics of Full-time Permanent Faculty Newly Hired by Mathematics Programs

- The 451 (SE 83) newly-hired full-time permanent faculty in fall 2015 represented a decrease of 326 faculty from 2010. Thirty-seven percent (37%; 7 SEs) were hired from graduate school (23% in 2010). Four percent (4%; 2 SEs) of the new full-time permanent faculty had been teaching in four-year institutions (3% in 2010) and one percent (1%; 1 SE) had been teaching in secondary schools (25% in 2010). Twenty-six percent (26%; 6 SEs) had taught part-time or on a full-time faculty contract at the same college of the hire. Eight-seven percent (87%; 4 SEs) of newly hired full-time faculty held masters degrees in 2015, compared to 82% in 2010. Nine percent (9%; 3 SEs) held doctorate degrees, compared to 11% in 2010. See Tables TYF.18 and TYF.19.
- Nine percent (9%), 41 persons, of the 451 newly-hired full-time permanent faculty in fall 2015 were ethnic minorities (Asian/Pacific Islander, Black or African American, Mexican American, Puerto Rican, or other Hispanic), down nine percentage points from 2010. In 2015, fifty-five percent (55%; 7 SEs) of all new hires were women, up eight points from 2010. See Tables TYF.18 and TYF.20.

Teaching Evaluations and Professional Development of Mathematics Program Faculty

- The percentage of two-year colleges requiring periodic teaching evaluations for all full-time faculty members increased to 100% (0 SE) in 2015 from 96% in 2010. Percentages of colleges requiring evaluation of part-time faculty increased to 98% (1 SE) in 2015 from 88% in 2010. Increases in the percentages of methods for evaluating full-time faculty were reported in observation of classes by other faculty (75%; 5 SEs) and evaluation forms completed by students (95%; 3 SEs). Decreases in the percentages of methods used for evaluating teaching of full-time were reported in observations by an administrator (45%; 5 SEs) and self-evaluation, such as teaching portfolios (23%; 4 SEs), and written peer evaluations (21%; 5 SEs). Table TYF.22 also reports evaluation methods for part-time faculty, where 94% (3 SEs) of colleges used evaluation forms completed by students and 64% (5 SEs) used observation by other faculty. See Tables TYF.21 and TYF.22.
- The percentage of two-year colleges requiring annual continuing education or professional development for full-time permanent faculty rose to 82% (4 SEs), up 15 points from 2010. The percentages of specific activities used to meet professional development requirements in 2015 were similar to those in 2010, with an increase of nine percentage points to 62% (2 SEs) of activities provided by the employer. See Table TYF.23.
- The three items reported by mathematics program heads with the highest percentage as being a "major problem" in 2015 were:
  - i. too many students needing remediation (64%; 5 SEs),
  - ii. students not understanding the demands of college work (62%; 5 SEs), and
  - iii. low student motivation (57%; 8 SEs).

  When considering issues reported as "somewhat of a problem," the top three items and their percentages were:
  - i. low success rate in transfer-level courses (54%; 5 SEs),
  - ii. coordinating mathematics courses with high schools (52%; 4 SEs), and
  - iii. lack of curricular flexibility because of transfer rules (46%; 5 SEs).

  See Tables TYF.24 and TYF.25.
- In fall 2015, a traditional mathematics department was found in more than half (52%; 5 SEs) of the two-year colleges, up six points compared to 2010. A combined mathematics/science department or division was the management structure at 28% (5 SEs) of institutions and 10% (3 SEs) in mathematics and computer science programs. "Other" department or division structures were reported at 6% (2 SEs) of responding institutions. See Table TYF.26.

Topics of Special Interest for Mathematics Programs

- Issues related to faculty involvement and instructional strategies in distance learning courses are discussed in Chapters 2 and 6. Eighty-seven percent (87%; 4 SEs) of two-year colleges reported that distance learning courses were offered in fall 2015. Instructional materials for distance courses were created by a combination of commercially produced materials and faculty in 67% (5 SEs) of the colleges. Ninety-seven percent (97%; 3 SEs) of responding colleges reported that the same course outlines were used in distance learning and face-to-face courses. Instructors participated in evaluation in the same way in both non-distance and distance learning formats in 93% (3 SEs) of responding colleges. Thirty-two percent (32%; 7 SEs) of two-year colleges reported that faculty whose entire teaching load was in distance learning had a specific number of office hours per week. See Tables TYE.12.1 and TYE.12.2 in Chapter 6 and Tables SP.8-SP.10 in Chapter 2.

- Two-year colleges' focus on teacher preparation in 2015 included 35% (6 SEs) of reporting institutions assigning a mathematics faculty member to coordinate K-8 teacher education in mathematics. Pre-service elementary teachers could complete their entire mathematics course requirement or licensure requirements at the two-year college in 28% (5 SEs) of institutions, down from 41% in 2010. Table SP.2 presents decreases in all percentages of organized programs for pre- and in-service teachers. While teacher education is still a focus at two-year colleges, the decreases presented in SP.2, together with the decrease in enrollment in the courses Mathematics for Elementary Teachers I and II presented in Chapter 6, may indicate a lessening of the priority. See Table TYE.3.2 in Chapter 6 and Tables SP.2 and SP.3 in Chapter 2.
- As reported in Chapter 6, ninety-four thousand (94,000; SE 23,000) students were dual enrolled in fall 2015 in a two-year college mathematics course that awarded credit at both the high school and at the college, an increase of 16% (1 SE) since 2010. The academic control of such courses resided primarily with the two-year colleges. Departmental teaching evaluations were required in 72% (5 SEs) of dual enrollment courses in 2015, up from 48% in 2010. Forty-four percent (44%; 6 SEs) of two-year colleges participating in dual enrollment assigned their own faculty members, compared to 22% in 2010 to teach off-campus. See Tables SP.16 and SP.17 in Chapter 2.
- As noted in Chapter 6, thirty-two percent (32%; 5 SEs) of two-year colleges reported that some of their precollege mathematics courses were administered outside of the control of the mathematics department in fall 2015. This percentage was three points higher than in 2010 for precollege courses. Within precollege courses, Arithmetic/Pre-algebra taught outside the mathematics program decreased one percentage point, and Elementary Algebra and Intermediate Algebra both increased nine points. See Tables TYE.14-TYE.16 in Chapter 6.

The Number and Teaching Assignments of Full-time and Part-time Mathematics Program Faculty

Number of full-time permanent faculty and part-time faculty

In fall 2015, the total estimated number of full-time faculty (permanent, continuing and other) in two-year colleges was 9801 (SE 894) and represented a decrease of 10% (2 SEs) of all full-time faculty (permanent, continuing, and other) from 2010 to 2015, the second decrease since 1980. This decrease is consistent with the 14% decrease in institutional enrollment in two-year colleges and is likely related to the 4% (1 SE) decrease in mathematics and statistics enrollment discussed in Chapter 6 (5 % when dual enrollment is excluded). The decrease in faculty follows an increase of 26% from 2000 to 2005 and an increase of 11% from 2005 to 2010.

In fall 2015, the total estimated number of faculty reported as "full-time permanent" faculty was 8314 (SE 840), a 15% (2 SEs) decrease of 1476 persons from 2010. This data should be considered by examining data of categories of full-time faculty. For the first time, CBMS2015 collected data on full-time faculty in the three categories of permanent, continuing and other faculty, instead of the two categories, permanent and temporary, in CBMS2010. Full-time continuing and other faculty together totaled 1487 (SE 273) persons in fall 2015, compared with 1083 full-time continuing faculty in fall 2010 and represented an increase of 37% (1 SE). Refer to page 1 in this chapter for a more detailed description of the faculty titles used in this document. The growth in non-tenure track continuing and other faculty may be an indication of the stressed financial conditions in two-year colleges, mathematics program changes and redesign, and shifting enrollment trends. See Chapter 6 for two-year college enrollment data and the overall enrollment data summary in Chapter 1 and Table TYF.1.

The total estimated number of all full-time faculty in four-year institutions, full-time (tenure-eligible), other full-time and postdocs, was approximately 24,000 (SE 317) in fall 2015, a 2% increase. Four-year institutions experienced 6% (4 SEs) decrease in full-time permanent (tenure-eligible) faculty in 2015 and an estimated total decrease of 768 faculty. Two-year colleges, a 22% (6 SEs) increase was evident in "other" full-time faculty at four-year institutions. See Tables S.13 and S.14 in Chapter 1.

TABLE TYF.1 Number of full-time permanent, full-time temporary faculty, other full-time faculty, and part-time faculty paid by two-year colleges (TYC) and by a third party (e.g. dual-enrollment instructors) in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

Two-Year Colleges	2000	2005	2010	2015
Full-time permanent faculty	6960	8793	9790	8314
Full-time continuing faculty	961	610	1083	1221
Other full-time faculty				266
Part-time faculty paid by TYC	14887	18227	23453	17888
Part-time, paid by third party	776	1915	2323	2359

Note: Prior to 2015, there was no differentiation between full-time continuing faculty and other full-time faculty.

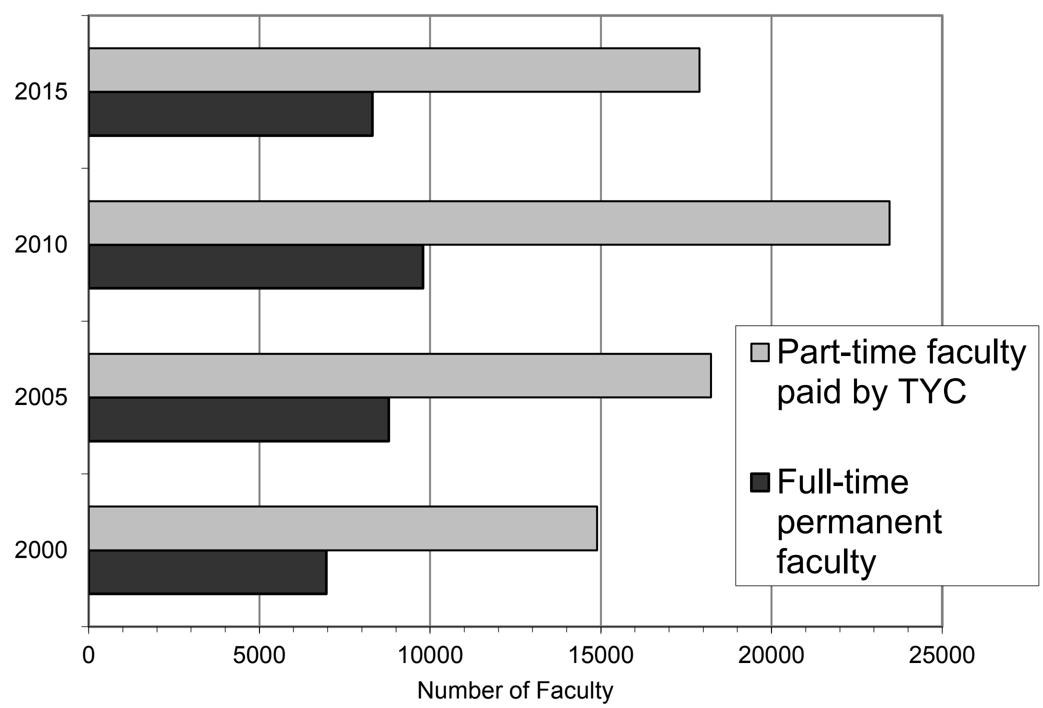

FIGURE TYF.1.1 Numbers of full-time permanent faculty and part-time faculty paid by TYC in mathematics programs in two-year colleges in fall 2000, 2005, 2010, and 2015.

Part-time faculty members in two-year colleges fell into two categories, those paid by two-year colleges and others paid by a third party. The latter most often were high school teachers in a school with which the college had a dual enrollment agreement. When both categories are included, the estimated number of part-time faculty was 20,247 or 67% of the total two-year college teaching staff, down three percentage points since 2010. When third party payees are excluded, the estimated number of part-time faculty members was 17,888 (SE 1909), a decrease of 24% (3 SEs) from 2010 to 2015, and represented 65% of total faculty, down three percentage points from 2010. Another 2,359 (SE 528) part-time faculty were paid by a third party, such as a school district. See Table TYF.1.

Demographics and discussion of newly hired full-time permanent faculty in fall 2015 are presented later in this chapter before and in Tables TYF.18, TYF.19, and TYF.20.

Teaching assignment of full-time permanent and part-time faculty

The average teaching assignment in weekly classroom contact hours for a full-time permanent mathematics faculty member at a public two-year college in fall 2015 was 18 (SE 2) weekly contact hours. This continued a long period during which this figure has oscillated. Previous CBMS surveys reported that in 2010, the average was 15 hours; in 2000, the average weekly contact hour assignment had been 14.8 hours; and in 1990, the number was 14.7 hours. See Tables TYF.2 and TYF.2.1.

In 2015, the teaching assignment for full-time faculty was between 13 and 15 weekly contact hours in 68% (5 SEs) of responding colleges. Nineteen percent (19%) of colleges reported weekly contact hour teaching assignments greater than 15 hours, up five points from 2010. This included 5% (2 SEs) of colleges reporting that teaching assignments were more than

TABLE TYF.2 Teaching assignment for full-time permanent faculty, and teaching and other duties of part-time faculty, in mathematics programs at two-year colleges in fall 2015, with 2010 data in parentheses.

	Teaching assignment in weekly contact hours					
	<10	10 to 12	13 to 15	16 to 18	19 to 21	>21
Percentage of two-year colleges	3 (3)	10 (7)	68 (76)	8 (8)	6 (3)	5 (3)
Full-time Permanent Faculty						
A. Average weekly contact hours: 18 (15)						
B. Percentage who teach extra hours for extra pay at their own two-year college: 74% (65%)						
C. Percentage teaching 1-3 extra hours for extra pay: 38% (47%)						
D. Percentage teaching 4-6 extra hours for extra pay: 39% (39%)						
E. Percentage teaching 7 or more extra hours for extra pay: 23% (14%)						
Part-time Faculty						
F. Percentage who teach 6 or more hours weekly: 64% (54%)						
G. Percentage of two-year colleges requiring part-time faculty to hold office hours: 29% (28%)						

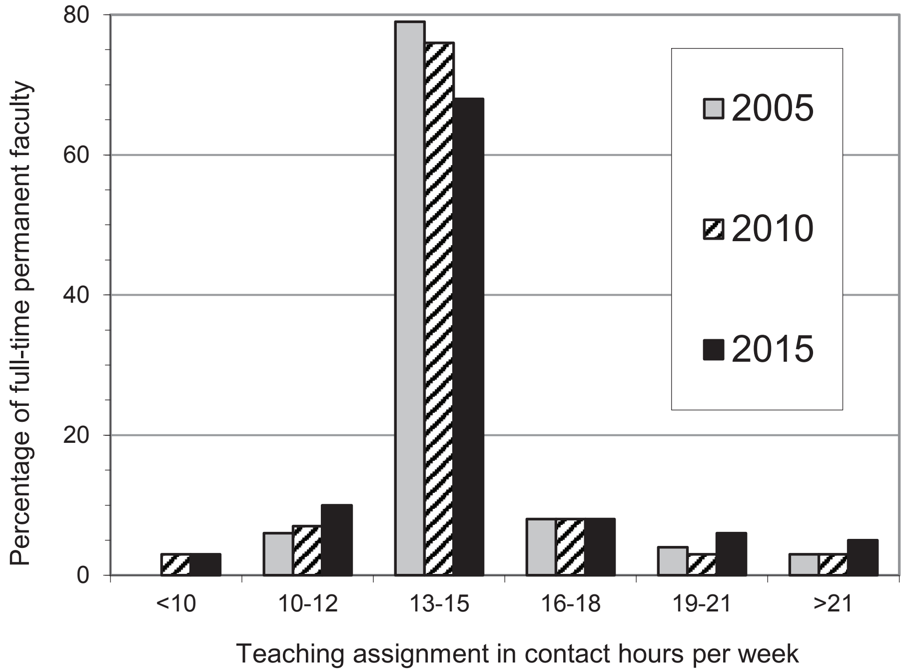

FIGURE TYF.2.1 Percentage of full-time permanent faculty with various teaching assignments in mathematics programs at two-year colleges in fall 2005, 2010, and 2015.

21 hours. Thirteen percent (13%) had teaching assignments less than 13 weekly contact hours.

Sixth-four percent (64%; 2 SEs) of part-time faculty members in two-year college mathematics programs taught six credit hours or more, up ten percentage points from 2010. Office hours were required of part-time faculty in 29% (6 SEs) of two-year colleges, up one point from 2010. See Table TYF.2.

Table TYF.2 also shows that 74% (3 SEs) of full-time permanent mathematics faculty members at two-year colleges taught extra hours for extra pay at their own colleges, compared to 65% in 2010. Of those faculty who taught for extra pay in 2015, 38% (3 SEs) of full-time permanent faculty taught 1-3 hours for extra pay, 39% (2 SEs) taught 4-6 hours, and 23% (2 SEs) taught 7 or more extra hours for extra pay. Full-time permanent faculty teaching 7 or more extra hours increased by nine points to 23% (2 SEs) from 2010 to 2015.

Outflow of full-time permanent mathematics faculty and other occupations of part-time faculty

Data about outflow of permanent faculty was collected in detail prior to CBMS2010, including specific information about faculty deaths, faculty retiring, faculty taking positions at four-year institutions, other two-year institutions, high schools, or graduate school. Because this detailed information is difficult to obtain, CBMS2015 and CBMS2010 collected only the total number of outflow of faculty. In 2015, six hundred twelve (612; SE 132) full-time permanent faculty were no longer a part of the faculty in 2015-2016, compared to 459 persons in 2010-2011. The authors acknowledge that this data is difficult to

TABLE TYF.3 Number of full-time permanent faculty in 2014-2015 who were no longer part of the faculty in 2015-2016.

Number no longer part of 2015-2016 faculty	612
Total full-time permanent faculty, fall 2015	8314

collect and may not represent a true picture in the change in faculty numbers over time.

Information about the percentage of part-time faculty in mathematics programs at two-year college with various other occupations was collected in CBMS surveys prior to 2010. CBMS2015 and CBMS2010 did not collect information about other occupations of part-time faculty.

Educational Credentials of Faculty in Mathematics Programs

Highest degree of full-time permanent faculty

In fall 2015, a masters degree was the terminal degree for 80% (3 SEs) of full-time permanent mathematics faculty at two-year colleges, down three points from 2010. The percentage of faculty with a doctorate

TABLE TYF.4 Percentage of full-time permanent faculty in mathematics programs at two-year colleges by highest degree in fall 1995, 2000, 2005, 2010, and 2015.

	Percentage of full-time permanent faculty				
Highest degree	1995	2000	2005	2010	2015
Doctorate	17	16	16	14	15
Masters	82	81	82	83	80
Bachelors	1	3	2	3	5
	100%	100%	100%	100%	100%
Number of full-time permanent faculty	7578	6960	8793	9790	8314

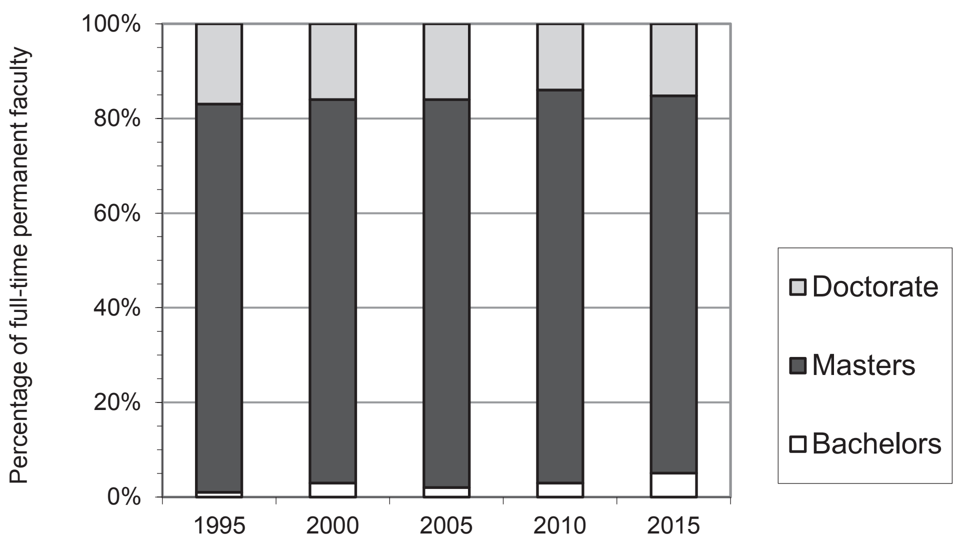

FIGURE TYE.4.1 Percentage of full-time permanent faculty in mathematics programs at two-year colleges by highest degree in fall 1995, 2000, 2005, 2010, and 2015.

TABLE TYF.5 Percentage of full-time permanent faculty in mathematics programs at public two-year colleges by field and highest degree in fall 2015.

	Percentage having as highest degree			
Field of degree	Doctorate	Masters	Bachelors	Total Percent in Field
Mathematics	9	60	4	73
Statistics	2	3	0	5
Mathematics Education	2	11	0	13
Other fields	2	6	0	9
Total Percentage by highest degree	15	80	5	100

Note: 0 means less than half of 1% and round-off may make column sums seem inaccurate.

increased one point to 15% (2 SEs) in 2015. The percentage of full-time faculty whose terminal degree was a bachelors degree increased two points to 5% (3 SEs) in 2015. Tables TYF.4 and TYF.4.1 present historical data from 1995 to 2015. Data regarding the previous employment and degrees of new hires in fall 2015 can be found in Tables TYF.18 and TYF.19, along with additional discussion there.

The academic major and highest degree of full-time permanent two-year college mathematics faculty is shown in Table TYF.5. The percentage of the faculty whose most advanced degree (doctorate, masters and bachelors) was in mathematics was 73% (2 SEs), compared to 68% in 2010 data. The percentage of the faculty whose most advanced degree was in mathematics education decreased eight points to 13% (2 SEs). The percentage of degrees with majors in statistics increased two points to 5% (1 SE).

Highest degree of part-time faculty

Tables TYF.6, TYF.6.1, and TYF.7 summarize data on the highest degrees held by part-time faculty members and their fields of specialization. In fall 2015, a doctoral degree was the highest degree held by 7% (1 SE) of part-time faculty, up two points from fall 2010. A masters degree was the highest degree for 76% (3 SEs) of part-time faculty, compared to 73% in 2010. A bachelors degree was the highest degree for 17% (2 SEs) of part-time faculty in 2015, a decrease of five points from 2010 and 2005.

In 2015, the percentage of part-time faculty whose most advanced degree had mathematics or mathe-

TABLE TYF.6 Percentage of part-time faculty in mathematics programs at two-year colleges (including those paid by a third party, as in dual-enrollment courses) by highest degree in fall 1995, 2000, 2005, 2010, and 2015.

	Percentage of part-time faculty				
Highest degree	1995	2000	2005	2010	2015
Doctorate	7	6	6	5	7
Masters	76	70	72	73	76
Bachelors	18	24	22	22	17
Total	100%	100%	100%	100%	100%
Number of part-time faculty	14266	14887	20142	25775	20247

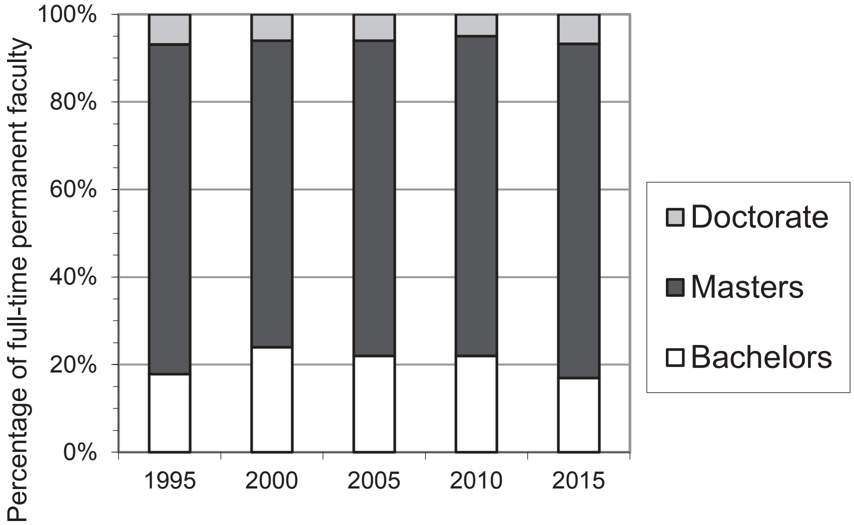

FIGURE TYF.6.1 Percentage of part-time faculty in mathematics programs at two-year colleges (including those paid by a third party, as in dual-enrollment courses) by highest degree in fall 1995, 2000, 2005, 2010, and 2015.

TABLE TYF.7 Percentage of part-time faculty in mathematics programs at two-year colleges (including those paid by a third party, as in dual enrollments) by field and highest degree in fall 2015, with 2010 data in parentheses.

	Percentage having as highest degree			
Field of degree	Doctorate	Masters	Bachelors	Total Percent in Field
Mathematics	4	45	8	58
Mathematics Education	1	16	3	19
Statistics	0	3	0	3
Other fields	2	12	6	19
Total Percentage by highest degree	7	76	17	100%
	(5)	(73)	(22)	

Note: 0 means less than half of 1% and round-off may make column sums seem inaccurate.

TABLE TYF.8 Number and percentage of total full-time permanent faculty in mathematics programs at two-year colleges by gender in fall 2000, 2005, 2010, and 2015.

	2000	2005	2010	2015
Men	3537	4420	4866	3969
	51%	50%	50%	48%
Women	3423	4373	4924	4345
	49%	50%	50%	52%
Total	6960	8793	9790	8314
	100%	100%	100%	100%

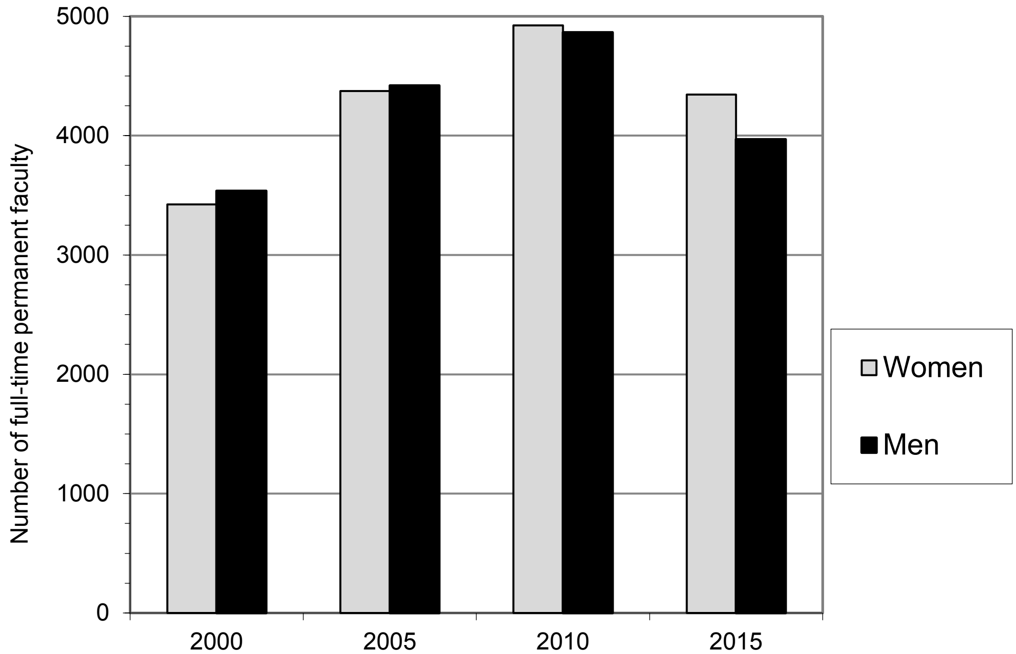

FIGURE TYF.8.1 Number of full-time permanent faculty in mathematics programs at two-year colleges by gender in fall 2000, 2005, 2010, and 2015.

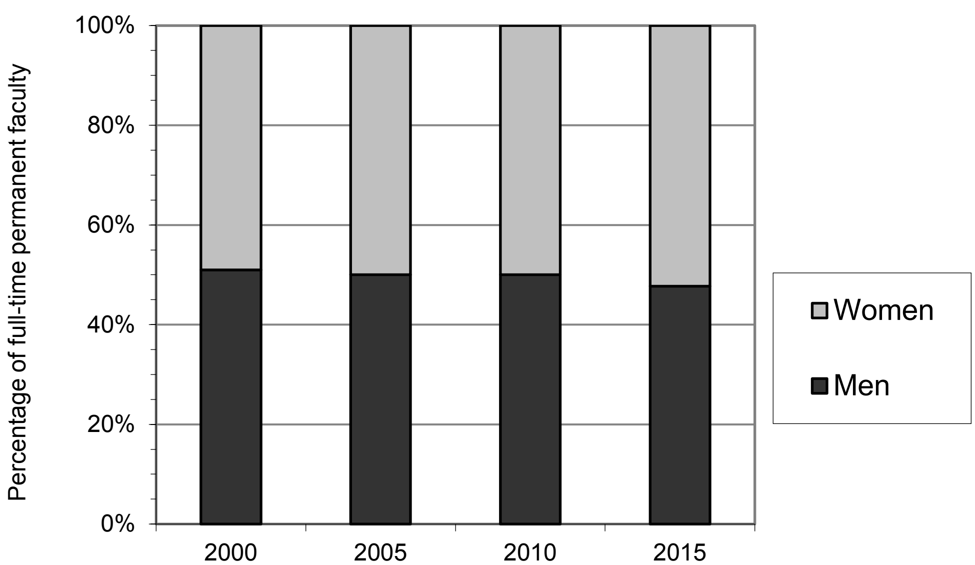

FIGURE TYF.8.2 Percentage of full-time permanent faculty in mathematics programs at two-year colleges by gender in fall 2000, 2005, 2010, and 2015.

matics education as the major field of study 77% (58%, 4 SEs and 19%, 2 SEs, respectively), compared to the combined total of 74% in 2010. Three percent (3%; 1 SE) of part-time faculty held degrees in statistics, up one point from 2010. A five-point decrease to 19% (3 SEs) was reported in "other fields." See Table TYF.7.

Gender, Ethnic Composition, and Age of Full-time Permanent Mathematics Program Faculty

Gender of full-time permanent faculty and part-time faculty

An increase in the percentage of women among full-time permanent mathematics faculty at two-year colleges has been reported in every CBMS study since 1975. This trend continued in fall 2015 with 52% (2 SEs) of full-time permanent faculty reported as women. In fall 2005 and 2010, the number was fifty percent (50%; 2 SEs). See Tables TYF.8 and TYF.8.1.

Table TYF.9 reports that in fall 2015 the percentage of women among part-time faculty was 53% (2 SEs). This was up from 49% in fall 2010. The percentage of women mathematics masters degree recipients among U.S. citizens/resident aliens was 36% in 2014-2015, compared with 41% in 2008-2009.

Table TYF.17 presents the percentage of full-time faculty in mathematics by age and gender and the percentage of women by age. Table TYF.20 presents data on the gender and ethnicity of newly hired full-time permanent mathematics faculty in fall 2015 and 2010. In fall 2015, the percentage of women in this group was 55% (7 SEs), up seven points from 2010. See the discussion before TYF.17 and TYF.20.

Ethnicity among full-time permanent and part-time faculty

Demographics data about ethnic minority faculty among full-time permanent mathematics faculty members at two-year colleges are given in Tables TYF.10, TYF.10.1, TYF.11, TYF.12, and TYF.13. The minority groups referenced in the survey are listed in TYF.11. Tables TYF.10 and TYF.11 provide an historical perspective, while Tables TYF.12 and TYF.13 present more detailed information on the ethnic profile of the full-time permanent mathematics faculty in fall 2015, including information about both age and gender. Tables TYF.14 and TYF.15 present data on ethnicity of part-time faculty.

In fall 2015, ethnic minority faculty constituted 23% (2 SEs) of the full-time permanent faculty and 1876 (SE 289) faculty. In fall 2010, 1566 full-time permanent ethnic minority faculty comprised 16% of total mathematics faculty. In 2015, the change in the number of minority faculty was 310 more persons. See Table TYF.10 and TYF.10.1.

The relative percentage of the full-time permanent minority faculty within individual ethnic groups changed slightly between 2010 and 2015. The percentage of Black (non-Hispanic) faculty remained the same (6%; 1 SE). The percentage of Mexican American/Puerto Rican/other Hispanic faculty was 6% (1 SE), up two points from 2010. Asian/Pacific Islanders represented the largest ethnic minority

TABLE TYF.9 Percentage of full-time permanent faculty and part-time faculty in mathematics programs at public two-year colleges by gender in fall 2015. Also masters degrees in mathematics and statistics granted in the U.S. to citizens and resident aliens, by gender, in 2014-15. Part-time faculty paid by a third party are not included.

	Percentage of		
	Full-time permanent faculty	Part-time faculty	Masters degrees in mathematics & statistics granted in the U.S. in 2014-15 to citizens and resident aliens[1]
Men	48	47	64
Women	52	53	36
Total	100%	100%	100%
Total Number	8314	17888	3909

[1] Report Tables 323.40 and 323.50 from Digest of Education Statistics 2016, National Center for Education Statistics, https://nces.ed.gov/programs/digest/current_tables.asp.

TABLE TYF.10 Percentage and number of ethnic minority full-time permanent faculty in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

	2000	2005	2010	2015
Percentage of ethnic minorities among full-time permanent faculty	13%	14%	16%	23%
Number of full-time permanent ethnic minority faculty	909	1198	1566	1876
Number of full-time permanent faculty	6960	8793	9790	8314

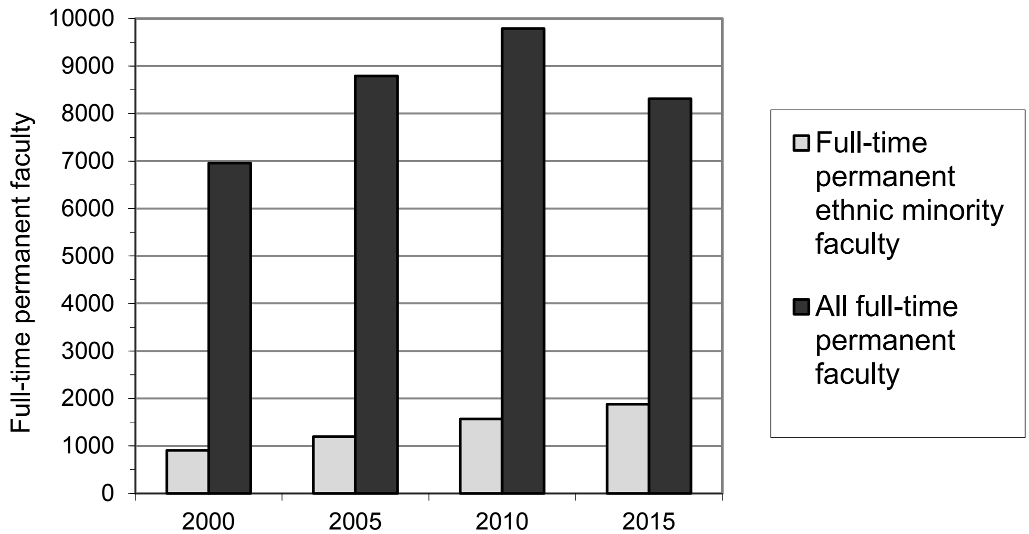

FIGURE TYF.10.1 Number of ethnic minority full-time permanent faculty and number of all full-time permanent faculty in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

TABLE TYF.11 Percentage of full-time permanent faculty in mathematics programs at two-year colleges by ethnicity, in fall 2000, 2005, 2010, and 2015.

	Percentage of full-time permanent faculty			
Ethnic Group	2000	2005	2010	2015
American Indian/Eskimo/Aleut	1	0	0	0
Asian/Pacific Islander	4	6	6	9
Black (non-Hispanic)	5	5	6	6
Mexican American/Puerto Rican/ other Hispanic	3	3	4	6
White (non-Hispanic)	85	84	79	75
Status unknown	2	2	5	3
	100%	100%	100%	100%
Number of full-time permanent faculty	6960	8793	9790	8314

Note: 0 means less than half of 1%.

TABLE TYF.12 Number and percentage of full-time permanent faculty in mathematics programs at two-year colleges by ethnic group and percentage of women within each ethnic group in fall 2015.

Ethnic Group	Number of full-time permanent faculty	Percentage of ethnic group in full-time permanent faculty	Percentage of women in ethnic group
American Indian, Alaskan Native	27	0	24
Asian/Pacific Islander	734	7	36
Black or African American (non-Hispanic)	521	5	52
Mexican American, Puerto Rican or other Hispanic	595	6	37
White (non-Hispanic)	6141	58	54
Status not known or other	297	3	44
Total	8314	100%	52

Note: 0 means less than half of 1%.

TABLE TYF.13 Percentage of full-time permanent faculty and of full-time permanent faculty under age 40 in mathematics programs at public two-year colleges by ethnic group in fall 2015. Also U.S. Masters degrees in mathematics and statistics granted in the U.S. to citizens and resident aliens by ethnic group in 2014-15.

	Percentage among		
Ethnic Group	All full-time permanent faculty	Full-time permanent faculty under age 40	Masters degrees in mathematics & statistics granted in the U.S. in 2014-15 to citizens and resident aliens[1]
Ethnic Minorities	23	26	29
White (non-Hispanic)	74	72	71
Unknown	4	2	
Total	100%	100%	100%
Number	8314	2045	3909

[1] Table 323.30 from Digest of Education Statistics 2016, https://nces.ed.gov/programs/digest/d16/tables/dt16_323.30.asp?current=yes. (These figures include resident aliens but do not include a total of 3680 nonresident aliens who also received masters degrees.)

TABLE TYF.14 Percentage of ethnic minority part-time faculty in mathematics programs at public two-year colleges in fall 2005, 2010, and 2015.

	2005	2010	2015
Percentage of ethnic minorities among part-time faculty	16	17	22
Number of part-time faculty	18227	23453	17888

groups in fall 2015 at 9% (1 SE) of full-time permanent faculty, up three points from 2010. These changes impacted the percentage of White (non-Hispanic) full-time permanent faculty in 2015, down four points from 2010 to 75% (2 SEs). See Table TYF.11.

Table TYF.12 gives the number of full-time permanent faculty and the percentage of women within ethnic groups. The largest percentage of women within a group occurred in White (non-Hispanic) with 54% (3 SEs) of the 6141 (SE 598) faculty in that group or 3316 women. Next, the Black or African American group of 521 (SE 80) faculty had 271 women (52%; 8 SEs). The female Asian/Pacific Islander and Native Hawaiian faculty were 36% (7 SEs) of the 734 (SE 111) faculty in that group or 264 women. Native Americans (American Indians/Eskimo/Aleut) faculty, recorded as zero in the table (0.3%), represented a total of 27 (SE 10) faculty of whom 6 were women. A

TABLE TYF.15 Number and percentage of part-time faculty in mathematics programs at public two-year colleges by ethnic group and percentage of women within each ethnic group in fall 2015.

		Percentage of	
Ethnic Group	Number of part-time faculty	Ethnic group among all part-time faculty	Women within ethnic group
American Indian, Alaskan Native	46	0	80
Asian/Pacific Islander	1341	7	49
Black or African American (non-Hispanic)	1009	6	41
Mexican American,Puerto Rican or other Hispanic	1073	6	42
White (non-Hispanic)	12531	70	55
Status not known or other	1888	11	59
Total	17888	100%	53

TABLE TYF.16 Percentage and number of full-time permanent faculty in mathematics programs at two-year colleges by age in fall 2000, 2005, 2010, and 2015.

	Percentage of full-time permanent faculty				Number of full-time permanent faculty			
Age	2000	2005	2010	2015	2000	2005	2010	2015
<30	4	5	8	4	290	478	832	363
30-34	9	8	9	6	615	716	893	529
35-39	13	12	12	14	890	1037	1189	1153
40-44	11	13	14	14	763	1163	1416	1159
45-49	15	15	15	18	1075	1298	1475	1479
50-54	20	18	11	16	1418	1574	1085	1357
55-59	16	17	13	13	1146	1528	1268	1055
>59	11	11	17	15	763	999	1631	1219
Total	100%	100%	100%	100%	6960	8793	9790	8314

Note: Rounding may make column totals seem inaccurate.

word of caution is in order given that respondents to CBMS2015 reported the ethnicity of 297 (SE 81) full-time permanent faculty was unknown.

In fall 2015, the total number of full-time permanent faculty under the age of 40 was 2045 (SE 292), compared to a total of 3244 in 2010, a 37% (4 SEs) decrease. These faculty under the age of 40 comprised 25% of all full-time permanent faculty, compared to 33% in 2010.In fall 2015, the percentage of ethnic minority full-time permanent mathematics faculty under the age of 40 rose to 26% (3 SEs). Percentages can be misleading. The 18% of ethnic minority faculty under age 40 reported in 2010 represented 584 persons and the 26% in 2015 was 532 faculty. See Table TYF.13. Data on ethnicity of newly-hired full-time permanent faculty in fall 2015 are presented in Table TYF.20.

In fall 2015, twenty-two percent (22%; 2 SEs) of part-time faculty members or 3935 persons were ethnic minorities (Asian/Pacific Islander, Black or African American, Mexican American, Puerto Rican, or other Hispanic), up three percentage points from 2010 and up four points compared with 2005. Asian/Pacific Islanders comprised 7% (1 SE) of part-time faculty (1341 persons) and Black or African American and Mexican American, Puerto Rican or other Hispanic

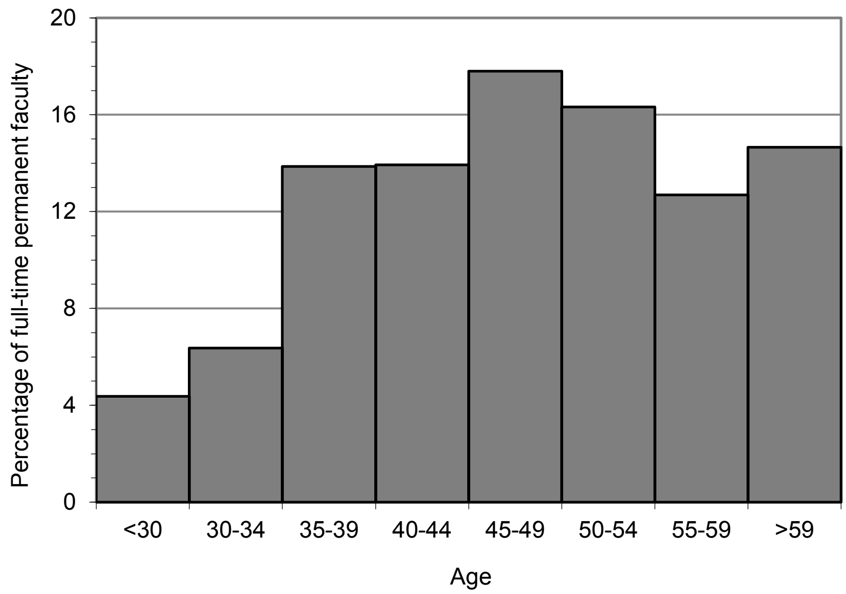

FIGURE TYF.16.1 Percentage distribution of full-time permanent faculty in mathematics programs at public two-year colleges by age in fall 2015.

TABLE TYF.17 Percentage of full-time permanent faculty in mathematics programs at public two-year colleges by age and by gender and percentage of women by age in fall 2015.

	Percentage of full-time permanent faculty		Percentage of women in age group
Age	Women	Men	
<35	6	5	56
35-44	14	14	50
45-54	19	14	58
>54	13	15	46
Total	52	48	

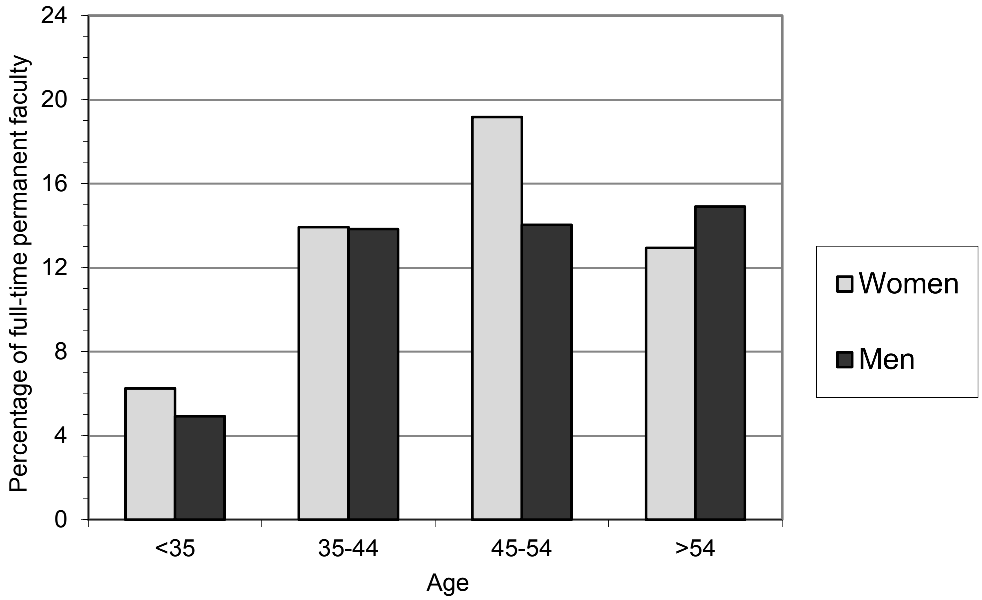

FIGURE TYF.17.1 Percentage of full-time permanent faculty in mathematics programs at public two-year colleges by age and by gender in fall 2015.

TABLE TYF.18 Percentage of newly appointed full-time permanent faculty in mathematics programs at two-year colleges coming from various sources in fall 2010 and 2015.

Percentage of new faculty from:	2010	2015
A. Graduate School	23	37
B. Teaching in a four-year college or university	3	4
C. Teaching in another two-year college	18	19
D. Teaching in a secondary school	25	1
E. Part-time or full-time temporary employment at the same college	23	26
F. Nonacademic employment	1	1
G. Unemployed	0	4
F. Unknown	6	9
Total	100%	100%
Total Number Hired	777	451

together represented 6% each (1 SE) of all part-time faculty (2082 persons). Women comprised 53% (2 SEs) of all part-time faculty. See Tables TYF.14 and TYF.15.

Number and age distribution of full-time permanent faculty

As mentioned above, the number of full-time permanent faculty in mathematics programs at two-year colleges decreased by 15% in 2015 to a total of 8314, compared to 9790 faculty in 2010. When the 1487 continuing and other full-time faculty are included, the total was 9800 persons and represented a decrease of 10% compared to 2010. See Table TYF.1.

During the fifteen-year period (1990 to 2005), the two-year college mathematics faculty, as a cohort, was getting older and reached an average age of 47.8

TABLE TYF.19 Percentage of full-time permanent faculty newly hired for mathematics programs at two-year colleges by highest degree in fall 2010 and 2015.

	Percentage of New Hires	
Highest Degree	2010-2011	2015-2016
Doctorate	11	9
Masters	82	87
Bachelors	2	0
Unknown	4	4
Total	100%	100%

Note: 0 means less than one-half of one percent and round-off may make column totals seem inaccurate.

TABLE TYF.20 Percentage of full-time permanent faculty newly hired for mathematics programs at two-year colleges by ethnic group in fall 2010 and 2015. Also percentage of women within each ethnic group in fall 2015.

	Percentage of new hires		Percentage of women in ethnic group for 2015-2016 new hires
Ethnic Group	2010-2011	2015-2016	
American Indian	0	0	na
Asian/Pacific Islander	9	4	11
Black or Arican American (non-Hispanic)	5	2	54
Mexican American, Puerto Rican, or other Hispanic	4	3	33
White (non-Hispanic)	78	82	63
Other	1	3	33
Unknown	3	5	0
Percentage of women among all new hires	47	55	

Note: 0 means less than one-half of one percent and round-off may make column totals seem inaccurate.

na = Not applicable

years. In fall 2010, a decrease was noted with the average faculty age of 46.8 years. Fall 2015 data showed a slight increase of the average age to 47.7 (SE 0.5) years. Of particular interest and due to possible influence of sample error, the percentage of full-time faculty over the age of 59 rose from 11% (999 persons) in 2005 to 17% (1631 persons) in 2010 and then down 15% (1 SE) in 2015 (1219 persons; SE 153). See Table S.16 in Chapter 1 for data on age of mathematics faculty in both two-year and four-year institutions and Table TYF.16 for specific age groups and historical data for two-year colleges.

In 2015, the percentage of full-time permanent faculty under age 40 years dropped seven points to 25% compared to 2010, similar the 25% collected in 2005. Again, percentages do not tell the entire story. The number of full-time permanent faculty under the age of 40 in 2015, 2010, and 2005 was 2045, 2914, and 2231, respectively. Among ethnic minority faculty, 26% (3 SEs; 532 persons) were under age 40 in fall 2015, as reported in Table TYF.13. The percentage of full-time permanent faculty between the ages of 50-59 years increased five points to 29% in 2015 (total increase of 59 persons), compared to 2010. The percentage of full-time faculty over age 59 was down two points from 2010 to 15% (1 SE) in 2015 (a decrease of 412 persons). The total number of full-time permanent faculty over the age of 49 decreased by 353 persons from 2010 to 2015. See Table TYF.16.

In 2015, women were a majority with 56% (2 SEs) in the age group less than 35 years, down one point from 2010. Fifty-eight percent (58%; 2 SEs) of the age group 45-54 were women, up 10 points from 2010. Forty-six percent (46%; 2 SEs) of the age group over age 54 were women, down one point from 2010. See Table TYF.17 and TYF.17.1.

Demographics of Full-time Permanent Faculty Newly Hired by Mathematics Programs

Two-year college mathematics programs hired 451 (SE 83) new full-time permanent faculty members in fall 2015, down 326 persons and 42% (4 SEs) from those hired in 2010. See Table TYF.18.

Fall 2015 and earlier surveys presented sources of new hires at two-year colleges. In 2005 and 2010, graduate school as a source remained steady at 23%. In fall 2015, that percentage increased to 37% (7 SEs) in 2015 (166 persons). In contrast, the percentage of new hires who had been teaching at four-year institutions was 4% (2 SEs) in 2015 (18 persons), compared to 3% in 2010 and 18% in 2005. Hiring from among part-time faculty at the same institution was up three points to 26% (6 SEs; 116 persons), while new faculty hired from a secondary school decreased to 1% (1 SE; 4 persons) of total new hires, down 24 points from 2010. See Table TYF.18.

The masters degree was held by 87% (4 SEs) of newly-hired full-time permanent faculty in fall 2015, up five points from 2010, and in contrast to 2000 when the percentage was 66%. Percentage of new faculty with a doctorate degree in 2015 was 9% (3 SEs), compared with 11% in 2010. See Table TYF.19.

The 2000, 2005, 2010, and 2015 data indicate a decrease of new hires with a bachelors degree from 19% to 5% to 2% to 0% (less than one percent and/or round-off may make 0% totals inaccurate), respectively.

In 2015, fifty-five percent (55%; 7 SEs) of new mathematics faculty hires were women, compared to 47% in fall 2010. Table TYF.20 shows White (non-Hispanic) faculty comprised 82% (5 SEs) of new hires for 2015, up 4 points from 2010. Overall, 9% of the 451

TABLE TYF.21 Percentage of two-year colleges that require periodic teaching evaluations for all full-time or all part-time faculty in fall 2010 and 2015.

	Percentage of two-year colleges in fall 2010	Percentage of two-year colleges in fall 2015
Colleges that require teaching evaluations for all full-time faculty	96	100
Colleges that require teaching evaluations for all part-time faculty	88	98

TABLE TYF.22 Percentage of mathematics programs at public two-year colleges using various methods of evaluating teaching of part-time and full-time faculty in fall 2015.

	Percentage of programs using evaluation method for	
Method of evaluating teaching	Part-time faculty	Full-time faculty
A. Observation of classes by other faculty	64	75
B. Observation of classes by division head (if different from chair) or other administrator	62	45
C. Evaluation forms completed by students	94	95
D. Evaluation of written course material such as lesson plans, syllabus, or exams	57	53
E. Self-evaluation such as teaching portfolios	62	23
F. Written Peer Evaluations	34	21
G. Other methods	18	9

TABLE TYF.23 Percentage of two-year colleges that require some form of continuing education or professional development for full-time permanent faculty, and percentage of faculty using various methods to fulfill those requirements, in mathematics programs at two-year colleges in fall 2010 and 2015.

Faculty Development	Fall 2010	Fall 2015
Percentage of institutions requiring continuing education or professional development for full-time permanent faculty	67	82
How Faculty Meet Professional Development Requirements	Percentage of permanent faculty in fall 2010	Percentage of permanent faculty in fall 2015
A. Activities provided by employer	53	62
B. Activities provided by professional associations	34	33
C. Publishing books or research or expository papers	3	3
D. Continuing graduate education	4	3

TABLE TYF.24 Percentage of program heads classifying various problems as "major" in mathematics programs at two-year colleges in fall 2000, 2005, 2010, and 2015.

	Percentage of program heads classifying problem as major			
Problem	2000	2005	2010	2015
A. Maintaining vitality of faculty	9	2	4	7
B. Dual-enrollment courses	8	5	11	7
C. Staffing statistics courses	2	3	2	5
D. Students don't understand demands of college work	na	55	64	62
E. Need to use part-time faculty for too many courses	39	30	35	15
F. Faculty salaries too low	36	22	21	39
G. Class sizes too large	10	5	3	5
H. Low student motivation	47	50	50	57
I. Too many students needing remediation	62	63	67	64
J. Lack of student progress from developmental to advanced courses	na	34	37	36
K. Low success rate in transfer-level courses	8	7	13	14
L. Too few students who intend to transfer actually do	2	4	11	8
M. Inadequate travel funds for faculty	15	22	23	25
N. Inadequate classroom facilities for use of technology	na	12	10	4
O. Inadequate computer facilities for part-time faculty use	na	9	6	7
P. Inadequate computer facilities for student services	3	1	5	6
Q. Heavy classroom duties prevent personal & teaching enrichment by faculty	na	14	11	13
R. Coordinating mathematics courses with high schools	6	7	14	21
S. Lack of curricular flexibility because of transfer rules	1	7	5	2
T. Other barriers than inhibit curricular changes[1]	na	na	na	7
U. Maintaining high and consistent expectations across sections[1]	na	na	na	8
V. High cost of textbooks[1]	na	na	na	54
W. Lack of flexibility in curricular redesign[1]	na	na	na	4
X. Maintaining common standards between distance learning and related courses[1]	na	na	na	2
Y. Use of distance education[1]	10	6	6	4

Note: 0 means less than one-half of one percent.

[1]Data not collected before 2015.

TABLE TYF.25 Percentage of program heads of mathematics programs at public two-year colleges classifying various problems by severity in fall 2015.

	Percentage of program heads classifying problems as		
Problem	minor or no problem	somewhat of a problem	major problem
A. Maintaining vitality of faculty	60	33	7
B. Dual-enrollment courses	57	36	7
C. Staffing statistics courses	63	31	5
D. Students don't understand demands of college work	7	31	62
E. Need to use part-time faculty for too many courses	47	38	15
F. Faculty salaries too low	22	39	39
G. Class sizes too large	70	24	5
H. Low student motivation	9	34	57
I. Too many students needing remediation	2	33	64
J. Lack of student progress from developmental to advanced courses	15	48	36
K. Low success rate in transfer-level courses	32	54	14
L. Too few students who intend to transfer actually do	47	45	8
M. Inadequate travel funds for faculty	44	31	25
N. Inadequate classroom facilities for use of technology	70	26	4
O. Inadequate computer facilities for part-time faculty use	63	31	7
P. Inadequate computer facilities for student services	70	24	6
Q. Heavy classroom duties prevent personal & teaching enrichment by faculty	43	43	13
R. Coordinating mathematics courses with high schools	28	52	21
S. Lack of curricular flexibility because of transfer rules	52	46	2
T. Other barriers than inhibit curricul changes	61	32	7
U. Maintaining high and consistent expectations across sections	48	44	8
V. High cost of textbooks	11	35	54
W. Lack of flexibility in curricular redesign	55	41	4
X. Maintaining common standards between distance learning and related courses	57	41	2
Y. Use of distance education	53	43	4

Note: 0 means less than one-half of 1%.

new hires in 2015 were ethnic minorities (41 persons), down nine points from 2010. New hires for Asian/ Pacific Islander, Mexican American, Puerto Rican or other Hispanic and the group “others,” tended to be males. Information about age of new hires was not collected in CBMS2015 and CBMS2010.

Teaching Evaluations and Professional Development of Mathematics Program Faculty and Concerns and Issues in Mathematics Programs

In fall 2015, one hundred percent (100%; 0 SE) of two-year colleges responding to the survey required periodic evaluation of the teaching of full-time permanent mathematics faculty members, compared with 96% in 2010. Periodic teaching evaluation was required for part-time faculty at 98% (1 SE) of colleges, compared to 88% reported in 2010. See Table TYF.21.

Regarding methods of evaluating teaching, the percentage of colleges using classroom observation by other faculty (not administrators) increased eleven points to 75% (5 SEs) for full-time faculty and down five points in 2015 to 64% (5 SEs) for part-time faculty. The percentage of colleges that used classroom visitation by a division or department chair or other administrator as a component of full-time faculty evaluation was 45% (5 SEs), down ten points compared to 2010. In contrast, an increase of twenty percentage points to 62% (6 SEs) was reported in administrators observing part-time faculty in 2015. See Table TYF.22.

In 2015, 2010 and 2005, the most common method of evaluating full- and part-time teaching was the use of evaluation instruments completed by students. Student evaluations were used for full-time faculty in 95% (3 SEs) of reporting colleges and 94% (3 SEs) of colleges for part-time faculty in 2015. Self-evaluation, such as teaching portfolios, were used as a component of the evaluation of full-time faculty by 23% (4 SEs) of colleges in 2015, down twenty-nine points from 2010. In contrast, 62% (6 SEs) of responding colleges in 2015 used self-evaluation, such as teaching portfolios, for part-time faculty, compared to 19% in 2010.

For full-time faculty, evaluation of written materials, such as lesson plans, syllabi or course examinations, dipped to 53% (7 SEs) in 2015 from 58% in 2010. The use of such written materials for part-time faculty evaluation rose four points from 2015 to 57% (6 SEs) in 2015. In 2015, written peer evaluations, as a method of evaluating teaching, occurred in 21% (5 SEs) of colleges (down six points from 2010) reporting this method for full-time faculty and 34% (5 SEs; up 23 points from 2010) for part-time faculty. See Table TYF.22.

Professional development obligations and activities of full-time permanent faculty

In fall 2015, some form of continuing education or professional development was required of full-time permanent faculty members at 82% (4 SEs) of two-year colleges, up 15% from 2010. This represents a 20-year long increase in required professional development for full-time permanent faculty. Sixty-two percent (62%; 2 SEs) of the full-time permanent faculty met part of their professional development obligation through activities provided by their own colleges in 2015, compared to 53% in 2010. A slight decrease of one percentage point showed 33% (2 SEs) of permanent faculty met professional development requirements provided by professional societies. See Table TYF.23.

Concerns and issues in mathematics programs

Obtaining travel funds for faculty professional development has historically been a department concern. Lack of or reduced funds available for faculty professional travel and other professional development activities continued to challenge mathematics departments in 2015. The concern about the level of travel funding for mathematics faculty by program heads was a “major concern” in 25% (4 SEs) of reporting colleges and “somewhat of a problem” by 31% (3 SEs) of reporting colleges, both increased from 2010. See Tables TYF.24 and TYF.25.

In every CBMS survey since 1985, sixty percent or more of mathematics program heads classified “too many students needing remediation” as a “major” problem for their programs. In fall 2015, this figure was 64% (5 SEs). In fall 2010, this figure was 67%. This was the number one major problem in 2015, 2010, 2005, 2000 and 1995. See Tables TYF.24 and TYF.25.

In 2005, a new category, “students’ lack of understanding of the demands of college work,” was introduced. This ranked second in the list of major problems in 2015, 2010 and 2005, reported by 62% (5 SEs), 64% and 55% respectively of mathematics program heads. “Low student motivation” ranked third in 2015 and 2010 (50%), as reported by 57% (8 SEs) of mathematics program heads. Other notable major problems in 2015 were “high cost of textbooks” (54%; 4 SEs) and “lack of student progress from developmental to advanced courses” (36%; 6 SEs). The “need to use too many part-time faculty” decreased as a major problem by twenty points to 15% (3 SEs) in 2015. See Tables TYF.24 and TYF.25.

When considering issues reported as “somewhat of a problem,” the top three items and their percentages were “low success rate in transfer-level courses” (54%; 5 SEs), “coordinating mathematics courses with high schools” (52%; 4 SEs) and “lack of curricular flexibility because of transfer rules” (46%; 5 SEs).

Table TYF.25 includes additional data on the extent to which program heads thought items listed were a "major" problem, "somewhat" of a problem, or a "minor or no" problem.

Administration of Mathematics Programs

In 2015, fifty-two (52%; 5 SEs) reported that two-year college mathematics programs were administered within a mathematics departmental structure, up six points from 2010. A division structure, where mathematics is combined with science department was found in 28% (5 SEs) of colleges and another 10% of the college reported a mathematics and computer science department structure. Six percent (6%; 2 SEs) of mathematics programs were administered by other departments or division structures (down 25 points), leaving 4% unreported or unknown. See Table TYF.26.

Historically, mathematics courses at two-year colleges have been taught in different administrative units other than in mathematics programs/departments. The location of precollege (remedial) mathematics courses within a college's academic structure always has been of special interest. This practice continued in fall 2015, as shown in Table TYE.16 in Chapter 6. In fall 2015, about 32% (5 SEs) of colleges reported that some precollege mathematics courses were taught outside of the mathematics program. This was up three points from 2010 and up one point compared to 2005. Table TYE.16 in Chapter 6 reports specific courses percentages of two-year colleges administering mathematics course offering separately from the mathematics program: Arithmetic & Basic Math and Prealgebra (23%; 5 SEs), Elementary Algebra (22%; 5 SEs) and Intermediate Algebra (16%; 5 SEs), with nine percentage point increases in Elementary and Intermediate Algebra.

TABLE TYF.26 Percentage of mathematics programs at public two-year colleges by type of administrative structure on their own campus in fall 2010 and 2015.

	Percentage of Mathematics Programs	
Administrative structure	2010	2015
Mathematics Department	46	52
Mathematics and computer science[1]	na	10
Mathematics and science	14	28
Other department or division structure	31	6
None of the above or unknown	9	4

[1]Data not collected before 2015.

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Appendix I

Enrollments in Departmental Courses in Four-Year Colleges and Universities: 2000, 2005, 2010, 2015

TABLE A.1 Enrollment (in 1000s) in mathematics courses in fall 2000, 2005, 2010, and 2015 [with SE for 2005, 2010, and 2015 totals]. Roundoff may cause marginal totals to appear incorrect.

							Fall 2015 Enrollment (in 1000s)						
							Mathematics Departments						
							Total (Including Distance Courses)			Total (Non-Distance Courses)			
Courses	2000	2005	2005	2010 Total (including Distance Courses)	2010 Total (Non-Distance Courses)	2015 Total (including Distance Courses)	Univ (PhD)	Univ (MA)	Coll (BA)	Univ (PhD)	Univ (MA)	Coll (BA)	Subtotal
Precollege Level [2]	**218**	**201 [18.8]**	**201 [18.8]**	**209 [22.0]**	**201 [21.5]**	**253 [26.5]**	**80 [16.0]**	**48 [11.2]**	**125 [18.1]**	**77 [15.6]**	**47 [10.5]**	**121 [17.7]**	**244 [25.7]**
Introductory (Including Pre-Calc) Level													
6 College Algebra	211	201 [17.2]	201 [17.2]	251 [15.9]	243 [15.3]	261 [24.7]	88	57	116	84	54	112	251 [24.1]
7 Trigonometry	33	30 [3.5]	30 [3.5]	42 [5.2]	41 [5.0]	47 [7.4]	22	14	12	21	14	11	46 [7.1]
8 Coll Alg & Trig Combined	37	34 [6.8]	34 [6.8]	35 [7.6]	35 [7.4]	62 [15.6]	30	21	10	29	21	10	60 [15.1]
9 Elementary Functions [1]	105	93 [8.9]	93 [8.9]	114 [8.2]	112 [8.1]	128 [11.2]	58	25	46	56	25	44	125 [10.7]
10 Intro Math Modeling	13	8 [3.1]	8 [3.1]	9 [2.2]	9 [2.1]	12 [4.2]	7	2	3	6	2	3	12 [4.0]
11 Math for Liberal Arts	86	123 [11.7]	123 [11.7]	147 [14.4]	141 [13.8]	171 [21.9]	57	45	68	55	44	61	159 [19.5]
12 Finite Math	82	94 [16.1]	94 [16.1]	62 [6.7]	61 [6.6]	90 [11.1]	50	14	27	44	13	24	81 [10.2]
13 Business Math	53	38 [5.8]	38 [5.8]	47 [7.7]	46 [7.5]	48 [8.8]	16	18	14	15	16	13	45 [7.9]
14 Math Elem Sch Tchrs	68	72 [6.5]	72 [6.5]	85 [7.2]	80 [7.3]	73 [9.6]	16	23	34	16	23	33	72 [9.5]
15 Other Intro Level Math	36	12 [2.5]	12 [2.5]	69 [10.5]	66 [9.9]	108 [24.2]	64	7	37	62	7	34	103 [23.5]
Subtotal Introductory Level	**723**	**706 [29.0]**	**706 [29.0]**	**863 [35.0]**	**834 [33.8]**	**1000 [79.6]**	**408 [53.8]**	**226 [37.6]**	**365 [46.2]**	**390 [49.6]**	**218 [36.3]**	**346 [43.1]**	**954 [74.4]**

[1] Elementary Functions, Precalculus, and Analytic Geometry.

[2] Additional details on Precollege Level courses prior to 2010 are available in the *CBMS Survey Fall 2010* report available at www.ams.org/cbms-survey

TABLE A.1, Cont. Fall term mathematics course enrollment (in 1000s) [with SE for 2005, 2010, and 2015 totals].

						Fall 2015 Enrollment (in 1000s)						
						Mathematics Departments						
						Total (Including Distance Courses)			Total (Non-Distance Courses)			
Courses	2000	2005	2010 Total (including Distance)	2010 Total (Non-Distance)	2015 Total	Univ (PhD)	Univ (MA)	Coll (BA)	Univ (PhD)	Univ (MA)	Coll (BA)	Subtotal
Calculus Level												
16 Mainstream Calc I	192	201 [9.6]	235 [14.2]	234 [14.1]	261 [23.9]	140	58	63	134	58	63	255 [22.9]
17 Mainstream Calc II	87	85 [4.9]	129 [13.7]	128 [13.7]	129 [11.7]	79	21	29	76	21	29	125 [10.7]
18 Mainstream Calc III, IV	73	74 [4.0]	104 [6.2]	103 [6.2]	117 [10.6]	78	19	20	77	19	20	115 [10.9]
19 Non-Mainstream Calc I	105	108 [8.6]	99 [6.4]	99 [6.3]	94 [10.9]	59	18	18	57	17	17	91 [10.5]
20 Non-Mainstream Calc II	10	11 [2.0]										
20.5 Non-Mainstream Calc II, III, etc.			22 [3.3]	22 [3.3]	16 [4.3]	6	8	1	6	8	1	16 [4.3]
21a Diff Eq & Lin Alg (comb)	na	9 [2.2]	15 [2.6]	15 [2.6]	23 [3.4]	13	7	3	13	7	3	23 [3.4]
21b Differential Equations	34	36 [2.8]	56 [5.3]	56 [5.3]	61 [5.6]	41	9	10	41	9	10	60 [5.6]
22 Discrete Math	20	17 [1.9]	25 [3.7]	25 [3.7]	25 [3.0]	10	6	10	9	6	10	25 [3.0]
23 Linear/Matrix Algebra	41	37 [2.6]	46 [4.0]	45 [4.0]	55 [4.8]	34	8	12	34	8	12	54 [4.8]
21 Freshman seminar					5 [0.7]	3	0	2	3	0	2	5 [0.7]
24 Other Calculus Level	7	9 [2.7]	17 [3.1]	17 [3.1]	21 [6.0]	11	3	6	11	3	6	20 [6.0]
Subtotal Calculus Level	**570**	**586 [23.6]**	**748 [35.2]**	**743 [34.8]**	**807 [62.3]**	**474**	**157**	**176**	**460**	**156**	**174**	**790 [60.7]**

TABLE A.1, Cont. Fall term mathematics course enrollment (in 1000s) [with SE for 2005, 2010, and 2015 totals].

							Fall 2015 Enrollment (in 1000s)		
							Math Departments		
Courses	2000	2005	2010		2015		Univ (PhD)	Univ (MA)	Coll (BA)
Advanced Level									
25 Intro to Proofs	10	12 [1.3]	15	[1.2]	18	[1.4]	9	4	5
26-1 Modern Algebra I			13	[1]	13	[1.7]	5	2	6
26-2 Modern Algebra II			1	[0.1]	1	[0.2]	0	0	0
26 Modern Algebra I & II	11	11 [1.1]	14	-	14	[1.7]	6	2	6
27 Number Theory	4	3 [0.5]	4	[0.5]	4	[0.5]	2	1	1
28 Combinatorics	3	3 [0.5]	3	[0.5]	3	[0.8]	2	0	1
29 Actuarial Mathematics	1	2 [0.5]	2	[0.3]	6	[1.1]	5	1	0
30 Logic/Foundations	2	1 [0.4]	1	[0.2]	1	[0.4]	0	0	1
31 Discrete Structures	5	3 [0.7]	4	[0.9]	4	[0.8]	1	1	1
32 History of Mathematics	2	6 [1.0]	7	[1.4]	5	[0.9]	2	1	2
33 Geometry	6	8 [1.0]	10	[1]	8	[1.1]	4	1	4
34 Math for HS Teachers	7	8 [2.2]	8	[1]	8	[1.4]	2	3	2
35-1 Advanced Calculus I, Real Analysis I			16	[1.6]	15	[1.4]	7	3	5
35-2 Advanced Calculus II, Real Analysis II			2	[0.8]	1	[0.3]	1	0	0
35 Advanced Calculus I & II, Real Analysis I & II	10	15 [1.2]	18	-	17	[1.6]	8	3	5
36 Advanced Math for Engineering and Physical Sciences	5	6 [1.1]	11	[5.3]	6	[1.3]	4	1	1
37 Advanced Linear Algebra	3	4 [0.7]	4	[0.5]	7	[0.9]	6	1	0
38 Vector Analysis	2	2 [0.8]	3	[0.5]	4	[1.3]	4	0	0
39 Advanced Differential Equations	2	1 [0.2]	3	[0.6]	3	[0.6]	3	0	0
40 Partial Differential Equations	2	3 [0.5]	4	[0.5]	4	[1.0]	3	1	1
41 Numerical Analysis I & II	5	5 [0.5]	7	[1.1]	8	[0.8]	5	2	1

Note: 0 means less than 500 enrollments.

TABLE A.1, Cont. Fall term mathematics course enrollment (in 1000s) [with SE for 2005, 2010, and 2015 totals].

							Fall 2015 Enrollment (in 1000s)		
							Mathematics Departments		
Courses	2000	2005	2010		2015		Univ (PhD)	Univ (MA)	Coll (BA)
(Advanced Level Cont.)									
42 Applied Math (Modeling)	2	2 [0.3]	3	[0.5]	4	[0.7]	2	1	1
43 Complex Variables	3	3 [0.5]	3	[0.3]	3	[0.5]	2	0	1
44 Topology	2	1 [0.3]	2	[0.2]	2	[0.3]	1	0	0
45 Math of Finance	na	1 [0.4]	2	[0.4]	4	[1.1]	2	0	1
46 Codes & Cryptology	na	0 [0.2]	0	[0.1]	1	[0.3]	1	0	0
47 Biomathematics	na	1 [0.2]	1	[0.2]	1	[0.2]	0	0	0
48 Senior Sem / Ind Study in Math	3	3 [0.5]	5	[0.5]	6	[0.6]	1	1	3
49 Other Adv Level Courses	10	5 [0.7]	14	[3.8]	11	[2.6]	6	2	3
Operations Research									
58 Intro Oper Research	1	1 [0.2]							
59 Int to Linear Programming	1	1 [0.4]							
60 Other Oper Research	0	0 [0.2]							
61 Operations Research (all courses)			2	[0.4]	3	[1.2]	1	1	2
Subtotal Advanced Level	**102**	**112 [6.2]**	**150**	**[6.6]**	**154**	**[12.2]**	**81**	**30**	**43**
Mathematics Total	**1614**	**606 [45.3]**	**1971**	**[72.5]**	**2213**	**[139.7]**	**1043**	**461**	**709**

TABLE A.2. Enrollment (in 1000s) in statistics courses in fall 2000, 2005, 2010, and 2015 [with SE for 2005 and 2015 totals]. (SEs for 2010 Mathematics and Statistics department totals in CBMS2010, Table A.2 P. 189.) Roundoff may cause marginal totals to appear incorrect.

					Fall 2015 Enrollment (in 1000s)								Fall 2015 Enrollment (in 1000s)					
					Mathematics Departments								Statistics Departments					
					Total (Including Dist. Courses)				Total (Non-Dist. Courses)				Total (Inc. Dist. Courses)			Total (Non-Dist. Courses)		
Statistics Courses	2000	2005	Total 2010	Total 2015	Univ (PhD)	Univ (MA)	Coll (BA)	Subtotal	Univ (PhD)	Univ (MA)	Coll (BA)	Subtotal	Univ (PhD)	Univ (MA)	Subtotal	Univ (PhD)	Univ (MA)	Subtotal
Lower Level Statistics																		
Introductory Statistics (no Calc prereq)	155	167 [14.3]	243 -	275 [16.7]	45	45	115	205 [16.3]	41	43	104	188 [15.1]	58	12	70 [2.2]	54	12	66 [2.1]
Introductory Statistics (Calc prereq, for non-majors)			42 -	56 [6.2]	8	14	14	36 [6.1]	7	13	14	34 [5.8]	16	3	20 [1.4]	16	3	20 [1.4]
Probability & Statistics (no Calc prereq)	17	21 [5.5]	19 -	NA NA	NA	NA	NA	NA NA	NA	NA	NA	NA NA	NA	NA	NA NA	NA	NA	NA NA
Statistics for pre-service elementary or middle grade teachers			66 -	1 [0.3]	1	0	0	1 [0.3]	1	0	0	1 [0.3]	0	0	0 [0.0]	0	0	0 [0.0]
Statistics for pre-service high school teachers			122 -	0 [0.2]	0	0	0	0 [0.2]	0	0	0	0 [0.2]	0	0	0 [0.0]	0	0	0 [0.0]
Other Intro. Level Statistics	17	13 [2.5]	8 -	15 [2.9]	3	2	6	11 [2.8]	3	2	6	11 [2.8]	4	0	4 [0.7]	4	0	4 [0.7]
Subtotal Intro. Level Statistics	**190**	**202 [14.9]**	**312** -	**347** [20.7]	**57**	**62**	**134**	**253 [20.2]**	**53**	**58**	**123**	**235 [18.6]**	**78**	**16**	**94 [2.9]**	**74**	**15**	**90 [2.9]**

Note: 0 means less than 500 enrollments. Standard errors for combined enrollments across mathematics and statistics departments were not calculated in 2010.

TABLE A.2, Cont. Enrollment (in 1000s) in statistics courses in 2000, 2005, 2010, and 2015 in mathematics and statistics departments [with SE for 2005 and 2015 totals]. (SEs for 2010 Mathematics and Statistics department totals in CBMS2010, Table A.2 P. 190.) Roundoff may cause marginal totals to appear incorrect.

					Fall 2015 Enrollment (in 1000s)						
					Mathematics Departments				Statistics Departments		
Statistics Courses	2000	2005	2010	Total 2015	Univ (PhD)	Univ (MA)	Coll (BA)	Subtotal	Univ (PhD)	Univ (MA)	Subtotal
Upper Level Statistics											
Prob & Statistics for majors (no calc prereq)				38 [4.7]	1	15	6	21 [4.6]	15	2	17 [1.5]
Math. Statistics (Calc prereq)	18	12 [2.1]	8 -	8 [0.7]	2	1	2	5 [0.7]	3	0	3 [0.2]
Probability (Calc prereq)	17	10 [1.0]	12 -	16 [1.2]	7	2	4	12 [1.2]	4	0	4 [0.4]
Prob & Statistics Combined		16 [2.0]	12 -	19 [1.8]	4	2	5	12 [1.8]	7	1	7 [0.7]
Stochastic Processes	1	1 [0.2]	1 -	2 [0.3]	1	0	0	1 [0.3]	1	0	1 [0.1]
Applied Statistical Analysis	6	7 [1.2]	5 -	4 [0.9]	1	1	1	2 [0.9]	2	0	2 [0.2]
Data Science/Analytics				2 [0.2]	0	0	0	0 [0.2]	2	0	2 [0.3]
Design & Anal of Experiments	2	1 [0.2]	2 -	2 [0.2]	0	0	0	1 [0.2]	1	0	1 [0.1]
Regression & Correlation	2	3 [0.5]	4 -	5 [0.4]	0	1	1	2 [0.4]	3	0	3 [0.2]
Biostatistics	2	2 [0.6]	1 -	2 [0.4]	0	0	0	1 [0.4]	1	0	1 [0.2]
Nonparametric Statistics	1	0 [0.1]	0 -	1 [0.0]	0	0	0	0 [0.0]	1	0	1 [0.1]

Note: 0 means less than 500 enrollments. Standard errors for combined enrollments across mathematics and statistics departments were not calculated in 2010.

TABLE A.2, Cont. Fall term statistics enrollment (in 1000s) [with SE for 2005 and 2015 totals]. (SEs for 2010 Mathematics and Statistics department totals in CBMS2010, Table A.2 P. 191.)

					Fall 2015 Enrollment (in 1000s)						
					Mathematics Departments				Statistics Departments		
Statistics Courses	2000	2005	2010	Total 2015	Univ (PhD)	Univ (MA)	Coll (BA)	Subtotal	Univ (PhD)	Univ (MA)	Subtotal
(Upper Level Statistics, Continued)											
12 Categorical Data Analysis	0	0 [0.1]	0 -	0 [0.2]	0	0	0	0 [0.2]	0	0	0 [0.1]
13 Survey Design & Analysis	0	1 [0.2]	0 -	0 [0.1]	0	0	0	0 [0.1]	0	0	0 [0.1]
14 Stat Software & Computing	1	1 [0.2]	1 -	3 [0.2]	0	0	0	1 [0.2]	2	0	2 [0.2]
15 Data Management	0	0 [0.0]	0 -								
16 Senior Sem / Indep Stdy in Statistics	0	0 [0.1]	1 -	0 [0.1]	0	0	0	0 [0.1]	0	0	0 [0.0]
Bayesian Statistics			0 -	0 [0.0]					0	0	0 [0.1]
Statistical Consulting			0 -	0 [0.0]					0	0	0 [0.0]
17 Other Upper Level Statistics	5	3 [0.5]	4 -	4 [0.2]	0	0	0	1 [0.2]	2	0	3 [0.4]
All departmental courses other than Prob. or Stat.	5	3 [0.5]	8 -	2 [0.0]					2	0	2 [0.6]
Subtotal Upper Level Statistics	**45**	**57 [3.7]**	**60 -**	**110 [6.2]**	**17**	**24**	**20**	**60 [6.1]**	**45**	**5**	**50 [2.3]**
Statistics Total	**235**	**259 [15.4]**	**372 -**	**457 [24.8]**	74	85	154	313 [24.2]	124	20	144 [4.0]

Note: 0 means less than 500 enrollments. Standard errors for combined enrollments across mathematics and statistics departments were not calculated in 2010.

TABLE A.3. Enrollment (in 1000s) in computer science courses in fall 2000, 2005, 2010, and 2015 [with SE for 2005, 2010, and 2015 totals]. Roundoff may cause marginal totals to appear incorrect.

					Fall 2015 Enrollment (in 1000s)						
					Mathematics Departments						
					Total (Including Distance Courses)			Total (Non-Distance Courses)			
CS Courses	2000	2005	2010	Total 2015	Univ (PhD)	Univ (MA)	Coll (BA)	Univ (PhD)	Univ (MA)	Coll (BA)	Subtotal
General Education CS Courses											
Computers & Society, Issues in Computer Science	4	5 [1.8]	10.1 [5.3]	2 [0.8]	0	0	2	0	0	2	2 [0.8]
Intro to Software Pkgs	25	12 [4.1]	11.1 [3.6]	6 [2.0]	0	1	5	0	0	5	5 [2.0]
Other CS general ed courses	6	11 [4.8]	9.4 [3.6]	12 [3.5]	0	1	11	0	1	11	12 [3.4]
Subtotal general education courses	**35**	**28 [6.2]**	**30.6 [7.3]**	**20 [3.9]**	**0**	**1**	**18**	**0**	**1**	**18**	**19 [3.8]**
Lower-Level CS Courses											
Computer Programming I *	23	10 [1.8]	15.2 [1.9]	15 [3.1]	2	2	11	2	2	11	15 [3.1]
Computer Programming II *	6	2 [0.6]		3 [0.9]	0	1	2	0	1	2	3 [0.9]
Discrete Structures for CS	4	1 [0.5]	1.5 [0.5]	2 [0.6]	1	0	1	1	0	1	2 [0.6]
Other Lower-level CS Courses	22	4 [1.1]	4.4 [1.3]	5 [1.7]	0	1	4	0	1	4	5 [1.6]
Subtotal Lower-Level CS	**55**	**18 [2.9]**	**25.4 [3.2]**	**25 [4.7]**	**4**	**4**	**18**	**4**	**4**	**18**	**25 [4.6]**
All intermediate-level courses	18	8 [1.4]	11.7 [1.8]	16 [3.4]	1	2	14	1	2	14	16 [3.4]
All upper-level CS courses	17	5 [1.3]	9.8 [2.4]	6 [1.5]	0	2	5	0	2	5	6 [1.5]
Total Computer Science	**123**	**59 [9.9]**	**77.4 [11.2]**	**68 [10.8]**	**5**	**8**	**55**	**5**	**8**	**54**	**67 [10.6]**

* For 1995 and 2000, this course category was described in the 1991 ACM/IEEE CS curriculum report. For 2005, these courses were described in the 2001 ACM/IEEE report "Model Curricula for Computing." For 2015, they are described in "Computer Science Curricular 2013," a joint IEEE Computer Society/ACM Task Force Report.

Appendix II, Part I

Sampling and Estimation Procedures

Rui Jiao and **Bradford Chaney, Westat**

Overview

A stratified, simple random sample was employed in the CBMS 2015 survey, and strata were based on three variables: curriculum, highest degree level offered, and total institutional enrollment. Data were collected using an online survey with email and telephone followup.

Sampling Approach

For CBMS 2015, the basic design was a stratified simple random sample of institutions. Neyman allocation based on a key outcome variable was used to determine targeted sample sizes for the 29 sampling strata. A two-phase sample design was applied to some of the strata to ease data collection workload when the sampling frame was imperfect.

Target Population and Sampling Frames

The Integrated Postsecondary Education Data System (IPEDS), a database maintained by the National Center for Education Statistics within the U.S. Department of Education, was used as a basis for building a frame for this survey. For the academic year 2013-2014, there were approximately 3,300 four-year colleges and universities across the country and 2,600 two-year colleges, according to IPEDS. Of these, 2,501 had mathematics or statistics departments (or both). AMS conducts annual surveys of four-year institutions, and thus has reasonably current information for four-year institutions; this information was used as a basis for updating the IPEDS frame. However, it was necessary to obtain updated information on two-year institutions, partly because they are surveyed only every five years, and partly because of variations in how they are administered. Two-year institutions are sometimes centralized (with one institution having all required information, including for branch campuses) and sometimes decentralized (with each campus maintaining its own data, and there being no integrated database); the latter must be surveyed separately, so the sampling unit becomes the campus rather than the institution. Sometimes there is a mixture of centralization and decentralization at two-year colleges; for example, an administratively independent campus might have a satellite location that is not administratively separate from the campus. The sampling unit was that level that maintained administrative data on faculty and courses. In 2010, AMS and Westat contacted all two-year institutions in the frame to include the individual campuses, but the effort of finding all of those campuses on the frame would have been significant. To reduce the operational burden of screening the entire 2-year institutions frame, a two-phase sample was applied for CBMS 2015. The 2-year institutions formed the frame for the first phase of sampling, and then the identification of eligible campuses took place just among the sampled institutions. In the second phase, one or two campuses were selected per decentralized institution depending on the number of campuses per institution.

The target population of the CBMS 2015 survey consisted of undergraduate mathematics and statistics programs at two-year and four-year colleges and universities in the United States. Thus the frame for the CBMS 2015 survey was divided into three parts: (A) 1,395 institutions having four-year math programs, (B) 75 institutions having four-year statistics programs, and (C) 1,031 institutions having two-year math programs, for a total of 2,501 institutions having programs eligible for participation in the survey. Note that parts A and B did not necessarily consist of mutually exclusive institutions since some institutions had both four-year math programs and four-year statistics programs. However, this was not problematic since the math and statistics programs within these institutions were the targets of interest, and the departments were sampled independently.

Sampling Strata

The three parts of the frame were each stratified using the same two variables that were used in the previous three rounds of the CBMS survey, that is, "Highest Degree Granted by the Institution" (PhD, MA or BA) and "Institutional Full Time Equivalent (FTE) Undergraduate Fall Enrollment." After an initial investigation on the population distributions of the two variables, it was determined that the strata from CBMS 2010 largely could be maintained with a few exceptions. The stratification for part A was similar to the design in CBMS 2010 except for a change in the boundaries between strata 4 and 5. The lower bound of stratum 5 was increased to 27,500, determined by the lowest enrollment among the certainty institutions, and consequently the upper bound of stratum 4 was increased to 27,499. The stratification used in CBMS 2010 for part C was applied for this round except for the addition of stratum 9, which consists of 4-year institutions offering 2-year math programs. The stratification for part B of the frame remained unchanged. The final stratification can be seen in the first four columns of Table 1 ahead. The four-year mathematics programs were divided into fifteen strata, the four-year statistics programs were divided into five strata, and the two-year programs were divided into nine strata.

Allocation Process

For the CBMS 2015 survey, a stratified simple random sample of 595 institutions was drawn from parts A, B and C. For CBMS 2015, since there were only 75 institutions within part B of the frame (4-year Statistics), and since each of the five strata within part B had fewer than 25 institutions, a decision was made to sample all 75 institutions, forcing strata 16-20 to be certainty strata. The remaining 520 sampled institutions for CBMS 2015 were sampled from parts A and C of the frame. The sampling rates were adjusted based on the response rates in CBMS 2010. For the 2010 CBMS, the response rate in part C was lower than it was in part A and part B. In order to maintain the overall sample size to be at the same level of CBMS 2010, the sample size of part A was reduced and the sample size of part C was increased to yield the target sizes that are comparable among parts A, B, and C. As a result, the sample for CBMS 2015 consisted of 300 institutions sampled from part A, and 220 institutions sampled from part C. The second phase selection for part C involved drawing one or two campuses if the college was decentralized. If the institution contained five or more eligible decentralized administered campuses then two campuses were selected, otherwise, only a single campus was selected. The individual campuses were selected randomly without regard to campus size or other campus characteristics. We expected about five more campuses to be selected through the second sampling phase, making a total sample size of around 600 institutions/campuses.

In order to allocate the sample optimally to each of the 24 strata, Neyman allocation was used. This form of allocation distributes sample to the strata proportionately to the overall number of institutions on the frame belonging to each stratum, while adjusting the allocation to give more sample to those strata with greater variability (larger standard deviations) with respect to key variables. The statistics of interest in this survey involve both the counts at the student level and the counts at the institution level. In the frame for the 2015 CBMS, the most reliable information for developing the design was the student enrollment, a count at the student level, so it was used as the key outcome variable to measure variability.

For part A, the standard deviation varied substantially, ranging from 146.59 in stratum 12 to 4855.93 in stratum 10. To smooth out this broad range of variability, and not let it dominate the sample allocation, while balancing the precision of estimates at the institution level, a modified Neyman allocation, the square root of the standard deviation of the student FTE enrollment in Fall 2013, was used to allocate the sample in strata 1 through 4, and 7 through 15. Strata 5 and 6 were selected with certainty.

For part C, the first phase sampling rate of stratum 29 was set to be the same as the overall sampling rate, which yielded selecting 3 institutions. The certainty institutions were determined by the student FTE enrollment in Fall 2013 and they were in stratum 28. The rest of the sample was distributed through strata 21 to 27 by Neyman allocation. The variability of the key estimates was measured by the standard deviation of the student FTE in Fall 2013. Unlike the 4-year mathematics programs frame, the variability was not heavily loaded in one stratum, so use of the square root was not warranted.

The first phase sample for CBMS 2015 consisted of 300 institutions from part A (including the two certainty strata, strata 5 and 6, of size sixteen and seven, respectively), all 75 institutions from part B, and 221 institutions from part C (including the one certainty stratum, stratum 28, of size nine), for a total of 596 institutions. See Table 1 below for details of the final allocation given in the columns labeled "Universe" (or number of institutions on the frame), "Final Sample Allocation", and "Sampling Rate". The final column of Table 1 also gives the "Raw Sampling Weights" which were adjusted for non-response after the surveys were conducted. In so doing, final sampling weights were produced, which can be used for estimation purposes.

The 221 sampled institutions for part C were contacted to obtain information on the individual campuses for the second phase sampling. One institution was found to be ineligible. Of the remaining 220 sampled institutions, 19 had decentralized administered campuses, nine of which had five or more campuses, and 10 of which had less than five campuses, yielding 297 campuses subject to the second phase sampling. Table 2 gives the distribution of the sampled institutions with different levels of campuses. The number of sampled campuses, sampling rate, and the raw sampling weights at the second phase are given in the last three columns, respectively.

TABLE 1: Phase 1 - Stratum Designations and Final Allocation for the CBMS 2015 Study (Program Types A, B and C)

Stratum	Program Type	Highest Degree Granted	FTE Undergraduate Fall Enrollment	Universe (N)	Final Sample Allocation (n)	Sampling Rate (n/N)	Raw Sampling Weights (N/n)
1	Four-Year Math (A)	PhD	0-7,499	49	14	0.29	3.50
2			7,500-14,999	53	18	0.34	2.94
3			15,000-19,999	43	12	0.28	3.58
4			20,000-27,499	33	11	0.33	3.00
5			27,500-34,999	16	16	1.00	1.00
6			35,000+	7	7	1.00	1.00
7		MA	0-6,999	76	22	0.29	3.45
8			7,000-10,999	50	12	0.24	4.17
9			11,000-14,999	22	5	0.23	4.40
10			15,000+	28	14	0.50	2.00
11		BA	0-999	185	18	0.10	10.28
12			1,000-1,499	186	16	0.09	11.63
13			1,500-2,499	298	36	0.12	8.28
14			2,500-4,999	223	42	0.19	5.31
15			5,000+	126	57	0.45	2.21
16	Four-Year Statistics (B)	PhD	0-14,999	16	16	1.00	1.00
17			15,000-24,999	18	18	1.00	1.00
18			25,000-34,999	17	17	1.00	1.00
19			35,000+	4	4	1.00	1.00
20		MA/BA	All	20	20	1.00	1.00
21	Two-Year Schools (C)	N/A	0-999	145	13	0.09	11.15
22			1,000-1,999	231	21	0.09	11.00
23			2,000-3,999	276	51	0.18	5.41
24			4,000-7,999	223	79	0.35	2.82
25			8,000-11,499	76	24	0.32	3.17
26			11,500-14,999	36	11	0.31	3.27
27			15,000-19,999	23	10	0.43	2.30
28			20,000+	9	9	1.00	1.00
29			4-year institution	12	3	0.25	4.00

TABLE 2: Phase 2 – Sampling rate per institution for the CBMS 2015 Study (Program Type C)

		# Institutions	# Campuses per institution (Universe, N)	# Sampled campuses per institution, (Final Sample Allocation, n)	Sampling Rate (n/N)	Raw Sampling Weights (N/n)
201 centralized institutions		201	1	1	1.00	1
19 decentralized institutions	10 institutions (less than 5 campuses)	3	2	1	0.50	2
		4	3	1	0.33	3
		3	4	1	0.25	4
	9 institutions (above 5 campuses)	6	5	2	0.40	2.5
		1	6	2	0.33	3
		1	7	2	0.29	3.5
		1	23	2	0.09	11.5
Total		**220**	**297**	**229**		

Weighting Approach

Sampling weights that adjusted for non-responding institutions were created for weighted data analysis. To facilitate the calculation of standard errors, replicate weights were created using the stratified jackknife method. Nonresponse adjustments were also applied to each set of replicate weights.

Sampling Weights

For parts A and B, the raw sampling weight in table A serves as the base weight. (For part B, the sample of statistics departments, the base weight was equal to one since the departments were selected with certainty.) The raw sampling weight in the h^{th} stratum was computed as N_h/n_h, where N_h is the total number of institutions in the h^{th} stratum and n_h is the number of selected institutions in the hth stratum. For part C, the product of the raw sampling weights in tables A and B serves as the base weight. Among the sampled institutions , a few were identified as ineligible for the following reasons:

- Institutions only offering math as part of general studies requirement but that were classified as a four-year mathematics program based on the sampling frame;
- Institutions having math courses required for some other programs but that were classified as a two-year mathematics program;
- Institutions having statistics courses required for some other programs, i.e. business school, but that were classified as a four-year statistics program;
- A duplicate institution was found.

The ineligible institutions were out-of-scope of the population of interest, so they were excluded from the weighting adjustment. The rest of the sample was classified as either responding institutions or nonresponding institutions. To remove bias from the estimates and reduce variability of the estimates, the base weights were adjusted for nonresponse. Within stratum h, a nonresponse adjustment factor, f_h was calculated as

$$f_h = \frac{\sum_{eligible} W_h}{\sum_{responding} W_h}$$

where W_h is the base weight. Small cells in a stratum with less than 10 institutions or large nonresponse adjustment exceeding 2.5 were collapsed with an adjacent cell within program type and highest degree granted. The analysis weight, W_h^* for any respondent in the h^{th} stratum was computed as

$$W_h^* = W_h f_h.$$

See Tables 3, 4, 5 for the weights used in the four-year mathematics, four-year statistics, and two-year mathematics categories, respectively. Two sets of weights were produced for two-year mathematics. One set of weights applied to all of the responding two-year institutions. Since some responding two-year institutions did not answer the course enrollment matrices, and in order to calculate variances for the course enrollments, a second set of weights was created for the subset of the responding institutions who also provided enrollment data. See tables 5a and 5b for the weights used in two-year mathematics non-enrollment estimates and enrollment estimates, respectively.

Table 3. Final sampling weights used in the four-year mathematics questionnaire

Stratum (h)	Number of completes	Number of nonresponse	Number of ineligibles	Response rate	Base weight (W_h)	Nonresponse adjusted factor (f_h)	Final weight (W_h*)
1	9	5	0	0.643	3.500	1.298	4.541
2	16	2	0	0.889	2.944	1.298	3.820
3	10	2	0	0.833	3.583	1.2	4.300
4	10	1	0	0.909	3.000	1.1	3.300
5	15	1	0	0.938	1.000	1.095	1.095
6	6	1	0	0.857	1.000	1.095	1.095
7	13	9	0	0.591	3.455	1.61	5.563
8	8	4	0	0.667	4.167	1.61	6.710
9	5	0	0	1.000	4.400	1	4.400
10	10	4	0	0.714	2.000	1.4	2.800
11	5	11	2	0.313	10.278	1.836	18.869
12	12	4	0	0.750	11.625	1.836	21.342
13	23	13	0	0.639	8.278	1.565	12.957
14	34	7	1	0.829	5.310	1.21	1.986-6.425*
15	37	19	0	0.661	2.211	1.514	3.346
Total	213	83	3	0.720			

Table 4. Final sampling weights used in the four-year statistics questionnaire

Stratum (h)	Number of completes	Number of nonresponse	Number of ineligibles	Response rate	Base weight (W_h)	Nonresponse adjusted factor (f_h)	Final weight (W_h*)
16	11	5	0	0.688	1.000	1.455	1.455
17	14	3	1	0.824	1.000	1.214	1.214
18	15	1	1	0.938	1.000	1.067	1.067
19	3	0	1	1.000	1.000	1	1.000
20	13	4	3	0.765	1.000	1.308	1.308
Total	56	13	6	0.812			

Table 5a. Final sampling weights used in the two-year mathematics questionnaire, non-enrollment estimates

Stratum (h)	Number of completes	Number of nonresponse	Number of ineligibles	Response rate	Base weight (W_h)	Nonresponse adjusted factor (f_h)	Final weight (W_h*)
21	8	4	0	0.667	11.154	2.059	22.961
22	8	13	0	0.381	11.000	2.059	22.645
23	26	22	3	0.542	5.412	1.846	9.991
24	45	32	2	0.584	2.823-5.646	1.739	4.909-9.818
25	13	11	0	0.542	3.167-12.667	1.896	6.004-24.016
26	9	3	0	0.750	3.273-8.182	1.896	6.205-15.512
27	3	9	0	0.250	2.300-9.200	1.896	4.361-17.443
28	8	7	0	0.533	1.000-11.500	1.896	1.896-6.636
29	0	1	2	-	4.000	1.896	-
Total	120	102	7	0.541			

Table 5b. Final sampling weights used in the two-year mathematics questionnaire, enrollment estimates

Stratum (h)	Number of completes	Number of nonresponse	Number of ineligibles	Response rate	Base weight (W_h)	Nonresponse adjusted factor (f_h)	Final weight (W_h*)
21	8	4	0	0.667	11.154	2.059	22.961
22	8	13	0	0.381	11.000	2.059	22.645
23	24	24	3	0.500	5.412	2	10.824
24	41	36	2	0.532	2.823-5.646	1.905	5.377-10.753
25	11	13	0	0.458	3.167-12.667	2.297	7.273-29.092
26	7	5	0	0.583	3.273-8.182	2.297	7.517-18.791
27	2	10	0	0.167	2.300-9.200	2.297	5.282-13.206
28	7	8	0	0.467	1.000-11.500	2.297	2.297-8.039
29	0	1	2	-	4.000	2.297	-
Total	108	114	7	0.486			

Replicate Weights

Weighted estimates and standard errors were calculated using the replication method JKn (Jackknife method n, or the stratified jackknife method). The idea behind replication is to select subsamples (replicates) repeatedly from the whole sample, calculate the statistic of interest for each subsample, and then use these subsamples or replicate statistics to estimate the variance of the full-sample statistics. The JKn method divides the sample into subsamples by excluding one unit at a time.

For the CBMS, 74 replicates were created for the four-year mathematics program and 61 replicates for the two-year mathematics programs. The replicates were designed in such a way so that on average, each replicate contains four to five sampled institutions. For the four-year statistics program, each sampled institution constituted a replicate except for those in stratum 19, resulting in 71 replicates. The same nonresponse adjustment used for the full sample was applied to each replicate.

In stratum 19, all the institutions were selected and all of them responded. These self-representing institutions were excluded from the computations involved in creating the replicate weights for non-self-representing institutions. Replicate weights associated with self-representing institutions were set equal to their full-sample weights. By handling the self-representing institutions in this manner, they were included in the population estimates but do not contribute to the resulting variance.

See Tables 6, 7, and 8 for the replicates for the four-year mathematics, four-year statistics, and two-year mathematics categories, respectively.

For variance estimation purposes, the "Stratum" in Tables 6, 7, and 8 is referred as the variance stratum (VarStrat). The sampled institutions in a VarStrat are the variance units (VarUnits). For the first replicate weight, the full sample of institutions in the first VarStrat and VarUnit were multiplied by 0 and the weights associated with the other VarUnits in the same VarStrat and adjusted by $n_h'/(n_h'-1)$ to account for reducing the sample. The weights of the institutions in other VarStrat were not changed. The remaining replicates were formed in the same manner by systematically dropping each of the remaining VarUnits and computing the replicate weights as described for the first replicate.

Variance Estimation

Suppose that $\hat{\theta}$ is the full-sample estimate of some population parameter θ. The variance estimator using the JKn method, $v(\hat{\theta})$ is

$$v(\hat{\theta})=\sum_{g=1}^{G} f_g\, h_g\, (\hat{\theta}_{(g)} - \theta)^2.$$

where

$\hat{\theta}_{(g)}$ is the estimate of θ based on the observations included in the g-th replicate,

G is the number of replicates formed,

f_g is the finite population correction (FPC) factors for replicate g, and

h_g is the JKn factors for replicate g.

The FPC is an adjustment to the estimated variance that accounts for how large a fraction of the population is selection for the sample. For replicate g, the FPC factor is $f_g = 1 - m_h/N_h'$, where m_h is the number of completes and N_h' is the total number of eligible institutions in the h^{th} stratum. For the two-year mathematics, the FPC factor was calculated for the first phase of selection. The JKn factor is computed as $h_g = (n_h' - 1) / n_h'$, where n_h' is the number of selected eligible institutions in the h^{th} stratum.

See Tables 6, 7, and 8 for the JKn factors and FPC factors for the four-year mathematics, four-year statistics, and two-year mathematics categories, respectively.

Table 6. Replicates, JKn factors, and FPC factors for the four-year mathematics program

Stratum (*h*)	Replicate (*g*)	Number of replicates	JKn factors	FPC factors
1	1-3	3	0.667	0.816
2	4-7	4	0.750	0.698
3	8-10	3	0.667	0.767
4	11-12	2	0.500	0.697
5	13-16	4	0.750	0.063
6	17-23	7	0.857	0.143
7	24-28	5	0.800	0.829
8	29-31	3	0.667	0.840
9	32-34	3	0.667	0.773
10	35-37	3	0.667	0.643
11	38-41	4	0.750	0.973
12	42-45	4	0.750	0.935
13	46-53	8	0.875	0.923
14	54-62	9	0.889	0.847
15	63-74	12	0.917	0.704

Table 7. Replicates, JKn factors, and FPC factors for the four-year statistics program

Stratum (*h*)	Replicate (*g*)	Number of replicates	JKn factors	FPC factors
16	1-16	16	0.938	0.313
17	17-34	18	0.944	0.176
18	35-51	17	0.941	0.063
19	52-55	4	-	-
20	56-75	20	0.950	0.235

Table 8a. Replicates, JKn factors, and FPC factors for the two-year statistics program, nonenrollment estimates

Stratum (*h*)	Replicate (*g*)	Number of replicates	JKn factors	FPC factors
21	1-4	4	0.750	0.917
22	5-8	4	0.750	0.909
23	9-21	13	0.923	0.815
24	22-38	17	0.941	0.646
25	39-46	8	0.875	0.684
26	47-49	3	0.667	0.694
27	50-52	3	0.667	0.565
28	53-58	6	0.833	0.857
29	59-61	3	0.667	0.750

Table 8b. Replicates, JKn factors, and FPC factors for the two-year statistics program, enrollment estimates

Stratum (*h*)	Replicate (*g*)	Number of replicates	JKn factors	FPC factors
21	1-4	4	0.750	0.917
22	5-8	4	0.750	0.909
23	9-21	13	0.923	0.815
24	22-38	17	0.941	0.646
25	39-46	8	0.875	0.684
26	47-49	3	0.667	0.694
27	50-52	3	0.458	0.565
28	53-58	6	0.833	0.875
29	59-61	3	0.667	0.750

WesVar, a variance estimation software designed for complex surveys, was used to calculate estimates and standard errors of the estimates for the CBMS using the JKn replication method. WesVar can be used with a wide range of complex sample designs, including multistage, stratified, and unequal probability samples. The replicate variance estimates can reflect many types of estimation schemes, including nonresponse adjustment, poststratification, raking, and ratio estimation. It computes variance estimates for medians, percentiles, ratios, difference of ratios, and log-odds ratios.

Appendix II, Part II

Sampling and Estimation Procedures: Four-Year Mathematics and Statistics Faculty Profile

James W. Maxwell,
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Overview

In CBMS surveys prior to 2005, information on the faculty was based on data collected on the CBMS survey form. Starting with the 2010 CBMS survey the information on the faculty at four-year colleges and universities is based on a separate survey conducted by the American Mathematical Society. The Departmental Profile Survey is one of several surveys of mathematical sciences departments at four-year institutions conducted annually as part of the *AMS-ASA-IMS-MAA-SIAM Annual Survey of the Mathematical Sciences.* For 2015 the Departmental Profile Survey form was expanded to gather data on the age and the race/ethnicity of the faculty, in addition to the data collected annually on rank, tenure status and gender. The information on the four-year mathematics and statistics faculty derived from this data appears in Chapters 1 and 4 of this report.

Target Populations and Survey Approach

The procedures used to conduct the 2015 Departmental Profile survey are parallel to those used in CBMS 2015 as described in detail in Part I of this appendix. The primary characteristics used to stratify the departments for survey and reporting purposes are program type (four-year mathematics or four-year statistics) and the highest mathematical sciences degree offered by the department: doctoral, masters, or bachelors. The 2015 Departmental Profile survey employed a census of the mathematics and statistics departments in the sample frame whereas the CBMS survey sampled these departments. In addition, the CBMS 2015 sample frame of statistics departments included sixteen departments that offered at most a masters degree in statistics. These departments are not part of the regular Annual Survey sample frame but were included in the 2015 Departmental Profile survey. The Annual Survey reports separately on doctorate-granting departments of applied mathematics, but these departments were grouped with the doctoral departments of mathematics for the CBMS 2015 analysis.

Comparison of the Annual Survey Sample Frame with the CBMS Sample Frame

Table AS.1 demonstrates that the sample frames of four-year mathematics and statistics departments used in the two surveys closely align. As a consequence of this alignment, the distinction between the terms “Bachelors”, “Masters” and “Doctoral” Mathematics Departments as defined in the two surveys is immaterial.

Table AS.1 Comparability of 2015 Annual Survey Sample Frame and the 2015 CBMS Sample Frame for Four-Year Mathematics Departments & Statistics Departments

Dept. Grouping	Annual Survey Count	CBMS Count	Overlap Count
Doctoral Math. Depts.	201	201	200
Masters Math. Depts.	175	176	174
Bachelors Math. Depts.	1011	1018	1010
Doctoral Stat. Depts.	54	55	54
Masters Stat. Depts.	16	20	16
Total	1457	1470	1454

Table AS.2 describes the stratifications used with the the 2015 Departmental Profile data. This is the same stratification scheme used for CBMS 2015 data and described in more detail in Part I of this appendix.

Survey Implementation

Departments of mathematics and statistics received the Departmental Profile forms in early January of 2016 asking them to report on their fall-term 2015 faculty. Non-responding departments received follow-up requests over the winter and early spring of 2016. The final effort to obtain responses took place during April, and these efforts were concentrated on the strata with the lowest response rates.

Data Analysis

The analysis used with the 2015 Departmental Profile data parallels that used for CBMS 2015 data.

Table AS.2 lists the final sample weights used to produce the estimates within each stratum of the counts of faculty by rank, type-of-appointment and gender. The column "Response rate" reflects the sum of the usable forms returned. The sample weights used to produce estimates of age distribution and race/ethnicity distributions were somewhat higher due to item non-response for these data. By way of comparison, Table AS.3 shows response rates for the age data collected.

The standard errors reported for the faculty data were computed using the formulas described on pages 83-84 and 97-98 of [SMO].

Table AS.2 Stratum designations and allocations and nonresponse-adjusted sample weights used with Annual Survey Data of faculty counts by rank, type-of-appointment and gender for the CBMS 2015 report.

Stratum	Program Type	Highest Degree	Universe (N)	Number selected (n)	Number of Responses	Response rate	Final sampling weights
1	4-year Math	PhD	49	49	37	0.755	1.324
2			53	53	45	0.849	1.178
3			43	43	35	0.814	1.229
4			32	32	23	0.719	1.391
5			16	16	13	0.813	1.231
6			7	7	7	1.000	1.000
7		MA	76	76	27	0.355	2.815
8			50	50	31	0.620	1.613
9			22	22	15	0.682	1.467
10			28	28	11	0.393	2.545
11		BA	180	180	48	0.267	3.750
12			186	186	59	0.317	3.153
13			297	297	110	0.370	2.700
14			222	222	80	0.360	2.775
15			123	123	53	0.431	2.321
16	4-year Stat	PhD	16	16	10	0.625	1.600
17			18	18	15	0.833	1.200
18			16	16	11	0.688	1.455
19			4	4	3	0.750	1.333
20		MA	16	16	6	0.375	2.667

Table AS.3 Stratum designations and allocations and nonresponse-adjusted sample weights used with Annual Survey Data of faculty counts by age bins for the CBMS 2015 report.

Stratum	Program Type	Highest Degree	Universe (N)	Number selected (n)	Number of Responses	Response rate	Final sampling weights
1	4-year Math	PhD	49	49	28	0.571	1.750
2			53	53	38	0.717	1.395
3			43	43	26	0.605	1.654
4			32	32	22	0.688	1.455
5			16	16	13	0.813	1.231
6			7	7	7	1.000	1.000
7		MA	76	76	22	0.289	3.455
8			50	50	29	0.580	1.724
9			22	22	12	0.545	1.833
10			28	28	8	0.286	3.500
11		BA	180	180	48	0.267	3.750
12			186	186	57	0.306	3.263
13			297	297	98	0.330	3.031
14			222	222	74	0.333	3.000
15			123	123	44	0.358	2.795
16	4-year Stat	PhD	16	16	7	0.438	2.286
17			18	18	14	0.778	1.286
18			16	16	10	0.625	1.600
19			4	4	2	0.500	2.000
20		MA	16	16	6	0.375	2.667

Appendix III

List of Responders to the Survey

Two-Year Respondents

Anoka Technical College
Mathematics

Arapahoe Community College, Main campus
Mathematics

Arkansas State University-Beebe, Beebe campus
Mathematics and Science

Atlanta Technical College
Arts and Sciences

Atlantic Cape Community College
Mathematics Department

Austin Community College District
Mathematics

Blinn College, Brenham
Mathematics

Broward College, Central Campus
Department of Mathematics

Bunker Hill Community College
Department of Mathematics

Butler Community College
Mathematics

Cabrillo College
Mathematics

Cape Cod Community College
Mathematics

Cape Fear Community College
Mathematics and Physical Education

Central Carolina Technical College
Mathematics

Central Texas College
Mathematics

Chattanooga State Community College
Mathematics

Cisco College
Business & Mathematics Division

City Colleges of Chicago-Wilbur Wright College
Mathematics

Clarendon College
Mathematics Department

College of the Desert
Department of Mathematics and Computer Science

College of the Sequoias
Mathematics and Engineering

Crowder College
Mathematics

Delaware Technical Community College-Owens
Mathematics/Physics

Eastern Gateway Community College
Humanities, Social Science, and Mathematics

Eastfield College
Science, Technology, Engineering and Mathematics

Everett Community College
Mathematics Department

Fayetteville Technical Community College
Mathematics Department

Front Range Community College, Boulder County campus
Mathematics

Fullerton College
Mathematics

Gadsden State Community College
Mathematics and Engineering

Gaston College
Mathematics

George C Wallace State Community College-Dothan
Mathematics and Computer Information Science

Glendale Community College, Main campus
Mathematics and Computer Science

Green River Community College
Mathematics Division

Grossmont College
Mathematics

Gulf Coast State College
Mathematics

Highline Community College
Mathematics Department

Hillsborough Community College, Dale Mabry Campus
Dale Mabry Mathematics and Science Department

Housatonic Community College
Math-Science

Jackson State Community College
Mathematics and Science Division

James A Rhodes State College
Mathematics Department

Jamestown Community College
STEM

Jefferson Davis Community College, Brewton campus
Mathematics

John Tyler Community College
Mathematics

Laredo Community College
Mathematics

Las Positas College
Mathematics

Lone Star College System - Tomball, Tomball Campus
Mathematics

Lone Star College System - University Park, University Park Campus
Mathematics

Los Angeles Mission College
Mathematics/CSIT/Engineering

Los Angeles Southwest College
Mathematics

Madison Area Technical College
Mathematics &a Computer Science

Madisonville Community College
Mathematics Department

Manchester Community College
Mathematics, Science & Health Careers

Metropolitan Community College, MCC-Blue River
Business Technology, Mathematics and Public Safety

Metropolitan Community College, MCC-Longview
Mathematics

Miami Dade College, West Campus
Natural/Social Sciences

Midland College
Mathematics Department

Milwaukee Area Technical College
Mathematics

MiraCosta College
Mathematics

Mississippi Gulf Coast Community College, Jefferson Davis
Mathematics and Computer Science

Mohawk Valley Community College
STEM Center

Montgomery County Community College
STEM

Moreno Valley College
Mathematics

Morgan Community College, Main campus
Mathematics Department

Motlow State Community College
Mathematics

Nash Community College
Mathematics Department

Naugatuck Valley Community College
Mathematics

Normandale Community College
Department of Mathematics and Computer Science

North Iowa Area Community College
Mathematics Department

North Lake College
Mathematics

North Shore Community College
Department of Sciences and Mathematics

Northern Virginia Community College, Loudoun
Natural and Applied Science

Northwest State Community College
Math, Science, Engineering Technology Division

Northwest Vista College
Mathematics and Engineering Department

Ohlone College
Mathematics

Orange Coast College
Mathematics

Ozarks Technical Community College
Mathematics

Palomar College
Mathematics

Pennsylvania College of Technology
Mathematics Department

Pennsylvania State University-Penn State Mont Alto
Mathematics Program

Pikes Peak Community College
College Level Mathematics

Polk State College
Mathematics Department

Potomac State College of West Virginia University
STEM Division - Mathematics

Pueblo Community College, Pueblo campus
Mathematics

Ranger College
Mathematics

Rend Lake College
Mathematics

Richland College
Mathematics

Roane State Community College
Division of Mathematics and Sciences

Rockland Community College
Mathematics

Rowan College at Gloucester County
STEM

Saginaw Chippewa Tribal College
NA

Santa Fe Community College
Math, Engineering, Computer Science and Info Technology

Santa Monica College
Mathematics

Seminole State College of Florida
Mathematics

Sinclair Community College
Mathematics

Southern West Virginia Community and Technical College
Mathematics

Southwestern Michigan College
Math/Science

Spokane Falls Community College
Mathematics

Springfield Technical Community College
Mathematics

Temple College
Mathematics

The University of Akron
Statistics

Thomas Nelson Community College
Mathematics

Tyler Junior College
Mathematics

University of Arkansas Community College-Batesville, Batesville
Mathematics and Science

University of New Mexico-Los Alamos Campus
Mathematics and Engineering

Valencia College, West Campus
Division of Mathematics

Vermont Technical College
Mathematics

Wayne Community College
Mathematics

West Los Angeles College
Mathematics

West Valley College
Mathematics

Wharton County Junior College
Mathematics

White Mountains Community College, Berlin campus
VPAA

Yavapai College, Prescott Campus
Mathematics Department

York Technical College
Mathematics Department

Four-Year Mathematics Respondents

Alabama State University
Department of Mathematics & Computer Science

Alderson-Broaddus University
Department of Mathematics

Appalachian State University
Department of Mathematical Science

Arizona State University
School of Mathematical & Statistical Sciences

Arizona State University at West Campus
School of Mathematics & Natural Science

Arkansas Tech University
Department of Mathematics

Armstrong State University
Department of Mathematics

Augustana University
Department of Mathematics

Austin Peay State University
Department of Mathematics & Statistics

Baker University
Department of Mathematics, Computer Science & Physics

Baldwin-Wallace University
Mathematics & Computer Science Department

Bellarmine University
Department of Mathematics

Belmont University
Mathematics & Computer Science Department

Beloit College
Mathematics & Computer Science Department

Binghamton University, State University of New York
Department of Mathematics & Science

Black Hills State University
School of Mathematics and Social Sciences

Bloomsburg University of Pennsylvania
Mathematics, Computer Science & Statistics Department

Bowie State University
Department of Mathematics

Brigham Young University-Idaho
Department of Mathematics

Brown University
Division of Applied Mathematics

Buena Vista University
School of Natural Science

Butler University
Department of Mathematics & Actuarial Science

Caldwell University
Department of Mathematics & Computer Science

California Polytechnic State University
Mathematics Department

California State University, Dominguez Hills
Department of Mathematics

California State University, Long Beach
Department of Mathematics & Statistics

California State University, Stanislaus
Department of Mathematics

Capital University
Department of Mathematics, Computer Science & Physics

Christopher Newport University
Department of Mathematics

Clayton State University
Department of Mathematics

Coastal Carolina University
Department of Mathematics & Statistics

Coker College
Department of Mathematics & Science

College of St Rose
Department of Mathematics

College of Staten Island, CUNY
Department of Mathematics

Columbia University
Department of Applied Physics & Applied Mathematics

CUNY, J Jay C Criminal Justice
Department of Mathematics

DePaul University
Department of Mathematical Science

East Carolina University
Department of Mathematics

East Stroudsburg University of Pennsylvania
Department of Mathematics

Eastern Illinois University
Department of Mathematics & Computer Science

Eastern University
Department of Mathematics

Edinboro University of Pennsylvania
Department of Mathematics & Computer Science

Elon University
Department of Mathematics and Statistics

Emmanuel College
Department of Mathematics

Emory University
Mathematics & Computer Science

Endicott College
Department of Mathematics & Computer Science

Florida Institute of Technology
Department of Mathematical Sciences

Florida State University
Department of Mathematics

Framingham State University
Department of Mathematics

George Washington University
Department of Mathematics

Georgia Southern University
Department of Mathematical Sciences

Grand View University
Mathematics & Computer Science Department

Guilford College
Department of Mathematics

Hope College
Department of Mathematics

Humboldt State University
Department of Mathematics

Idaho State University
Department of Mathematics

Illinois State University
Department of Mathematics

Indiana State University
Department of Mathematics & Computer Science

Indiana University South Bend
Department of Mathematical Sciences

Indiana University of Pennsylvania
Department of Mathematics

Indiana University, Bloomington
Department of Mathematics

Indiana University-Purdue University Indianapolis
Department of Mathematical Sciences

Jarvis Christian College
Department of Mathematics

Kansas State University
Department of Mathematics

Kean University
Mathematics Department

LIU Brooklyn
Department of Mathematics

Langston University
Department of Mathematics

Le Moyne College
Department of Mathematics & Computer Science

Lesley University
Department of Natural Science & Mathematics

Lindenwood University
Department of Mathematics

Longwood University
Department of Mathematics & Computer Science

Loras College
Division of Mathematics, Engineering & Computer Science

Louisiana State University, Baton Rouge
Department of Mathematics

Loyola Marymount University
Department of Mathematics

Lubbock Christian University
Department of Mathematics

Maine Maritime Academy
Arts and Science Department

Marist College
Department of Mathematics

Metropolitan State University
Department of Mathematics

Miami University-Hamilton
Mathematics and Sciences Coordinatorship

Michigan State University
Department of Mathematics

Midland University
Department of Mathematics & Computer Science

Mississippi College
Mathematics Department

Missouri Southern State University
Department of Mathematics

Missouri State University
Department of Mathematics

Missouri Western State University
Department of Computer Science, Mathematics & Physics

Montana State University
Department of Mathematical Sciences

Morehead State University
Department of Mathematics and Physics

Mount Ida College
Mathematics Department

Mount St Mary's University
Department of Mathematics & Computer Science

New England College
Department of Mathematics

New Jersey Institute of Technology
Department of Mathematical Sciences

New Mexico Institute of Mining & Technology
Department of Mathematics

New York University, Courant Institute
Courant Institute of Mathematical Sciences

North Carolina Agricultural & Technical State University
Department of Mathematics

North Dakota State University, Fargo
Department of Mathematics

Occidental College
Department of Mathematics

Ohio State University, Columbus
Department of Mathematics

Ohio University, Athens
Department of Mathematics

Pace University, New York City Campus
Department of Mathematics

Paine College
Department of Mathematics, Sciences, and Technology

Pennsylvania State University Erie, Behrend College
Mathematics

Pittsburg State University
Department of Mathematics

Purdue University
Department of Mathematics

Purdue University, North Central
Department of Mathematics, Statistics & Physics

Regis University
Department of Mathematics

Rensselaer Polytechnic Institute
Department of Mathematical Sciences

Rhodes College
Department of Mathematics & Computer Science

Rice University
Department of Mathematics

Roosevelt University
Mathematics and Actuarial Science

Rutgers The State University of New Jersey Camden
Department of Mathematical Science

Rutgers The State University of New Jersey New Brunswick
Mathematics Department

SUNY College at Cortland
Department of Mathematics

SUNY Maritime College
Science Department

Saint Peter's University
Department of Mathematics

Salem State University
Mathematics Department

San Francisco State University
Department of Mathematics

Seton Hill University
Division of Natural & Health Science

Siena Heights University
Department of Mathematics

Skidmore College
Department of Mathematics & Computer Science

Slippery Rock University of Pennsylvania
Department of Mathematics

South Dakota State University
Department of Mathematics & Statistics

Southern Illinois University at Edwardsville
Mathematics & Statistics Department

Southern Utah University
Department of Mathematics

Southwest Baptist University
Department of Mathematics

Southwest Minnesota State University
Department of Mathematics & Computer Science

St Cloud State University
Mathematics & Statistics Department

St Edward's University
Mathematics Department

St John Fisher College
Mathematical & Computing Sciences Department

St Joseph's College, Brooklyn
Department of Mathematics & Computer Science

St Leo University
Department of Mathematics & Science

Stevenson University
Department of Mathematics & Physics

Texas A&M University
Department of Mathematics

Texas A&M University at Galveston
Liberal Studies

Texas A&M University-Central Texas
Mathematics & Physics Program

Texas Christian University
Department of Mathematics

Texas State University
Department of Mathematics

The College of New Jersey
Mathematics & Statistics Department

Troy University
Department of Mathematics

Truman State University
Department of Mathematics

Union College
Department of Natural Sciences

Union University
Mathematics Department

University of Alabama
Department of Mathematics

University of Arizona
Department of Mathematics

University of California, Los Angeles
Department of Mathematics

University of California, Riverside
Department of Mathematics

University of California, San Diego
Department of Mathematics

University of California, Santa Cruz
Department of Mathematics

University of Central Arkansas
Department of Mathematics

University of Central Florida
Department of Mathematics

University of Central Oklahoma
Mathematics & Statistics Department

University of Colorado Denver
Department of Mathematics and Statistical Sciences

University of Colorado, Boulder
Department of Applied Mathematics

University of Connecticut, Storrs
Department of Mathematics

University of Findlay
Department of Mathematics

University of Florida
Department of Mathematics

University of Georgia
Department of Mathematics

University of Houston
Department of Mathematics

University of Illinois, Urbana-Champaign
Department of Mathematics

University of Kansas
Department of Mathematics

University of Kentucky
Department of Mathematics

University of La Verne
Mathematics, Physics, Computer Science Department

University of Louisiana at Lafayette
Department of Mathematics

University of Louisiana at Monroe
Department of Mathematics

University of Louisville
Department of Mathematics

University of Mary Hardin-Baylor
Department of Mathematics & Physics

University of Massachusetts Dartmouth
Mathematics Department

University of Michigan
Department of Mathematics

University of Minnesota-Twin Cities
School of Mathematics

University of Mississippi
Department of Mathematics

University of Missouri-Columbia
Department of Mathematics

University of Missouri-Kansas City
Department of Mathematics & Statistics

University of Montana - Missoula
Department of Mathematical Sciences

University of Nevada, Reno
Department of Mathematics & Statistics

University of New Hampshire
Department of Mathematics & Statistics

University of North Alabama
Department of Mathematics

University of Northern Colorado
School of Mathematical Sciences

University of Northern Iowa
Mathematics Department

University of Oregon
Department of Mathematics

University of Rochester
Department of Mathematics

University of South Carolina, Aiken
Department of Mathematical Science

University of South Carolina, Spartanburg
Division of Mathematics & Computer Science

University of South Dakota
Department of Mathematical Science

University of South Florida
Department of Mathematics & Statistics

University of Southern Indiana
Department of Mathematics

University of Tampa
Department of Mathematics

University of Tennessee at Chattanooga
Department of Mathematics

University of Texas at Austin
Department of Mathematics

University of Texas at El Paso
Department of Mathematical Science

University of Texas at Permian Basin
Department of Mathematics & Computer Science

University of Toledo
Department of Mathematics & Statistics

University of Tulsa
Department of Mathematics

University of Utah
Department of Mathematics

University of Washington
Applied Mathematics Department

University of Washington
Department of Mathematics

University of Wisconsin, La Crosse
Department of Mathematics

University of Wisconsin, Milwaukee
Department of Mathematical Sciences

University of Wisconsin, Stevens Point
Department of Mathematical Sciences

University of the Pacific
Department of Mathematics

Urbana University
Department of Mathematics & Science

Villanova University
Department of Mathematics and Statistics

Virginia Commonwealth University
Department of Mathematics and Applied Mathematics

Viterbo University
Department of Mathematics

Wake Forest University
Department of Mathematics

Warren Wilson College
Department of Mathematics & Computer Science

Washburn University of Topeka
Mathematics & Statistics Department

Wellesley College
Department of Mathematics

West Virginia State University
Department of Mathematics and Computer Science

West Virginia University Institute of Technology
Department of Mathematics

Western Carolina University
Department of Mathematics & Computer Science

Western Kentucky University
Department of Mathematics

Westmont College
Department of Mathematics & Computer Science

William Paterson University
Department of Mathematics

Yeshiva University
Department of Mathematical Sciences

Four-Year Statistics Respondents

Baylor University
Department of Statistical Sciences

Bernard M Baruch College/City University of New York
Statistics & Computer Information Systems Department

Bowling Green State University
Applied Statistics & Operations Research Department

Brigham Young University
Department of Statistics

California Polytechnic State University
Statistics Department

California State University, East Bay
Department of Statistics & Biostatistics

Carnegie Mellon University
Department of Statistics

Colorado State University
Department of Statistics

Columbia University
Department of Statistics

Duke University
Department of Statistical Science

Florida State University
Department of Statistics

George Mason University
Department of Statistics

George Washington University
Department of Statistics

Harvard University
Department of Statistics

Indiana University, Bloomington
Department of Statistics

Iowa State University
Department of Statistics

Kansas State University
Department of Statistics

Louisiana State University, Baton Rouge
Department of Experimental Statistics

Michigan State University
Department of Statistics & Probability

North Dakota State University, Fargo
Department of Statistics

Northern Illinois University
Division of Statistics

Ohio State University, Columbus
Department of Statistics

Oklahoma State University
Department of Statistics

Pennsylvania State University, University Park
Department of Statistics

Purdue University
Department of Statistics

Rice University
Department of Statistics

Rochester Institute of Technology
School of Mathematical Sciences

Rutgers The State University of New Jersey New Brunswick
Department of Statistics & Biostatistics

Stanford University
Department of Statistics

University of California, Berkeley
Department of Statistics

University of California, Davis
Department of Statistics

University of California, Irvine
Department of Statistics

University of California, Los Angeles
Department of Statistics

University of California, Riverside
Department of Statistics

University of Chicago
Department of Statistics

University of Connecticut, Storrs
Department of Statistics

University of Florida
Department of Statistics

University of Georgia
Department of Statistics

University of Idaho
Department of Statistics

University of Illinois, Urbana-Champaign
Department of Statistics

University of Iowa
Department of Statistics & Actuarial Science

University of Kentucky
Department of Statistics

University of Michigan
Department of Statistics

University of Minnesota-Twin Cities
School of Statistics

University of North Carolina at Chapel Hill
Department of Statistics & Operation Research

University of Pittsburgh
Department of Statistics

University of South Carolina
Department of Statistics

University of Virginia
Department of Statistics

University of Washington
Department of Statistics

University of Wisconsin, Madison
Department of Statistics

University of Wyoming
Department of Statistics

Virginia Commonwealth University
Department of Statistical Sciences & Operations Research

Virginia Polytechnic Institute and State University
Department of Statistics

Washington State University
Department of Mathematics and Statistics

West Virginia University
Department of Statistics

Western Michigan University
Department of Statistics

Appendix IV

Four-Year Mathematics Questionnaire

FOUR-YEAR QUESTIONNAIRE

CBMS2015

CONFERENCE BOARD OF THE MATHEMATICAL SCIENCES

SURVEY OF UNDERGRADUATE PROGRAMS IN THE MATHEMATICAL SCIENCES

General Information

As part of a random sample, your department has been chosen to participate in the NSF-funded CBMS2015 National Survey of Undergraduate Mathematical Sciences Programs. The presidents of all U.S. mathematical sciences organizations have endorsed it and ask for your cooperation, even though it is a very complicated survey.

We assure you that no individual departmental data, except the names of responding departments, will be released.

This survey provides data about the nation's undergraduate mathematical and statistical effort that is available from no other source. You can see the results of a similar survey fielded five years ago by going to www.ams.org/cbms, where the CBMS 2010 report is available online.

All departments in this survey are in universities and colleges that offer at least a bachelor's degree. They may or may not offer a major in mathematics. Many of the departments in our random sample also offer higher degrees in mathematical sciences.

We have classified your department as belonging to a university or four-year college. If this is not correct, please contact Ellen Kirkman, Survey Director, at 336-758-5351 or at Kirkman@wfu.edu.

Please report on undergraduate programs in the broadly defined mathematical sciences (including applied mathematics, statistics, operations research, and computer science) that are under the direction of your department. Do not include data for other departments or for branches or campuses of your institution that are budgetarily separate from your own. Also, if your department is broader than just mathematics (e.g., Division of Mathematics and Sciences), please report only on the mathematics courses (as broadly defined here).

This survey may be completed either online or using a hard-copy questionnaire. We recommend using the online system because it will do some of the work for you; e.g., it will automatically skip those questions that are not applicable (based on the response you give), gray out portions of questions that do not apply, remind you of previous responses, and provide definitions when you let your cursor hover over certain highlighted words.

If you have any questions while filling out this survey form, please call the Survey Director, Ellen Kirkman, at 336-758-5351 or contact her by e-mail at Kirkman@wfu.edu. For help with the online questionnaire, call Westat at 855-680-1849 or send an email to cbms2015@westat.com.

Please complete the questionnaire by October 31, 2015, either online or by mailing a hard copy to:

CBMS Survey
Westat
1600 Research Boulevard, RB 3103
Rockville, MD 20850-3129

Please retain a copy of your responses to this questionnaire in case questions arise.

A. General Information

A1. Name of your institution: ______________________________

A2. Name of your department: ______________________________

A3. We have classified your department as being part of a university or four-year college. Do you agree?

Yes .... ☐ ⟶ If Yes, go to A4 below.

No .... ☐ ⟶ If No, please call Ellen Kirkman, Survey Director, at 336-758-5351.

A4. If your college or university does not recognize tenure, check this box. ☐

A5. Contact person in your department: [ ]

A6. Contact person's e-mail address: [ ]

A7. Contact person's phone number including area code: [(   )]

A8. Contact person's mailing address:

a. Street .... [ ]

b. Street2............................ [ ]

c. City................................ [ ]

d. State.. [ ]

e. Zip code .... [ ]

B. Dual-Enrollment Courses

Mathematics Questionnaire

Definition: We use the term dual enrollment courses to refer to courses conducted on a high school campus and taught by high school teachers, for which high school students may obtain high school credit and, simultaneously, college credit through your institution.

B1. Does your department participate in any dual enrollment programs of this type?

Yes.................. ☐ ⟶ If Yes, go to B2.

No .... ☐ ⟶ If No, go to B4.

B2. Please complete the following table giving the number of students enrolled in your dual enrollment program (as defined above) for the previous term (spring 2015) and the current fall term of 2015.

Course	**Total Dual Enrollments**	
	Last Term= Spring 2015	**This Term= Fall 2015**
a. College Algebra............		
b. Pre-calculus		
c. Calculus I		
d. Statistics.......................		
e. Other		

B3. Are the high school instructors of the dual enrollment courses reported in B2 required to participate in a teaching evaluation program conducted by your institution?

Yes .... ☐

No .... ☐

B. Dual-Enrollment Courses (cont.)

Mathematics Questionnaire

B4. Does your department assign any of its own full-time or part-time faculty to teach courses conducted on a high school campus for which high school students may receive both high school and college credit (through your institution)?

Yes.................. ☐ → If Yes, go to B5.

No .... ☐ → If No, go to B6.

B5. In fall 2015, how many students are enrolled in the courses conducted on a high school campus and taught by your full-time or part-time faculty and through which high school students may receive both high school and college credit (through your institution)?

Number of students............................ ☐

B6. Does your institution participate in a program that allows high school students to enroll in mathematical sciences courses on your campus for high school credit and, simultaneously, college credit?

Yes .... ☐

No .... ☐

*In subsequent sections we ask about course enrollments in your department; please **do not** include any of the enrollments reported in this Section B.*

C. Distance Learning

Mathematics Questionnaire

Definition: Distance learning courses are those courses offered by your institution for credit, in which the majority of the instruction occurs with the instructor and the students separated by time and /or place (e.g. courses in which the majority of the course is taught online, or by computer software, or by other technologies) including MOOCs that are offered for credit. (A MOOC is a "massive open online course.")

C1. Does your institution give (transfer) credit for any distance learning courses in the mathematical sciences that are not taught by faculty in your institution?

Yes .... ☐

No .... ☐

C2. Does your institution have a limit on the number of credits earned (or courses taken) in distance learning classes that may be counted toward graduation?

Yes .... ☐

No .... ☐

C3. Has your department taught any distance learning course within the calendar years 2013-2015?

Yes................. ☐ If Yes, go to C4.

No .... ☐ If No, skip to section D.

C4. Which best characterizes the format/structure of the majority of your distance learning courses? (Choose one response.)

Completely online: Instruction takes place completely online .... ☐
Blended/Hybrid: Instruction takes place in a combination of face-to-face and online formats .... ☐
Other.. ☐

C5. Which one response best describes the general pattern for how the instructional materials used in your distance learning courses are determined? (Choose one response.)

Course instructors create materials... ☐
Course instructors choose commercially produced materials........ ☐
Course instructors choose a combination of both......................... ☐

C. Distance Learning (cont.)

C6. In most of your distance learning courses, how are the majority of the tests administered? (Choose one response.)

- Not monitored .... ☐
- Online, but using some kind of monitoring technology .... ☐
- At a monitored testing site........ ☐
- Combination of both........ ☐

C7. Are there any courses that you offer in both non-distance learning and in distance learning formats?

Yes........ ☐ → If Yes, go to C8 below.

No .... ☐ → If No, go to C10.

C8. Do the course instructors in your distance learning courses generally:

	Yes	No
a. Hold office hours to meet with students on campus as in comparable non-distance learning courses taught on campus? ...	☐	☐
b. Participate in evaluation of instruction in the same way as faculty who teach comparable non-distance learning courses?	☐	☐

C9. Which, if any, of the following practices apply to the majority of distance learning courses in your department? (Check one response on each line.)

	Yes	No
a. Same use of common examinations (if any) as in the non-distance-learning course........	☐	☐
b. Same common course as in the non-distance-learning course	☐	☐
c. Same course projects as in the non-distance-learning course	☐	☐
d. More course projects than in non-distance-learning course	☐	☐

C10. In the three calendar years 2013-2015 has your department taught any course (for credit) that could be characterized as a MOOC?

Yes........ ☐ → go to C11 below.

No .... ☐ → go to Section D.

C. Distance Learning (cont.)

Mathematics Questionnaire

C11. In which of the following content areas has your department taught a MOOC (for credit) during 2013-2015? (Check all that apply.)

- ☐ Developmental Mathematics
- ☐ College-Level Mathematics below Calculus
- ☐ Calculus
- ☐ Intermediate Level (e.g. Linear Algebra, Differential Equations)
- ☐ Advanced Level
- ☐ Teacher Preparation
- ☐ Statistics
- ☐ Other (specify) ____________________

C12. What is the total number of students enrolled in MOOCs offered by your department (for credit) in Fall 2015?

____

D. Faculty Profile (Fall 2015)

Please indicate whether the following types of faculty are actively teaching one or more courses in fall 2015.

Definitions

- **Full-time faculty.** Faculty who are full-time employees in the institution and more than half-time in the department. For example, if a tenured physics professor with a joint appointment in your department teaches a total of two courses in fall 2015, with exactly one being in your department (i.e., mathematics is 50% of the fall teaching assignment) , then that person would be counted as part-time in your department.
- **Permanent faculty.** If your institution does not recognize tenure, please report full-time departmental faculty who are permanent on line D1a and report all other faculty on the remaining lines as appropriate.
- **Other full-time faculty**. Full-time faculty who are not tenured or tenure-eligible, faculty with renewable positions, postdoctoral faculty, and visiting faculty.

Faculty Type	Teach in Fall 2015	
	Yes	No
D1. Full-time faculty		
a. Tenured or tenure-eligible, or permanent (if your institution does not recognize tenure) faculty	☐	☐
b. Other full-time faculty..	☐	☐
D2. Part-time faculty	☐	☐
D3. Graduate teaching assistant(s) who teach courses independently (not counting the teaching of recitation sessions)	☐	☐

E. Mathematics Courses (Fall 2015)

In the next several pages you will enter data about courses your department is teaching. For each course that is taught, you will be asked to enter the fall 2015 enrollment and the number of sections of the course. Depending upon the type of course, you will be asked about distance learning enrollment and the numbers of each kind of faculty (tenure eligible, part time, etc.) who are teaching the course. Also, you may not teach some of your advanced courses in every term; for those courses we also ask whether the course was offered in spring 2015 or will be offered in spring 2016 (please combine the winter and spring terms if your institution uses the quarter system); please answer these questions regardless of whether you offer the courses in fall 2015.

The following instructions apply throughout Sections E, F, and G (pages 8-23).

- Report distance learning enrollments separately from other enrollments. Distance learning courses are those courses offered by your institution for credit, in which the majority of the instruction occurs with the instructor and the students separated by time and /or place (e.g. courses in which the majority of the course is taught online, or by computer software, or by other technologies), including MOOCs that are offered for credit. (a MOOC is a "massive open online course").
- Do NOT include any dual enrollment sections or enrollments in these tables. (In this questionnaire, a *dual enrollment* section is one that is conducted on a high school campus, taught by a high school teacher, and allows students to receive high school credit and, simultaneously, college credit from your institution for the course. These courses were reported in Section B.)
- For Calculus and Introductory Statistics classes, you will be asked to list separately classes taught in a large lecture format (with recitation/problem/laboratory sections) and, sections that meet as a class with an instructor at a regularly scheduled time (and are not divided into recitation sections). For example, for Mainstream Calculus I, you will be asked for both the number of large lecture courses (E12-1 column (c)) and the total number of recitation sections for all the large lectures (E12-2 column (c)).. There are other formats for handling large classes, but please treat any large class that is broken up into smaller units as a "lecture/recitation" class (even if there is no lecture); if neither the lecture/recitation or individual class format seems an appropriate description of the enrollment, enter the enrollment under "other".
- For all courses except as marked in E12, E13, E14, E15, F1, and F2, please do not treat recitation sessions as separate sections. Instead, please treat both the lecture component and any associated recitation sessions as a single section.
- Report a section of a course as being taught by a *graduate teaching assistant (GTA)* if and only if that section is taught *independently* by the GTA, i.e., when it is the GTA's own course and the GTA is the instructor of record.
- If your institution does not recognize tenure, report sections taught by your permanent full-time faculty in column (d) and sections taught by other full-time faculty in column (e).If your institution does recognize tenure but has faculty with renewable contracts, report these faculty as other full-time faculty (column e)
- Full-time faculty teaching in your department and holding joint appointments with other departments should be counted in column (d) if they are tenured, tenure-eligible, or permanent (if your institution does not recognize tenure) in your department. Faculty who are not tenured, tenure-eligible, or permanent in your department should be counted in column (f) if their fall 2015 teaching in your department is less than or equal to 50% of their total fall teaching assignment, and they should be reported in column (e) otherwise. (Example: If a tenured physics professor with a joint appointment in your department teaches a total of two courses in fall 2015, with exactly one being in your department and hence mathematics comprised 50% of the fall teaching assignment, then that person would be counted as part-time in your department.)
- Do not fill in any shaded boxes.
- Any unshaded box that is left blank will be interpreted as reporting a count of zero.
- Except where specifically stated to the contrary, the tables in Sections E, F, and G deal with enrollments in fall term 2015.
- If a section is co-taught by multiple faculty, categorize the section in terms of the most senior faculty member teaching that course.

E. Mathematics Courses (Fall 2015) (cont.)

◆ ***Cells left blank will be interpreted as zeros.***

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corresponding to column (b) (c)
MATHEMATICS			
PRECOLLEGE LEVEL			
E1. Precollege level (e.g., arithmetic, pre-algebra, elementary algebra, intermediate algebra)			
INTRODUCTORY LEVEL, INCLUDING PRE-CALCULUS			
E2. Mathematics for Liberal Arts			
E3. Finite Mathematics			
E4. Business Mathematics (non- Calculus)			

[1] Students receive the majority of their instruction online, or by computer software, or other technology where the instructor is NOT physically present (including MOOCs offered for credit)

[2] Do not include any dual enrollment courses, i.e., courses taught on a high school campus by a high school instructor for which high school students may obtain both high school credit and, simultaneously, college credit through your institution.

E. Mathematics Courses (Fall 2015) (cont.)

◆ ***Cells left blank will be interpreted as zeros.***

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corresponding to column (b) (c)
MATHEMATICS			
INTRODUCTORY LEVEL, INCLUDING PRE-CALCULUS, CONT.			
E5. Mathematics for pre-service K-8 School Teachers (all courses)			
E6. College Algebra (not included in the Precollege E1 above)			
E7. Trigonometry			
E8. College Algebra & Trigonometry (combined)			
E9. Elementary Functions, Pre- calculus, Analytic Geometry			
E10. Introduction to Mathematical Modeling			
E11. All other introductory-level non- Calculus courses			

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.
[2] Do not include any dual enrollment courses, i.e., courses taught on a high school campus by a high school instructor for which high school students may obtain both high school credit and, simultaneously, college credit through your institution.

E. Mathematics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corres-ponding to column (b) (c)	Of the number in column (c), how many sections are taught by: Full-time Faculty[3] Tenured or Tenure-eligible, Faculty (d)	Full-time Faculty[3] Other Full-time Faculty (e)	Part-time Faculty (f)	Graduate Teaching Assistants[4] (g)
MATHEMATICS							
MAINSTREAM[5] CALCULUS I							
E12-1. Lecture with separately scheduled recitation/problem/laboratory sessions[6]							
E12-2. Number of recitation/problem/laboratory sessions associated with courses reported in E12-1. See example [7] below.							
E12-3. Individual sections, not in E12-1, that meet as a class with an instructor at a regularly scheduled							
E12-4. Other sections, not listed above							
MAINSTREAM[5] CALCULUS II							
E13-1. Lecture with separately scheduled recitation/ problem/laboratory sessions[6]							
E13-2. Number of recitation/problem/ laboratory sessions associated with courses reported in E13-1. See example [7] below.							
E13-3. Sections not in E13-1, that meet as a class with an instructor at a regularly scheduled time							
E13-4. Other sections not listed above							

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.
[2] Do not include any dual enrollment courses, i.e., courses taught on a high school campus by a high school instructor for which high school students may obtain both high school credit and, simultaneously, college credit through your institution.
[3] Count faculty with joint appointments in column (d) if more than 50 percent of their fall 2015 teaching assignments are within your department, and in column (f) otherwise.
[4] Sections taught independently by GTAs .
[5] A calculus course is mainstream if it leads to the usual upper division mathematical sciences courses.
[6] Report a calculus class along with its recitation/problem/laboratory sessions as one section in column (c) of E12-1, E13-1, E14-1, and E15-1.
[7] Example: suppose your department offers four 100-student sections of a course and that each is divided into five student discussion sessions that meet separately from the lectures. Report 4*5=20 recitation/problem/laboratory sessions associated with the course, even if each discussion meets several times per week.

E. Mathematics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corres-ponding to column (b) (c)	Of the number in column (c), how many sections are taught by: Full-time Faculty[3] Tenured or Tenure-eligible Faculty (d)	Full-time Faculty[3] Other Full-time Faculty (e)	Part-time Faculty (f)	Graduate Teaching Assistants[4] (g)
MATHEMATICS							
MAINSTREAM[5] CALCULUS **III** (and **IV**, etc.)							
E14-1. Lecture with separately scheduled recitation/problem/laboratory sessions[6]							
E14-2. Number of recitation/problem/laboratory sessions associated with courses reported in E14-1. See example [7] below.							
E14-3. Individual sections not in E14-1, that meet as a class with an instructor at a regularly scheduled time							
E14-4. Other sections not listed above							
NON-MAINSTREAM[5] CALCULUS I							
E15-1. Lecture with separately scheduled recitation/problem/laboratory sessions[6]							
E15-2. Number of recitation/problem/laboratory sessions associated with courses reported in E15-1. See example[7] below.							
E15-3. Individual sections not in E15-1 that meet as a class with an instructor at a regularly scheduled							
E15-4. Other sections not listed above							

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.

[2] Do not include any dual enrollment courses, i.e., courses taught on a high school campus by a high school instructor for which high school students may obtain both high school credit and, simultaneously, college credit through your institution.

[3] Count faculty with joint appointments in column (d) if more than 50 percent of their fall 2015 teaching assignments are within your department, and in column (f) otherwise.

[4] Sections taught independently by GTAs .

[5] A calculus course is mainstream if it leads to the usual upper division mathematical sciences courses.

[6] Report a calculus class along with its recitation/problem/laboratory sessions as one section in column (c) of E12-1, E13-1, E14-1, and E15-1.

[7] Example: suppose your department offers four 100-student sections of a course and that each is divided into five student discussion sessions that meet separately from the lectures. Report 4*5=20 recitation/problem/laboratory sessions associated with the course, even if each discussion meets several times per week.

E. Mathematics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros.**

				Of the number in column (c), how many sections are taught by:			
				Full-time Faculty[3]			
Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corres-ponding to column (b) (c)	Tenured or Tenure-eligible Faculty (d)	Other Full-time Faculty (e)	Part-time Faculty (f)	Graduate Teaching Assistants[4] (g)
MATHEMATICS							
CALCULUS LEVEL, CONT.							
E16. Non-mainstream[5] Calculus I, II, III, etc.							
E17. Differential Equations and Linear Algebra (combined)							
E18. Differential Equations							
E19. Linear Algebra or Matrix Theory							
E20. Discrete Mathematics (not Discrete Structures, which is E29)							
E21. Freshman seminar (Only count courses that are not included elsewhere)							
E22. Other calculus-level courses							

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.
[2] Do not include any dual enrollment courses, i.e., courses taught on a high school campus by a high school instructor for which high school students may obtain both high school credit and, simultaneously, college credit through your institution.
[3] Count faculty with joint appointments in column (d) if more than 50 percent of their fall 2015 teaching assignments are within your department, and in column (f) otherwise.
[4] Sections taught independently by GTAs .
[5] A calculus course is mainstream if it leads to the usual upper division mathematical sciences courses.

E. Mathematics Courses (Fall 2015) (cont.)

In reporting on advanced courses, please pay special attention to the following instructions:

- If an undergraduate course contains a mixture of graduate and undergraduate students, report them all in column (a).
- If your institution does not recognize tenure, report sections taught by your permanent faculty in column (c).
- Make sure that no course is reported in more than one row.
- Respond to columns (d) and (e) for every course, even if the course is not offered in fall 2015.

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total enrollment fall 2015 (a)	Number of sections corresponding to column (a) (b)	Number of sections corresponding to column (b) taught by Tenured or Tenure-eligible Faculty (c)	Whether or not the course was offered in fall 2015: Was this course taught in ANY term of the previous academic year? (d)		Will this course be offered in the next term (spring 2016)? (e)	
MATHEMATICS							
ADVANCED UNDERGRADUATE LEVEL				Yes	No	Yes	No
E23. Introduction to Proofs				☐	☐	☐	☐
E24-1. Modern Algebra I				☐	☐	☐	☐
E24-2. Modern Algebra II				☐	☐	☐	☐
E25. Number Theory				☐	☐	☐	☐
E26. Combinatorics				☐	☐	☐	☐
E27. Actuarial Mathematics				☐	☐	☐	☐
E28. Logic/Foundations (not E23)				☐	☐	☐	☐
E29. Discrete Structures (beyond Discrete Mathematics, which is E20)				☐	☐	☐	☐
E30. History of Mathematics				☐	☐	☐	☐
E31. Geometry				☐	☐	☐	☐

E. Mathematics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total enrollment fall 2015 (a)	Number of sections corresponding to column (a) (b)	Number of sections corresponding to column (b) taught by Tenured or Tenure-eligible Faculty (c)	Whether or not the course was offered in fall 2015: Was this course taught in ANY term of the previous academic year? (d)		Will this course be offered in the next term (spring 2016)? (e)	
MATHEMATICS							
Advanced Undergraduate Level, cont.				Yes	No	Yes	No
E32-1. Advanced Calculus I and/or Real Analysis I				☐	☐	☐	☐
E32-2. Advanced Calculus II and/or Real Analysis II				☐	☐	☐	☐
E33. Advanced Mathematics for Engineering and Physical Sciences (all courses)				☐	☐	☐	☐
E34. Advanced Linear Algebra (beyond Differential Equations and Linear Algebra (combined) and Linear Algebra or Matrix Theory E17, E19)				☐	☐	☐	☐
E35. Vector Analysis				☐	☐	☐	☐
E36. Advanced Differential Equations (beyond Differential Equations E18)				☐	☐	☐	☐
E37. Partial Differential Equations				☐	☐	☐	☐
E38. Numerical Analysis I and II				☐	☐	☐	☐
E39. Applied Mathematics (Modeling)				☐	☐	☐	☐

E. Mathematics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total enrollment fall 2015 (a)	Number of sections corresponding to column (a) (b)	Number of sections corresponding to column (b) taught by Tenured or Tenure-eligible Faculty (c)	Whether or not the course was offered in fall 2015: Was this course taught in ANY term of the previous academic year? (d)		Will this course be offered in the next term (spring 2016)? (e)	
MATHEMATICS							
ADVANCED UNDERGRADUATE LEVEL, CONT.				Yes	No	Yes	No
E40. Complex Variables				☐	☐	☐	☐
E41. Topology				☐	☐	☐	☐
E42. Mathematics of Finance (not Academic Mathematics E27, or Applied Mathematics Modeling E39)				☐	☐	☐	☐
E43. Codes and Cryptology				☐	☐	☐	☐
E44. Biomathematics				☐	☐	☐	☐
E45. Operations Research (all courses)				☐	☐	☐	☐
E46. Senior Seminar/ Independent Study in Mathematics				☐	☐	☐	☐
E47. All other advanced level mathematics (excluding Math for Secondary School Teachers, Probability or Statistics courses)							
E48. Mathematics for Secondary School Teachers (all such courses not counted above)				☐	☐	☐	☐

E. Mathematics Courses (Fall 2015) (cont.)

Definition: Distance learning courses are those courses offered by your institution for credit, in which the majority of the instruction occurs with the instructor and the students separated by time and /or place (e.g. courses in which the majority of the course is taught online, or by computer software, or by other technologies), including MOOCs that are offered for credit. (A MOOC is a "massive open online course").

E49. Do you offer any advanced undergraduate mathematics courses (E23-E48) as distance learning courses?

Yes .... ☐ ⟶ If Yes, go to E50 below.

No .... ☐ ⟶ If No, go to Section F.

E50. Please indicate which advanced undergraduate mathematics courses you offer as distance learning courses. (Check all that apply.)

Course		Offer as distance learning
E23.	Introduction to Proofs	☐
E24-1.	Modern Algebra I	☐
E24-2.	Modern Algebra II	☐
E25.	Number Theory	☐
E26.	Combinatorics	☐
E27.	Actuarial Mathematics	☐
E28.	Logic/Foundations (not E23)	☐
E29.	Discrete Structures.(beyond E20)	☐
E30.	History of Mathematics	☐
E31.	Geometry	☐
E32-1.	Advanced Calculus I and/or Real Analysis I	☐
E32-2.	Advanced Calculus II and/or Real Analysis I	☐
E33.	Advanced Mathematics for Engineering and Physical Sciences (all courses)	☐
E34.	Advanced Linear Algebra (beyond E17, E19)	☐
E35.	Vector Analysis	☐
E36.	Advanced Differential Equations (beyond E18)	☐
E37.	Partial Differential Equations	☐
E38.	Numerical Analysis I and II	☐
E39.	Applied Mathematics (Modeling)	☐
E40.	Complex Variables	☐
E41.	Topology	☐
E42.	Mathematics of Finance (not E27, E39)	☐
E43.	Codes and Cryptology	☐
E44.	Biomathematics	☐
E45.	Operations Research (all courses)	☐
E46.	Senior Seminar/ Independent Study in Mathematics	☐
E47.	Other advanced level mathematics (excluding Math for Secondary School Teachers, Probability or Statistics courses)	☐
E48.	Mathematics for Secondary School Teachers (all such courses not counted above)	☐

F. Probability and Statistics Courses (Fall 2015)

F. Does your department offer any Probability and/or Statistics Courses?

Yes.................. ☐ ⟶ If Yes, go to F1 below.

No .... ☐ ⟶ If No, go to Section G.

Please refer to the course reporting instructions at the beginning of Section E.

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corres-ponding to column (b) (c)	Of the number in column (c), how many sections are taught by: Full-time Faculty[3] Tenured or Tenure-eligible Faculty (d)	Full-time Faculty[3] Other Full-time Faculty (e)	Part-time Faculty (f)	Graduate Teaching Assistants[4] (g)
STATISTICS							
INTRODUCTORY LEVEL							
Introductory Statistics (no calculus prerequisite)							
F1-1. Lecture with separately scheduled recitation/problem/laboratory sessions[5]							
F1-2. Number of recitation/problem/ laboratory sessions associated with courses reported in F1-1[6]							
F1-3. Individual sections not in F1-1, that meet as a class with an instructor at a regularly scheduled time Other sections							
F1-4. Other sections not listed above							

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.

[2] Do not include any dual enrollment courses, i.e., courses taught on a high school campus by a high school instructor for which high school students may obtain both high school credit and, simultaneously, college credit through your institution.

[3] Count faculty with joint appointments in column (d) or (e) if more than 50 percent of their fall 2015 teaching assignments are within your department, and in column (f) otherwise.

[4] Sections taught independently by GTAs .

[5] Report an introductory statistics class along with its recitation/problem/laboratory sessions as one section in column (c) of F1 and F-2.

[6] Example: suppose your department offers four 100-student sections of a course and that each is divided into five-student discussion sessions that meet separately from the lectures. Report 4*5=20 recitation/problem/laboratory sessions associated with the course, even if each discussion meets several times per week.

F. Probability and Statistics Courses (Fall 2015) (cont.)

Please refer to the course reporting instructions at the beginning of Section E.

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corres-ponding to column (b) (c)	Of the number in column (c), how many sections are taught by: Full-time Faculty[3] Tenured or Tenure-eligible (d)	Full-time Faculty[3] Other Full-time Faculty (e)	Part-time Faculty (f)	Graduate Teaching Assistants[4] (g)
STATISTICS							
INTRODUCTORY LEVEL							
Introductory Statistics (calculus prerequisite) (for non-majors)							
F2-1. Lecture with separately scheduled recitation/problem/laboratory sessions[5]							
F2-2. Number of recitation/problem/ laboratory sessions associated with courses reported in F2-1[6]							
F2-3. Individual sections not in F2-1,that meet as a class with an instructor at a regularly scheduled time							
F2-4. Sections not listed above							
Other Introductory Statistics Courses							
F3. Statistics for pre-service elementary and/or middle grade teachers							
F4. Statistics for pre-service secondary school teachers							
F5. Other introductory level Probability or Statistics courses for non-majors/minors							

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.

[2] Do not include any dual enrollment courses, i.e., courses taught on a high school campus by a high school instructor for which high school students may obtain both high school credit and, simultaneously, college credit through your institution.

[3] Count faculty with joint appointments in column (d) or (e) if more than 50 percent of their fall 2015 teaching assignments are within your department, and in column (f) otherwise.

[4] Sections taught independently by GTAs .

[5] Report an introductory statistics class along with its recitation/problem/laboratory sessions as one section in column (c) of F1 and F-2.

[6] Example: suppose your department offers four 100-student sections of a course and that each is divided into five-student discussion sessions that meet separately from the lectures. Report 4*5=20 recitation/problem/laboratory sessions associated with the course, even if each discussion meets several times per week.

F. Probability and Statistics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total enrollment fall 2015 (a)	Number of sections corresponding to column (a) (b)	Number of sections corresponding to column (b) taught by Tenured, Tenure-eligible, or Permanent Faculty (c)	Was this course taught in ANY term of the previous academic year? (d)		Will this course be offered in the next term (spring 2016)? (e)	
PROBABILITY & STATISTICS							
INTERMEDIATE AND ADVANCED LEVEL				Yes	No	Yes	No
F6. Introductory Probability and/or Statistics for majors/minors (no calculus prerequisite)							
F7. Combined Probability & Statistics (calculus prerequisite)							
F8. Probability (calculus prerequisite)							
F9. Mathematical Statistics (calculus prerequisite)							
F10. Stochastic Processes							
F11. Applied Statistical Analysis							
F12. Data Science/Analytics							
F13. Design & Analysis of Experiments							
F14. Regression (and Correlation)							
F15. Biostatistics							
F16. Nonparametric Statistics							
F17. Categorical Data Analysis							
F18. Sample Survey Design & Analysis							
F19. Statistical Software & Computing							
F20. Senior Seminar/Independent Studies							
F21. All other upper level Probability & Statistics							

F. Probability and Statistics Courses (Fall 2015) (cont.)

F22. Do you offer any intermediate/advanced undergraduate courses in statistics (F7-F21) as distance learning courses?

Yes................. ☐ ⟶ If Yes, go to F23 below.

No .... ☐ ⟶ If No, go to Section G.

F23. Please indicate which advanced undergraduate mathematics courses you offer as distance learning courses. (Check all that apply.)

	Course	Offer as distance learning
F6.	Introductory Probability and/or Statistics for majors/minors (no calculus prerequisite)	☐
F7.	Combined Probability & Statistics (calculus prerequisite)	☐
F8.	Probability (calculus prerequisite)	☐
F9.	Mathematical Statistics (calculus prerequisite)	☐
F10.	Stochastic Processes	☐
F11.	Applied Statistical Analysis	☐
F12.	Data Science/Analytics	☐
F13.	Design & Analysis of Experiments	☐
F14.	Regression (and Correlation)	☐
F15.	Biostatistics	☐
F16.	Nonparametric Statistics	☐
F17.	Categorical Data Analysis	☐
F18.	Sample Survey Design & Analysis	☐
F19.	Statistical Software & Computing	☐
F20.	Senior Seminar/ Independent Studies	☐
F21.	Other upper level Probability and/or Statistics	☐

G. Computer Science Courses (Fall 2015)

G. Does your department offer any Computer Science courses?

Yes.................. ☐ ⟶ If Yes, go to G1 below.

No .... ☐ ⟶ If No, go to Section J.

- *Please refer to the course reporting instructions at the beginning of Section E.*

In December 2013, a joint IEEE Computer Society/ACM Task Force issued its recommendations on “Computer Science Curricula 2013. That report, which listed 18 Knowledge Areas, is available by clicking http://www.acm.org/education/CS2013-final-report.pdf

- . Course titles that match Knowledge Areas are indicated below

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corres-ponding to column (b) (c)	Of the number in column (c), how many sections are taught by: Tenured or Tenure-eligible Faculty (d)	Other Full-time Faculty (e)	Part-time Faculty (f)	Graduate Teaching Assis-tants[3] (g)
COMPUTER SCIENCE							
GENERAL EDUCATION COURSES							
G1. Computers and Society, Issues in CS							
G2. Intro. to Software Packages							
G3. Other CS General Education Courses							

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.
[2] Do not include any dual enrollments (see Section B).
[3] Sections taught independently by GTAs.

G. Computer Science Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros.**

				Of the number in column (c), how many sections are taught by:			
Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corres-ponding to column (b) (c)	Tenured or Tenure-eligible Faculty (d)	Other Full-time Faculty (e)	Part-time Faculty (f)	Graduate Teaching Assistants[3] (g)
COMPUTER SCIENCE							
INTRODUCTORY CS COURSES							
G4. Computer Programming I							
G5. Computer Programming II							
G6. Discrete Structures DS)[4], but not math courses E20 or E29 in Section E above							
G7. All other introductory level CS courses							
INTERMEDIATE LEVEL							
G8. Algorithms and Complexity (AL)[4]							
G9. Architecture and Organization (AR)[4]							
G10. Operating Systems (OS)[4]							

[1]Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.
[2] Do not include any dual enrollments (see Section B).
[3] Sections taught independently by GTAs.
[4] Knowledge areas from Computer Science Curricula 2013

G. Computer Science Courses (Fall 2015) (cont.)

Mathematics Questionnaire

◆ **Cells left blank will be interpreted as zeros.**

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corresponding to column (b) (c)	Of the number in column (c), how many sections are taught by: Tenured or Tenure-eligible Faculty (d)	Other Full-time Faculty (e)	Part-time Faculty (f)	Graduate Teaching Assistants[3] (g)
COMPUTER SCIENCE							
INTERMEDIATE LEVEL CONT.							
G11. Networking and Communication (NC)[4]							
G12. Programming Languages (PL)[4]							
G13. Human-Computer Interaction (HCI)[4]							
G14. Intelligent Systems (IS)[4]							
G15. Information Management (IM)[4]							
G16. Social Issues and Professional Practice (SP)[4]							
G17. Software Development Fundamentals (SDF)[4]							
G18. Computational Science (CN)[4]							
UPPER LEVEL							
G19. Graphics and Visualization (GV)[4]							
G20: Information Assurance and Security (IAS)[4]							
G21: Parallel and Distributed Computing (PD)[4]							
G22. All other intermediate or advanced level CS Courses (including knowledge areas PBD, SE, SF[4])							

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.
[2] Do not include any dual enrollments (see Section B).
[3] Sections taught independently by GTAs.
[4] Knowledge areas from Computer Science Curricula 2013

H. Introductory Statistics Instruction

Introductory Statistics Instruction (taught within the mathematics department):

H1. Does your department offer an introductory statistics course for non-majors that has no calculus prerequisite?

Yes .... ☐ ⟶ If Yes, continue with H2.

No .... ☐ ⟶ If No, go to Section I.

H2. How many different kinds of introductory statistics courses for non-majors that have no calculus prerequisite does your department offer? (e.g. statistics for social scientists, for life scientists, etc.)

1 .... ☐

2 .... ☐

3 .... ☐

More than 3 ..... ☐

The following questions are about instruction in course F1: Introductory Statistics (no calculus prerequisite) on page18. If you offer more than one such course, choose the course that is aimed at the most general audience.

H3. In most sections of your introductory statistics course (as reported in course F1) the percentage of class sessions in which real data are used is generally approximately:

0-20% .... ☐

21-40% .... ☐

41-60% .... ☐

61-80% .... ☐

81-100% .... ☐

H4. In most sections of your introductory statistics course (as reported in course F1) the percentage of class sessions in which in-class demonstrations and/or in-class problem solving activities/discussions generally take place is approximately:

0-20% .... ☐

21-40% .... ☐

41-60% .... ☐

61-80% .... ☐

81-100% .... ☐

H. Introductory Statistics Instruction (cont.)

Mathematics Questionnaire

H5. Which, if any, of the following kinds of technology are used in a majority of the sections of your introductory statistics course (as reported in course F1)? (Check one on each line.)

	Yes	No
a. Graphing calculators	☐	☐
b. Statistical packages (e.g., R, JMP,SAS, SPSS, Minitab)	☐	☐
c. Educational software(e.g. software linked to the textbook)	☐	☐
d. Applets	☐	☐
e. Spreadsheets (e.g. Excel, GoogleDocs, Access)	☐	☐
f. Web-based resources including data sources or data analysis	☐	☐
g. Classroom response systems (e.g., clickers)	☐	☐
h. Online textbooks	☐	☐
i. Online videos	☐	☐

H6. Do most sections of the introductory statistics course (as reported in course F1) require assessments beyond homework, exams, and quizzes (assessments such as projects, oral presentations, written reports)?

Yes .... ☐

No .... ☐

H7: Which, if any, of the following topics are covered in the course (as reported in course F1)? (Check all that apply)

	Yes	No
a. Conditional probability........	☐	☐
b. Simulation to explore randomness........	☐	☐
c. Resampling techniques (e.g. bootstrapping, randomization tests)	☐	☐

H8. The instructors teaching introductory statistics course F1 typically have received the following highest degree in statistics: (Check one)

a. No graduate degree in statistics...................... ☐

b. A Masters' degree in statistics .... ☐

c. A Ph.D. degree in statistics............................. ☐

H9. Are there other introductory statistics courses at your institution, offered by departments outside of the mathematical sciences?

Yes .... ☐ If Yes, go to H10

No .... ☐ If No, go to Section I.

H10. Enter the Fall 2015 total enrollment in all such introductory courses, offered outside of the mathematical sciences, at your institution. ________

I. Undergraduate Program (Fall 2015)

Mathematics Questionnaire

If you do not offer a major in a mathematical science, check here ☐ and go to I5. Otherwise go to I1.

I1. Report the total number of your departmental majors who received their bachelor's degrees in the mathematical sciences or computer sciences between July 1, 2014 and June 30, 2015. Include joint majors and double majors[1] .... ☐

I2. Of the undergraduate degrees described in I1, please report the number who majored in each of the following categories. Each student should be reported only once. Include all double and joint majors[1] in your totals. Use the Other category for a major in your department who does not fit into one of the earlier categories.

Area of Major	Male	Female
a. Mathematics (including applied)		
b. Mathematics Education		
c. Statistics		
d. Computer Science		
e. Actuarial Mathematics		
f. Joint 1 Mathematics Majors		
g. Other mathematics majors		

[1] A "double major" is a student who completes the degree requirements of two separate majors, one in mathematics and one in another program or department. A "joint major" is a student who completes a single major in your department that integrates courses from mathematics and some other program or department and typically requires fewer credit hours that the sum of the credit hours required by the separate majors.

I. Undergraduate Program (Fall 2015) (cont.)

Mathematics Questionnaire

I3. To what extent must majors in your department complete the following? Check one box in each row.

	Required of all majors	Required of some but not all majors	Not required of any major
a. Modern Algebra I	☐	☐	☐
b. Real Analysis I	☐	☐	☐
c. Modern Algebra I or Real Analysis I (majors may choose either to fulfill this requirement)	☐	☐	☐
d. A one-year upper level sequence	☐	☐	☐
e. .At least one computer science course	☐	☐	☐
f. At least one statistics course	☐	☐	☐
g. At least one applied mathematics course beyond course E21 (in Section E)	☐	☐	☐
h. A capstone experience (e.g., a senior project, a senior thesis, a senior seminar, or an internship)	☐	☐	☐
i. An exit exam (written or oral)	☐	☐	☐

I4. Give your best estimate of the percentage of your department's graduating majors from the previous academic year 2014-15 (reported in I1) in each of the following categories. Please make the totals add to 100 percent.

a. Who went into pre-college teaching .... %

b. Who went to graduate school in the mathematical sciences .... %

c. Who went to professional school or to graduate school outside of the mathematical sciences .... %

d. Who took jobs in business, industry, government, etc. .... %

e. Who had other post-graduation plans known to the department .... %

f. Whose plans are not known to the department .... %

I. Undergraduate Program (Fall 2015) (cont.)

I5. Many departments today use a spectrum of program-assessment methods. Please indicate whether each of the following apply to your department's undergraduate program-assessment efforts during the last six years.

	Yes	No
a. We conducted a review of our undergraduate program that included one or more reviewers from outside of our institution	☐	☐
b. We asked graduates of our undergraduate program to comment on and suggest changes in our undergraduate program	☐	☐
c. Other departments at our institution were invited to comment on the preparation that their students received in our courses	☐	☐
d. Data on our students' progress in subsequent mathematics courses were gathered and analyzed	☐	☐
e. We have assessed student learning objectives in courses required in our major..	☐	☐
f. We have a placement system for first-year students and we gathered and analyzed data on its effectiveness	☐	☐
g. Our department's program assessment activities led to changes in our undergraduate program	☐	☐

I6. Which of the following are significant sources of information to the department about the types of pedagogy used in instruction in your department? (Check all that apply.)

a. Syllabi for classes .... ☐
b. Teaching portfolios .... ☐
c. Peer evaluations of instructors......................... ☐
d. Self–evaluations of instructors .... ☐
e. Department discussions of teaching practices ☐
f. None of these are available .... ☐ go to I10

I7. Which of the following pedagogical strategies are used by some member of your department faculty: (Check all that are used.)

a. Inquiry based class .... ☐
b. "Flipped classroom" .... ☐
c. Class conducted largely online .... ☐
d. Activity based learning... ☐
e. Technology used to develop conceptual understanding........... ☐

I. Undergraduate Program (Fall 2015) (cont.)

I8. Has your department seen major changes over the last ten years in the kinds of pedagogy used in your department?

Yes .... ☐ Go to I9

No .... ☐ Go to I10

I9. Which of the following factors were significant reasons for the changes made to the kinds pedagogy used in your department over the last ten years? (Check all that apply.)

a. Educational research .... ☐
b. Advocacy of some faculty member in our department............. ☐
c. Advocacy by another department .... ☐
d. Advocacy by institution's administrators.................................. ☐
e. Advocacy by a professional organization .... ☐

I. Undergraduate Program (Fall 2015) (cont.)

I10. For each of the following opportunities, indicate whether or not it is available to your undergraduate mathematical sciences students through your department or institutions.

	Yes	No
a. Honors sections of departmental courses	☐	☐
b. An undergraduate Mathematical Science Club	☐	☐
c. Special mathematics programs to encourage women	☐	☐
d. Special mathematics programs to encourage minorities	☐	☐
e. Opportunities to participate in mathematical science contests	☐	☐
f. Special mathematics statistics lectures/colloquia not part of a mathematical science club	☐	☐
g. Mathematical sciences outreach opportunities in local K–12 schools	☐	☐
h. Undergraduate research opportunities in mathematical sciences	☐	☐
i. Independent study opportunities in mathematical sciences	☐	☐
j. Assigned faculty advisers in mathematical sciences	☐	☐
k. Opportunity to write a senior thesis in mathematical sciences	☐	☐
l. A career day for mathematical sciences majors	☐	☐
m. Special advising about graduate school opportunities in mathematical sciences	☐	☐
n. Opportunity for an internship experience	☐	☐
o. Opportunity to participate in a senior seminar	☐	☐
p. Opportunity to tutor, grade papers, or TA in the department	☐	☐
q. Opportunity to provide mathematical or statistical consulting to client	☐	☐

I11. Give your best estimate of the number of all of your majors who have participated in each of the following activities over the past year September 1, 2014 – August 31, 2015.

a. Undergraduate research project in the mathematical sciences __________

b. Internship in mathematical sciences__________

c. Mathematical or statistical consulting to client __________

I. Undergraduate Program (Fall 2015) (cont.)

Mathematics Questionnaire

I12. Does your department offer interdisciplinary course(s) in any of the following areas below: (Check all that apply.) An interdisciplinary course is one in which mathematics is taught with relation to another field such as mathematics and economics, or mathematics and education; do not include calculus courses.

a. Mathematics and finance or business .... ☐

b. Mathematics and biology .... ☐

c. Mathematics and the study of the environment .... ☐

d. Mathematics and engineering or the physical sciences .... ☐

e. Mathematics and economics .... ☐

f. Mathematics and social sciences other than economics .... ☐

g. Mathematics and education .... ☐

h. Mathematics and the humanities .... ☐

i. Mathematics and computer science .... ☐

j. Other .... ☐

I13a. Does your department offer a minor in statistics?

Yes .... ☐ if yes go to I13b

No .... ☐ if no go to I14

I13b. How many students graduated with a minor in statistics from your department between July 1, 2014 and June 30, 2015? _____

I14. Does your department offer a major in statistics?

Yes .... ☐ if yes go to I15

No .... ☐ if no go to I16

I. Undergraduate Program (Fall 2015) (cont.)

I15. To what extent must statistics majors in your department complete the following? Check one box in each row.

	Required of all majors	Required of some but not all majors	Not required of any major
a. Calculus I	☐	☐	☐
b. Calculus II	☐	☐	☐
c. Multivariable Calculus	☐	☐	☐
d. Linear Algebra/Matrix Theory	☐	☐	☐
e. At least one computer science course	☐	☐	☐
f. At least one applied mathematics course (not including a, b, c, d above)	☐	☐	☐
g. A capstone experience (e.g., a senior project, a senior thesis, a senior seminar, or an internship)	☐	☐	☐
h. An exit exam (written or oral)	☐	☐	☐
i. At least one upper level Probability course	☐	☐	☐
j. At least one upper-level Mathematical Statistics course	☐	☐	☐
l. At least one applied statistics course	☐	☐	☐
m. At least one upper-level Linear Models course	☐	☐	☐
n. One Bayesian Inference course	☐	☐	☐

I16. Does your institution allow a student to meet an institutional or divisional graduation requirement in the mathematical sciences using an Advanced Placement course (taken while the student was in high school)?

Yes .... ☐

No .... ☐

I. Undergraduate Program (Fall 2015) (cont.)

Mathematics Questionnaire

I17. Responses to this question will be used to project total enrollment in the current (2015-2016) academic year based on the pattern of your departmental enrollments in 2014-2015. Do NOT include any numbers from dual enrollment courses in answering question I17.

a. Previous fall (2014) total student enrollment in your department's undergraduate mathematics, statistics, and computer science courses (remember: do not include dual enrollment courses[1]) ☐

b. Previous academic year (2014–2015) total enrollment in your department's undergraduate mathematics, statistics, and computer science courses, excluding dual enrollments and excluding enrollments in summer school 2015 ☐

c. Total enrollment in your department's undergraduate mathematics, statistics, and computer science courses in summer school 2015 .... ☐

d. Total enrollment in Calculus II in winter/spring term of 2015 (combine the winter and spring terms if using the quarter system) .... ☐

e. Total number of sections in Calculus II in winter/spring term of 2015 .... ☐

[1] In this question, the term "dual enrollment courses" is used to mean courses taught on a high school campus, by high school teachers, for which high school students may obtain high school credit and, simultaneously, college credit through your institution.

J. Pre-service Teacher Education in Mathematic

Questions regarding the mathematical preparation for secondary (generally grades 9-12) pre-service teachers of mathematics:

J1. Does your institution have a program of certification for pre-service secondary teachers (i.e. a program that leads to obtaining credentials to teach secondary mathematics (generally grades 9-12) in public high schools of your state)?

Yes................. ☐ ⟶ If Yes, go to J2.

No .... ☐ ⟶ If No, skip to J5.

J2. How many semester hours of mathematics courses from your department are required by your institution's program of certification for pre-service secondary mathematics teachers (grades 9-12)? ______

J3. How many semester hours of mathematics courses from your department with a primary focus on high school mathematics from an advanced viewpoint are required in your institution's program of certification for pre-service secondary mathematics teachers (grades 9-12)? _______

J4. Considering the teacher preparation program at your institution, in each of the following core areas indicate whether the core area is required of all students seeking mathematics certification, if the course is generally taken by those seeking certification (if it is not required), and if in that core area your department offers a special course that is specifically designed for pre-service secondary mathematics teachers.

Course	Required		Generally Taken		Special Course Offered	
	Yes	No	Yes	No	Yes	No
a. Advanced Calculus/Analysis	☐	☐	☐	☐	☐	☐
b. Modern Algebra	☐	☐	☐	☐	☐	☐
c. Number Theory	☐	☐	☐	☐	☐	☐
d. Geometry	☐	☐	☐	☐	☐	☐
e. Discrete Mathematics	☐	☐	☐	☐	☐	☐
f. Statistics	☐	☐	☐	☐	☐	☐
g. Probability	☐	☐	☐	☐	☐	☐
h. History of Mathematics	☐	☐	☐	☐	☐	☐
i. Other (_______________)	☐	☐	☐	☐	☐	☐

J. Pre-service Teacher Education in Mathematic (cont.)

Questions regarding the mathematical preparation for middle grades (generally grades 6-8) pre-service teachers of mathematics:

J5. Does your institution have a program of certification for pre-service middle-grade teachers of mathematics (i.e. a program that leads to obtaining credentials to teach mathematics in grades 6-8 in public schools in your state)?

Yes.................. ☐ ⟶ If Yes, go to J6.

No .... ☐ ⟶ If No, skip to J8.

J6. How many semester hours of courses in mathematics from your department are required by your institution's program of certification for pre-service middle grades (6-8) teachers of mathematics?

____

J7. How many semester hours of courses from your department on fundamental ideas of mathematics appropriate for middle grade teachers are required by your institution's program of certification for pre-service middle grades (6-8) teachers of mathematics? ______

Certification requirements for pre-service elementary (generally grades K-5) teachers of mathematics

J8. Does your institution have a program of certification for pre-service elementary teachers of mathematics in grades K-5 (i.e. a program that leads to obtaining credentials to teach mathematics in grades K-5 in public schools in your state)?

Yes.................. ☐ ⟶ If Yes, go to J9.

No .... ☐ ⟶ If No, skip to section K.

J9. How many semester hours of courses in mathematics from your department are required by your institution's program of certification for pre-service elementary grades (K-5) teachers of mathematics? _________________

J10. How many semester hours of courses from your department on fundamental ideas of mathematics appropriate for elementary teachers are required by your institution's program of certification for prospective elementary grades (K-5) teachers of mathematics? ______________

K. Comments and Suggestions

Mathematics Questionnaire

If you found some question(s) difficult to interpret or answer, please let us know. We welcome suggestions to improve future surveys (e.g., CBMS 2020).

Comments:____

Thank you for completing this questionnaire. We know it was a time-consuming process and we hope that the resulting survey report, which we hope to publish in spring 2017, will be of use to you and your department.

Please keep a copy of your responses to this questionnaire in case questions arise.

Appendix V

Other Full-Time Faculty Survey

Annual Survey
of the Mathematical Sciences
AMS · ASA · IMS · MAA · SIAM

Other Full-time Faculty Survey

www.ams.org/annual-survey/surveyforms.html

Return to: American Mathematical Society · P.O. Box 6248 · Providence, RI 02940-6248
Email: ams-survey@ams.org · Fax: 401-331-3842 (Attn:Surveys) · Tel: 800-321-4267, ext. 4189
Web: www.ams.org/webdeptprofile

Institution name: ____

Department name: ____

City/State/Zipcode: ______________________________ Date: ______________

Name of person completing form: ______________________ Title: ______________

Email: ______________________________ Phone: ______________

Please complete this form by June 1, 2016, keeping a copy for your records, and return it to the above address.

The purpose of this brief questionnaire is to obtain detailed information about the early career arcs of individuals with PhDs in mathematical sciences. The results of this survey will be reported in the next 2015 CBMS Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States.

1. Indicate the number of individuals in your department in 2014–15 who were postdoctoral faculty (those in a temporary position primarily intended to provide an opportunity to extend graduate training or to further research experience) _______ [1.a]; of these how many are not classifiable as postdoctoral research faculty in your department in 2015–16 _______ [1.b] (include postdocs who remain in your department in a different appointment).

Of those reported in [1.b], give the number whose employment status in 2015–16 (at your institution or elsewhere) is

_____[1.c] A tenure-track appointment
_____[1.d] Another postdoctoral research appointment
_____[1.e] A renewable appointment
_____[1.f] A non-renewable appointment
_____[1.g] A non-academic appointment
_____[1.h] Unemployed
_____[1.i] Unknown

continued on next page

continued from previous page

2. Indicate the number of faculty in your department during 2014–15 not counted in [1.a] who were in renewable non-tenure-track positions (e.g. lecturer, teaching professional, professor of the practice) ________[2.a]; of these how many are not in your department in 2015–16 ________[2.b].

Indicate the number of faculty in your department in 2015–16 in renewable non-tenure-track, non-postdoc positions ________ [2.c]

Of those reported in [2.c], indicate the number who are typically engaged in each of the following activities (note that the sum of the values entered here may be larger than that in [2.c]):

______[2.d] Teaching
______[2.e] Research
______[2.f] Attend research conferences with financial support
______[2.g] Attend teaching conferences with financial support
______[2.h] Serve on department committees
______[2.i] Advise undergraduate research projects
______[2.j] Serve as academic advisor to undergraduates or graduate students
______[2.k] Serve on university/college committees
______[2.l] Serve as department course coordinators

3. Indicate the number of faculty in your department during 2014–15 not counted in [1.a] who were in fixed-term (not renewable) non-tenure-track positions ________[3.a]; of these how many are not in your department in 2015–16 ________[3.b].

Indicate the number of faculty in your department in 2015–16 in fixed-term (not renewable) non-tenure-track, non-postdoc positions ________ [3.c]

Of those reported in [3.c], indicate the number who are typically engaged in each of the following activities (note that the sum of the values entered here may be larger than that in [3.c]):

______[3.d] Teaching
______[3.e] Research
______[3.f] Attend research conferences with financial support
______[3.g] Attend teaching conferences with financial support
______[3.h] Serve on department committees
______[3.i] Advise undergraduate research projects
______[3.j] Serve as academic advisor to undergraduates or graduate students
______[3.k] Serve on university/college committees
______[3.l] Serve as department course coordinators

Appendix VI

Two-Year Mathematics Questionnaire

TWO-YEAR QUESTIONNAIRE

CBMS2015

CONFERENCE BOARD OF THE MATHEMATICAL SCIENCES

SURVEY OF UNDERGRADUATE PROGRAMS IN THE MATHEMATICAL SCIENCES

General Information

Two-Year College Mathematics Questionnaire

As part of a random sample, your department has been selected to participate in the CBMS 2015 National Survey, the importance of which has been endorsed by all of our major professional societies. Please read the instructions in each section carefully and complete all of the pertinent item s as indicated.

If your college does not have a departmental or divisional structure, consider the group of all mathematics instructors to be the "mathematics department" for the purpose of this survey.

Because your campus is part of a multi-campus two-year system, special instructions apply. Our understanding is that your campus is administered separately from some of the other campuses in the system. Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department. If you disagree with this characterization of your multi-campus, please call Westat at 855-680-1849.

This questionnaire should be completed by the person who is directly in charge of the mathematics program or department on your campus.

Report on all of your courses and instructors that fall under the general heading of the mathematics program or department. Include all mathematics and statistics courses taught within your mathematics program or department. You will also be asked separately about enrollments in mathematics courses outside of the mathematics department: for example, mathematics courses administered in a developmental education division.

We have classified your department as belonging to a two-year college, to a college or campus within a two-year system, or to a two-year branch of a university system. If this is not correct, please contact Richelle (Rikki) Blair at the email address or telephone number given below.

We recommend completing this questionnaire online because the online system will automatically skip those questions that are not applicable to you (based on the responses you give). However, this survey may be completed using a hard-copy questionnaire.

If you have any questions, please contact Richelle (Rikki) Blair, Associate Director for Two-Year Colleges, by email at richelle.blair@sbcglobal.net or by phone at 440-212-5965. For help with the online questionnaire, call Westat at 855-680-1849 or send an email to cbms2015@westat.com.

Please return your completed questionnaire by October 31, 2015, either online or by mailing a hard copy to:

CBMS Survey
Westat
1600 Research Boulevard, RB 3103
Rockville, MD 20850-3129

Please retain a copy of your responses to this questionnaire in case questions arise.

A. General Information

PLEASE PRINT CLEARLY

A1. Name of your campus:____

A2. Name of your department: ______________________________________

A3. Mailing address of the multi-campus organization to which your campus belongs (if any). (Write NA if your campus does not belong to a multi-campus organization.)

____

____

A4. We have classified your department as belonging to a two-year college or to a college campus within a two-year college system, or to a two-year branch of a university system. Do you agree?

Yes.................. ☐ ⟶ go to the next question.

No .... ☐ ⟶ please contact Richelle (Rikki) Blair, Survey Associate Director, by email (richelle.blair@sbcglobal.net) or by phone (440-212-5965) before proceeding any further.

A5. What is the unit (= academic discipline group) that most directly administers the mathematics program on your campus? (Check one box.)

Mathematics Department (department does not offer Computer Science) .... ☐

Mathematics and Computer Science Department or Division (department also offers Computer Science, whether or not it is part of the title) .... ☐

Mathematics and Science Department or Division .... ☐

Other Departments or Division .... ☐

A. General Information

Two-Year College Mathematics Questionnaire

A6. To help us project enrollment for the current academic year (2015–2016), please give the following enrollment figures for the previous academic year (2014–2015) not counting summer enrollment.

a. Fall 2014 total student enrollment in your mathematics program .... ☐

b. Entire academic year 2014–2015 enrollment in your mathematics program .... ☐

c. Calculus II total enrollment in winter/spring 2015 .... ☐

d. Calculus II total number of sections in winter/spring 2015 .... ☐

A7. Does your college organize its **developmental education**, including mathematics, in a separately administered department or division?

Yes .... ☐

No .... ☐

A8. Your name or contact person in your department: ☐

A9. Your email address or contact person's e-mail address: ☐

A10. Your phone number or contact person's phone number including area code: (   )

A11. Campus mailing address: ☐

B. Mathematics Faculty in Mathematics Department/Program (Fall 2015)

- Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.
- Underlined faculty categories defined in this section will be used in later sections.

B1. For fall 2015, what is the **total number of full-time mathematics faculty in your department/program**, both permanent and temporary, including those on leave or sabbatical?

Number of full-time mathematics faculty .... ☐

B2. Of the number in B1, how many are tenured, tenure-eligible, or on your permanent faculty (including faculty who are on leave or sabbatical)? We will refer to these as "**permanent full-time faculty.**"

Number of permanent full-time faculty .... ☐

B3. Of the number in B1, how many are non-tenured, continuing full-time faculty? We will refer to these as "**non-tenure track full-time faculty.**"

Number of non-tenure track full-time faculty .... ☐

B4. Give the number of **"other full-time faculty"** by computing B1 minus (B2 and B3) ☐

B5. For the **permanent full-time faculty** reported in B2,

a. give the required teaching assignment in weekly contact hours .... ☐

b. give the maximum number of hours of the teaching assignment in B5a that can be met by teaching distance learning classes (= classes where at least half the students receive the majority of instruction by technological or other methods where the instructor is not physically present) (write -1 if your institution does not have distance learning or does not have such a policy) ...... ☐

c. give the number of office hours required weekly in association with the teaching assignment in B5a (count all office hours, including those offered online).. ☐

B6. Of the **permanent full-time faculty** reported in B2, how many teach extra hours for extra pay at your campus or within your organization?

Number who teach extra hours for extra pay at your campus or within your organization .... ☐

B. Mathematics Faculty in Mathematics Department/Program (Fall 2015) (cont.)

B7. Of the **permanent full-time faculty** reported in B2, how many permanent faculty teach extra hours per week in the following categories?

a. Number who teach 1–3 hours extra weekly .... ☐

b. Number who teach 4–6 hours extra weekly .... ☐

c. Number who teach 7 or more hours extra weekly .... ☐

B8. For fall 2015, how many **part-time mathematics faculty** are teaching in your department ? (Note: none of these were reported above.)

a. Number of part-time mathematics faculty **paid by your college** .... ☐

b. Number of part-time faculty paid only by a third party, such as a school district paying faculty who teach dual-enrollment courses (= courses taught in high school by high school teachers for which students may obtain high school credit and simultaneous college credit through your institution) .... ☐

c. **Total number of part-time faculty** (add B8a and B8b) .... ☐

B9. How many **part-time faculty paid by your college** (reported in B8a) teach 6 or more hours per week?

Number in B8a teaching 6 or more hours/week .... ☐

B10. Are office hours required by college policy for the **part-time faculty paid by your college** (reported in B8a)?

Yes .... ☐

No .... ☐

C. Distance Learning

Definition: Distance learning courses are courses offered by your institution for credit, in which the majority of instruction occurs with the instructor and the students separated by time and/or place (e.g., courses in which the majority of the course is taught online or by computer software or other technologies, including MOOCs (a MOOC is a "massive open online course")).

C1. Does your institution give (transfer) credit for any distance learning course in the mathematical sciences that is not taught by faculty in your institution?

Yes .... ☐

No .... ☐

C2. Does your institution have a limit on the number of credits earned in distance learning courses that can be counted toward graduation?

Yes .... ☐

No .... ☐

C2a. What is the limit on the number of credits earned in distance learning courses that can be counted toward graduation?

Number of courses: ☐

C3. Has your department taught any distance learning courses in 2013-2015?

Yes.................. ☐ → go to C4.

No .... ☐ → skip to D1.

C4. Which best characterizes the format/structure of the majority of your distance learning courses? (Check one box.)

Completely online: Instruction takes place entirely online .... ☐

Hybrid: Instruction takes place in a combination of face-to-face and online formats....... ☐

Other specify: ____ ☐

C5. How are the instructional materials used in distance learning courses generally determined? (Check one box.)

Course instructors create materials .... ☐

Course instructors choose commercially produced materials....................................... ☐

Course instructors choose a combination of both .... ☐

C. Distance Learning (cont.)

C6. In most of your distance learning courses, how and where do students take the majority of their tests? (Check one box.)

Not monitored .... ☐

Online, but using some kind of monitoring technology .... ☐

At a monitored testing site .... ☐

Combination of the above .... ☐

C7. If a faculty member teaches his/her entire teaching load using distance education, how often is the faculty member required to be on campus to meet with students? (Check one box.)

Never .... ☐

Only for a particular scheduled meeting or student appointment .... ☐

A specified number of office hours per week .... ☐

Not applicable .... ☐

C8. Do the instructors in your distance learning courses generally participate in evaluation of instruction using the same criteria and types of evaluation tools as faculty who teach comparable non-distance learning courses?

Yes .... ☐

No .... ☐

C9. Which, if any of the following practices, applies to the majority of distance learning courses in your department? (Please check one box on each line.)

	Yes	No
a. Same examinations as in the face-to-face course	☐	☐
b. Same common course outlines as in the face-to-face course	☐	☐
c. Same course projects	☐	☐
d. More course projects than in the non-distance learning course	☐	☐

C. Distance Learning (cont.)

C10. Rate the following challenges that your department faces when creating and/or offering distance learning mathematics courses. (Rate on a scale of 1 = not a challenge, 3 = somewhat of a challenge, 5 = very significant challenge.) (Please check one box in each line.)

Challenge	1	3	5
a. Maintaining a standard and reliable network/user platform.	☐	☐	☐
b. Maintaining a level of rigor in distance learning mathematics courses equivalent to courses offered face-to-face.	☐	☐	☐
c. Faculty knowledge about technology.	☐	☐	☐
d. Student success rates in online distance mathematics courses are lower than face-to-face courses with similar content.	☐	☐	☐
e. Student success rates in online distance mathematics courses are higher than face-to-face courses with similar content.	☐	☐	☐

C11. In the three years 2013-2015, has your department taught any mathematics course for credit that could be characterized as a MOOC?

Yes.................. ☐ ⟶ go to C12.

No .... ☐ ⟶ go to D1.

C12. In which of the following content areas has your department offered a MOOC during 2013-2015 (Check all that apply).

a. Developmental Mathematics.. ☐
b. College-Level Mathematics below Calculus................................. ☐
c. Calculus.. ☐
d. College-Level Mathematics above Calculus.................................. ☐
e. Teacher Preparation .... ☐
f. Statistics .... ☐
g. Other (specify) ____ ☐

C13. What is the total number of students enrolled in MOOCs offered by your department (for credit) in Fall 2015?

Number of students: ☐

D. Redesign of Developmental Mathematics

Two-Year College Mathematics Questionnaire

D1. Has your mathematics department or developmental education department implemented a "Pathways" course sequence? (Pathways is defined to be a redesign of a mathematics sequence that provides students with an alternative course or sequence to/through developmental mathematics and to/through a college-level mathematics or statistics course).

Yes.................. ☐ ⟶ Go to D2

No .... ☐ ⟶ Go to D3

D2. Which of the following "Pathways" courses have you implemented? Please list the enrollment in Fall 2015.

	Implemented?		Fall 2015 Enrollment
	Yes	No	
a. Foundations			
b. Quantitative Reasoning/Literacy			
c. Statistics			
d. Other			

D3. In what ways have any of these groups of mathematics courses changed significantly in the last five years? (Check all that apply.)

		Pre-College: Arithmetic, Pre-Algebra, Beginning Algebra, Intermediate Algebra	**Statistics**	**College-Level Non-STEM: College Algebra, Math for Liberal Arts, Finite Math, Quantitative Reasoning**	**College-Level STEM: College Algebra/ Trigonometry, Precalculus, Calculus and above**
Content					
i)	Students collect, organize, and analyze real data				
ii)	Student solves contextually-based problems/applications				
iii)	Course includes modeling				
iv)	Course focuses on quantitative reasoning				
v)	Course has less symbol manipulation and more emphasis on conceptual understanding				

D. Redesign of Developmental Mathematics (cont.)

		Pre-College: **Arithmetic, Pre-Algebra, Beginning Algebra, Intermediate Algebra**	**Statistics**	**College-Level Non-STEM:** **College Algebra, Math for Liberal Arts, Finite Math, Quantitative Reasoning**	**College-Level STEM:** **College Algebra/ Trigonometry, Precalculus, Calculus and above**
Delivery Methods					
i)	Emporium model				
ii)	Students complete prescribed modules				
iii)	Flipped Classroom				
iv)	Accelerated pace				
v)	Slower pace				
Instructional Strategies routinely include:					
i)	Group work				
ii)	Use of handheld devices				
iii)	Use of computer programs or internet				
iv)	Use of Excel spreadsheets				
v)	Guided questioning and less lecturing				
vi)	Active learning strategies				

E. Dual Enrollment Courses

- Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.

- **Definition**: We use the term "dual-enrollment courses" to refer to courses conducted on a high school campus and taught **by high school teachers,** for which students may obtain high school credit and, simultaneously, college credit through your institution.

E1. Does your department participate in any dual-enrollment program of the type defined above?

Yes.................. ☐ ⟶ go to E2.

No .... ☐ ⟶ go to E5.

E2. Please provide the head-count enrollment for your dual-enrollment program (as defined above) for the spring term of 2015 and for the current fall term of 2015.

Course	**Total Dual Enrollments Last Term = Spring 2015**	**Total Dual Enrollments This Term = Fall 2015**
a. College Algebra		
b. Precalculus		
c. Calculus I		
d. Statistics		
e. Other		

E3. Are the high school instructors in the dual-enrollment courses reported in E2 required to participate in a teaching evaluation program conducted by your institution?

Yes .... ☐

No .... ☐

E4. Does your department assign any of its own full-time or part-time faculty to teach courses on a high school campus for which high school students may receive both high school and college credit through your institution?

Yes.................. ☐ ⟶ go to E5.

No .... ☐ ⟶ go to Section F.

E. Dual Enrollment Courses (cont.)

E5. In fall 2015, how many students are enrolled in the courses conducted on a high school campus and taught by your full-time or part-time faculty and through which high school students may receive both high school and college credit through your institution?

Number of students....................... ☐

E6. Does your institution participate in a program that allows high school students to enroll in a mathematics course on your campus and receive both high school and college credit?

Yes .... ☐

No .... ☐

F. Mathematics Courses (Fall 2015)

The following instructions apply throughout **Section F**. Read them carefully before you begin filling out the tables.

Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.

- When completing this section, do **not** include courses taught in other departments, learning centers, or developmental/remedial programs separate from your mathematics program or department. Those enrollments will be listed in Section P.
- Read the row and column labels carefully. If the titles of courses listed below do not coincide exactly with yours, use your best judgment about where to list your courses. List each course only **once**. Note that the **part-time faculty** in Column f are those reported in B8(a) (part-time faculty paid by your college). Column f should **not** include any of your full-time faculty who teach an overload section.
- If a course is **not** taught at your campus during the fall term or if it is never taught at your campus, leave the cell blank.
- Do **not** include dual-enrollment sections taught in high school by high school teachers for which students receive simultaneous high school and college credit through your institution.

◆ **Cells left blank will be interpreted as zeros**

					LIST THE NUMBER OF SECTIONS FROM COLUMN (d) THAT:			
Name of Course (or equivalent)	Total number of **students** enrolled fall 2015 via distance learning[a] (a)	Total number of **sections** taught fall 2015 via distance learning[a] (b)	Total number of on-campus **students** enrolled fall 2015[b] (c)	Total number of on-campus **sections** fall 2015[b] (d)	have enrollment above 30 (e)	are taught by part-time faculty[c] (f)	have common Department exams (g)	use a Homework Management system (h)
F1. Arithmetic/Basic Mathematics								
F2. Pre-Algebra								
F3. Elementary Algebra (high school level)								
F4. Intermediate Algebra (high school level)								
F5. Geometry (high school level)								

[a] Distance learning courses are courses offered by your institution for credit, in which the majority of instruction occurs with the instructor and the students separated by time and/or place (e.g., courses in which the majority of the course is taught online or by computer software or other technologies, including MOOCs (a MOOC is a “massive open online course”)).
[b] These students are **not** included in column a.
[c] Do **not** include full-time mathematics faculty teaching an overload section in this column. Include only part-time faculty reported in B8a, i.e., those paid by your college.
[d] Only count sections where these tools are an integral part of the course

F. Mathematics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros**

Name of Course (or equivalent)	Total number of **students** enrolled fall 2015 via distance learning[a] (a)	Total number of **sections** taught fall 2015 via distance learning[a] (b)	Total number of on-campus **students** enrolled fall 2015[b] (c)	Total number of on-campus **sections** fall 2015[b] (d)	**LIST THE NUMBER OF SECTIONS FROM COLUMN (d) THAT:** have enrollment above 30 (e)	are taught by part-time faculty[c] (f)	have common Department exams (g)	use a Homework Management system (h)
F6. College Algebra (level beyond intermediate Algebra)								
F7. Trigonometry								
F8. College Algebra and Trigonometry, combined								
F9. Introduction to Mathematical Modeling								
F10. Precalculus/Elementary Functions/Analytic Geometry								

[a]Distance learning courses are courses offered by your institution for credit, in which the majority of instruction occurs with the instructor and the students separated by time and/or place (e.g., courses in which the majority of the course is taught online or by computer software or other technologies, including MOOCs (a MOOC is a “massive open online course”))

[b]These students are **not** included in column a.

[c]Do **not** include full-time mathematics faculty teaching an overload section in this column. Include only part-time faculty, reported in B8a, i.e., those paid by your college.

F. Mathematics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros**

Name of Course (or equivalent)	Total number of **students** enrolled fall 2015 via distance learning[a] (a)	Total number of **sections** taught fall 2015 via distance learning[a] (b)	Total number of on-campus **students** enrolled fall 2015[b] (c)	Total number of on-campus **sections** fall 2015[b] (d)	LIST THE NUMBER OF SECTIONS FROM COLUMN (d) THAT: have enrollment above 30 (e)	are taught by part-time faculty[c] (f)	have common Department exams (g)	use a Homework Management system (h)
F11. Mainstream Calculus I[d]								
F12. Mainstream Calculus II[d]								
F13. Mainstream Calculus III[d]								
F14. Non-Mainstream Calculus I[e]								
F15. Non-Mainstream Calculus II[e]								
F16. Differential Equations								
F17. Linear Algebra								
F18. Discrete Mathematics								

[a]Distance learning courses are courses offered by your institution for credit, in which the majority of instruction occurs with the instructor and the students separated by time and/or place (e.g., courses in which the majority of the course is taught online or by computer software or other technologies, including MOOCs (a MOOC is a "massive open online course")).

[b]These students are **not** included in column a.

[c]Do **not** include full-time mathematics faculty teaching an overload section in this column. Include only part-time faculty, reported in B8a, i.e., those paid by your college.

[d]Typically for mathematics, physical sciences, and engineering majors.

[e]Typically for business, life sciences, and social science majors.

F. Mathematics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros**

Name of Course (or equivalent)	Total number of **students** enrolled fall 2015 via distance learning[a] (a)	Total number of **sections** taught fall 2015 via distance learning[a] (b)	Total number of on-campus **students** enrolled fall 2015[b] (c)	Total number of on-campus **sections** fall 2015[b] (d)	LIST THE NUMBER OF SECTIONS FROM COLUMN (d) THAT: have enrollment above 30 (e)	Are taught by part-time faculty[c] (f)	have common Department exams (g)	use a Homework Management system (h)
F19. Elementary Statistics (with or without probability)[d]								
F20. Probability (with or without statistics)[d] (do not count the same course in both lines F19 and F20)								
F21. Finite Mathematics								
F22. Mathematics for Liberal Arts/ Math Appreciation/ Quantitative Literacy								
F23. Mathematics for Elementary School Teachers I								
F24. Mathematics for Elementary School Teachers II								
F25. Other Mathematics Courses for Teacher Preparation								

[a] Distance learning courses are courses offered by your institution for credit, in which the majority of instruction occurs with the instructor and the students separated by time and/or place (e.g., courses in which the majority of the course is taught online or by computer software or other technologies, including MOOCs (a MOOC is a "massive open online course")).

[b] These students are **not** included in column a.

[c] Do **not** include full-time mathematics faculty teaching an overload section in this column. Include only part-time faculty, reported in B8a, i.e., those paid by your college.

[d] Do **not** count the same course in both lines F19 and F20.

F. Mathematics Courses (Fall 2015) (cont.)

◆ **Cells left blank will be interpreted as zeros**

					LIST THE NUMBER OF SECTIONS FROM COLUMN (d) THAT:			
Name of Course (or equivalent)	Total number of **students** enrolled fall 2015 via distance learning[a] (a)	Total number of **sections** taught fall 2015 via distance learning[a] (b)	Total number of on-campus **students** enrolled fall 2015[b] (c)	Total number of on-campus **sections** fall 2015[b] (d)	have enrollment above 30 (e)	are taught by part-time faculty[c] (f)	have common Department exams (g)	use a Homework Management system (h)
F26. Business Mathematics[d]								
F27. Business Mathematics (transfer course)								
F28. Non-Calculus-Based Technical Mathematicsd								
F29. Calculus-Based Technical Mathematics (transfer course)								
F30. Other Mathematics Courses (non-transfer)								
F31. Other Mathematics Courses (transfer)								

[a] Distance learning courses are courses offered by your institution for credit, in which the majority of instruction occurs with the instructor and the students separated by time and/or place (e.g., courses in which the majority of the course is taught online or by computer software or other technologies, including MOOCs (a MOOC is a "massive open online course")).

[b] These students are **not** included in column a.

[c] Do **not** include full-time mathematics faculty teaching an overload section in this column. Include only part-time faculty, reported in B8a, i.e., those paid by your college.

[d] Mathematics courses for AAS programs, not a transfer course to four-year college.

G. Faculty Educational Level, by Subject Field

G1. For the **permanent full-time faculty** (including those on leave or sabbatical) reported in B2, complete the following table showing the area of each faculty member's highest earned degree. The total of all faculty listed in this table should equal the number reported in B2 (on page 3).

- Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics program

	Number of Full-Time Faculty by Major Field of Highest Degree			
Highest Degree	Mathematics	Statistics	Mathematics Education	Other
a. Doctorate				
b. Master's				
c. Bachelor's				

G. Faculty Educational Level, by Subject Field (cont.)

G2. For the **part-time faculty** reported in B8c (including those paid by your college and those paid by a third party), complete the following table showing the area of each faculty member's highest earned degree. The total of all faculty listed in this table should equal the number reported in B8c (on page 4).

- Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.

	Number of Part-Time Faculty by Major Field of Highest Degree			
Highest Degree	Mathematics	Statistics	Mathematics Education	Other
a. Doctorate				
b. Master's				
c. Bachelor's				

H. Faculty by Gender and Ethnicity/Race

Instructions:

H1. In the table below, please provide the number of permanent full-time faculty and part-time faculty having the characteristics listed.

- **Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.**
- For the **permanent full-time faculty** (including those on leave) reported in B2 and for the **part-time faculty** reported in B8a (those paid by your college), complete the following table giving data about gender and ethnicity/race.
- The total of full-time faculty should equal the figure given in B2. The total of part-time faculty should equal the figure reported in B8a (on page 4).

Ethnic/Racial Status and Gender		Number of Faculty		
		Permanent Full-Time Faculty From B2		Part-Time Faculty From B8a
		Age < 40	Age > 40	
1. American Indian, Alaskan Native	Male			
	Female			
2. Asian	Male			
	Female			
3. Black or African American (non-Hispanic)	Male			
	Female			
4. Mexican-American, Puerto Rican, or other Hispanic	Male			
	Female			
5. White (non-Hispanic)	Male			
	Female			
6. Native Hawaiian, Pacific Islander	Male			
	Female			
7. Status not known or other	Male			
	Female			

I. Faculty Age Profile

I1. Complete the following table showing the number of faculty who belong in each of the age categories below.

- Consider only the **permanent full-time faculty** (including those on leave) reported in B2 (on page 3).
- **Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.**
- The total faculty listed should equal the number reported in B2.

Age	Number of Faculty	
	Men	**Women**
a. Under 30		
b. 30-34		
c. 35-39		
d. 40-44		
e. 45-49		
f. 50-54		
g. 55-59		
h. 60-64		
i. 65-69		
j. 70 and over		

J. Faculty Employment and Mobility

- Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.

J1. How many of the **permanent full-time faculty** members you reported in B2 (on page 3) were newly appointed to a permanent full-time position this year (2015–2016)?

Number of faculty newly appointed on a permanent full-time position this year (2015-2016)? [ ]

if 0 → go to J3.

if 1 or more → go to J2.

J2. Of the faculty members counted in J1, how many had the following as their main activity in the academic year preceding their appointment? Report only **one** main activity per person. The total in J2 should equal the number reported in J1 above.

a. Attending graduate school.. [ ]

b. Teaching in a four-year college or university .... [ ]

c. Teaching in another two-year college .... [ ]

d. Teaching in a secondary school .... [ ]

e. Part-time or full-time temporary employment by your college .... [ ]

f. Nonacademic employment .... [ ]

g. Unemployed .... [ ]

h. Status unknown.. [ ]

J3. How many of your faculty who were **permanent full-time faculty** in the previous year (2014–2015) are no longer part of your **permanent full-time faculty**?.. [ ]

J. Faculty Employment and Mobility (cont.)

Two-Year College Mathematics Questionnaire

J4. For each newly appointed **permanent full-time faculty** member reported in J1, give the following data. Copy this page to add more faculty if necessary. For each new hire, check one box in each column.

	Gender	Ethnicity/Race	Highest Degree Earned
New Hire #1	Male .... ☐ Female..... ☐	Am Indian .... ☐ Asian Black ..... ☐ Hispanic .... ☐ White .... ☐ Other .... ☐	Bachelor's .... ☐ Master's .... ☐ Doctorate .... ☐
New Hire #2	Male .... ☐ Female..... ☐	Am Indian .... ☐ Asian Black ..... ☐ Hispanic .... ☐ White .... ☐ Other .... ☐	Bachelor's .... ☐ Master's .... ☐ Doctorate .... ☐
New Hire #3	Male .... ☐ Female..... ☐	Am Indian .... ☐ Asian Black ..... ☐ Hispanic .... ☐ White .... ☐ Other .... ☐	Bachelor's .... ☐ Master's .... ☐ Doctorate .... ☐
New Hire #4	Male .... ☐ Female..... ☐	Am Indian .... ☐ Asian Black ..... ☐ Hispanic .... ☐ White .... ☐ Other .... ☐	Bachelor's .... ☐ Master's .... ☐ Doctorate .... ☐
New Hire #5	Male .... ☐ Female..... ☐	Am Indian .... ☐ Asian Black ..... ☐ Hispanic .... ☐ White .... ☐ Other .... ☐	Bachelor's .... ☐ Master's .... ☐ Doctorate .... ☐
New Hire #6	Male .... ☐ Female..... ☐	Am Indian .... ☐ Asian Black ..... ☐ Hispanic .... ☐ White .... ☐ Other .... ☐	Bachelor's .... ☐ Master's .... ☐ Doctorate .... ☐

K Professional Activities and Evaluation of Faculty

K1. Is professional development required of your faculty?

	Yes	No
a. Permanent full-time	☐	☐
b. Part-time	☐	☐

K2. If you answered yes to the applicable row in K1, please estimate the number of faculty reported in B2 and B8 who fulfill the above continuing education or professional development requirement in one or more of the following ways.

	Permanent full-time	Part-time
a. Activities provided by your college or organization at one of its locations		
b. Activities provided by your college or organization at one of its locations		
c. Publishing expository or research articles or textbooks........		
d. Continuing graduate education		
e. Unknown		

K3. In general, how frequently are mathematics faculty evaluated? (Check one in each row.)

	At least once a year	At least once every other year	Occasionally	Never	Not applicable
a. Full-time (tenured)	☐	☐	☐	☐	☐
b. Part-time	☐	☐	☐	☐	☐
c. Full-time (non-tenured)	☐	☐	☐	☐	☐

K. Professional Activities and Evaluation of Faculty (cont.)

K4. Check all evaluation methods that are used for **part-time faculty** paid by your college (reported in B8(a)) or for **permanent full-time faculty** (reported in B2). *(*Check yes or no for both part-time and full-time faculty on each line.)

Evaluation Mode	Full-Time Faculty in B2		Part-Time Faculty in B8a	
	Yes	No	Yes	No
a. Observation of classes by other faculty members or department chair	☐	☐	☐	☐
b. Observation of classes by division head (if different from chair) or other administrator				
c. Evaluation forms completed by students	☐	☐	☐	☐
d. Evaluation of written course material such as lesson plans, syllabi, or exams	☐	☐	☐	☐
e. Self-evaluation such as teaching portfolios	☐	☐	☐	☐
f. Written peer evaluations	☐	☐	☐	☐
g. Other (specify)	☐	☐	☐	☐

L. Academic Support and Enrichment Opportunities for Students

- Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.

L1. Does your department or college offer a mathematics placement program for entering students?

Yes.................. ☐ ⟶ go to L2.

No .... ☐ ⟶ go to L6.

L2. Is some form of placement examination in mathematics <u>required</u> for first-time enrollees?

Yes.................. ☐ ⟶ go to L3

No .... ☐ ⟶ go to L6.

L3. Does your college/department periodically assess the effectiveness of the mathematics placement program?

Yes.................. ☐ ⟶ go to L4.

No .... ☐ ⟶ go to M1.

L. Academic Support and Enrichment Opportunities for Students (cont.)

L4. Check all opportunities available to your mathematics students. (Please check one box in each line.)

	Yes	No
a. Honors sections of mathematics course	☐	☐
b. Mathematics club	☐	☐
c. Special mathematics programs to encourage women	☐	☐
d. Special mathematics programs to encourage minorities	☐	☐
e. Opportunities to compete in mathematics contests	☐	☐
f. Special mathematics lectures/colloquia not part of a mathematics club	☐	☐
g. Mathematics outreach opportunities in local K–12 schools	☐	☐
h. Opportunities to participate in undergraduate research in mathematics	☐	☐
i. Independent study opportunities in mathematics	☐	☐
j. Assigned faculty advisors in mathematics	☐	☐
k. Other (specify)	☐	☐

M. Mathematics Preparation of K–12 Teachers

- Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.

M1. Does your department have any mathematics courses or programs specifically designed to prepare current or future teachers to teach: Mathematics in grades PK-5 or 6-8?

Mathematics in grades PK- 5 or 6-8?	Yes	☐	If yes, go to M2
	No	☐	If no, go to M3.

M2. Does your department have a faculty member assigned to coordinate mathematics program courses for pre-service elementary school teachers?

Yes .... ☐

No .... ☐

M3. Does your department have any mathematics courses or programs specifically designed to prepare current or future teachers to teach: Mathematics in grades
9-12?

Mathematics in grades 9-12?	Yes	☐	If yes, go to M4
	No	☐	If no, go to M5.

M4. Does your department have a faculty member assigned to coordinate mathematics program courses for pre-service secondary school teachers?

Yes .... ☐

No .... ☐

M5. Other than the courses “Mathematics for Elementary School Teachers I, II, and other Mathematics courses for Teacher Preparation” reported on lines F23, F24, and F25, do you designate any sections of your other mathematics program courses as “especially designed for pre-service elementary school teachers”?

Yes .... ☐

No .... ☐

M. Mathematics Preparation of K–12 Teachers (cont.)

M6. Which of the following groups can meet their entire mathematics course or licensure requirement for teaching via an organized program in your department? Consider "pre- service" and "career switchers" as distinct categories. "Career switchers" usually are post- baccalaureate older adults returning for teaching licensure after a non-teaching career and often under state-approved special licensure rules. (Check one on each row.)

	Yes	No
a. Pre-service elementary school teachers	☐	☐
b. Pre-service middle school teachers	☐	☐
c. Pre-service secondary school teachers	☐	☐
d. In-service elementary school teachers	☐	☐
e. In-service middle school teachers	☐	☐
f. In-service secondary school teachers	☐	☐
g. Career switchers moving to elementary school teaching	☐	☐
h. Career switchers moving to middle school teaching.....................	☐	☐
i. Career switchers moving to secondary school teaching...............	☐	☐

M7. Does your institution offer pedagogical courses in mathematics for teacher licensure for any of the three grade levels listed below? (Check all that apply.)

Grades PK-5 .... ☐

Grades 6-8 .... ☐

Grades 9-12 .... ☐

If any or all are checked, go to M8.

No .... ☐ Go to N1

M8. Where are the pedagogical courses in mathematics for teacher licensure taught?

In the mathematics department .... ☐

Elsewhere in the institution .... ☐

N. Issues of Professional Concern

N1. Below are problems often cited by two-year college mathematics departments. Please read each item carefully and check the box in each row that best reflects your view.

	Minor or No problem for us	Somewhat of a problem for us	Major problem for us	Not applicable
a. Maintaining vitality of faculty	☐	☐	☐	☐
b. Dual-enrollment (high school and college credit) courses[a]	☐	☐	☐	☐
c. Staffing statistics courses	☐	☐	☐	☐
d. Unrealistic student understanding of the demands of college work............	☐	☐	☐	☐
e. Part-time faculty teach too many courses	☐	☐	☐	☐
f. Faculty salaries too low	☐	☐	☐	☐
g. Class sizes too large	☐	☐	☐	☐
h. Low student motivation	☐	☐	☐	☐
i. Too many students needing remediation	☐	☐	☐	☐
j. Successful progress of students through developmental courses to more advanced mathematics courses is too low	☐	☐	☐	☐
k. Student success rate in transfer-level math courses is too low	☐	☐	☐	☐
l. Too few students who intend to transfer actually do transfer	☐	☐	☐	☐
m. Inadequate travel funds for faculty				
Professional development				
n. Inadequate classroom facilities for teaching with technology	☐	☐	☐	☐
o. Inadequate computer facilities for part-time faculty use	☐	☐	☐	☐
p. Inadequate computer facilities for student use	☐	☐	☐	☐

[a] Courses taught in high school by high school teachers for which students may obtain high school credit and simultaneous college credit through your institution.

N. Issues of Professional Concern (cont.)

Two-Year College Mathematics Questionnaire

N1. Continued

	Minor or No problem for us	Somewhat of a problem for us	Major problem for us	Not applicable
q. Classroom and other duties make it difficult for faculty to engage in professional development	☐	☐	☐	☐
r. Curriculum alignment between high schools and college	☐	☐	☐	☐
s. Lack of curricular flexibility because of transfer requirements	☐	☐	☐	☐
t. Other barriers that inhibit curricular changes	☐	☐	☐	☐
u. Maintaining high and consistent expectations of students across different sections of the same course	☐	☐	☐	☐
v. High cost of textbooks	☐	☐	☐	☐
w. Lack of flexibility in curricular redesign	☐	☐	☐	☐
x. Maintaining common standards between distance learning courses and related courses	☐	☐	☐	☐
y. Use of distance education[b].................................	☐	☐	☐	☐

[b] The majority of instruction occurs with the instructor and the students separated by time and/or place (e.g., courses in which the majority of the course is taught online or by computer software or other technologies, including MOOCs (a MOOC is a “massive open online course”)).

N. Issues of Professional Concern (cont.)

N2. Many departments today use a spectrum of program assessment methods. Please check all that apply to your department's program assessment efforts during the last six years.

	Yes	No
a. We conducted a review of our mathematics program that included one or more reviewers from outside our institution	☐	☐
b. We asked students in our mathematics program to comment on and suggest changes in our program...............	☐	☐
c. Other departments at our institution were invited to comment on the preparation that their students received in our courses..	☐	☐
d. Data on students' progress in subsequent mathematics courses were gathered and analyzed...	☐	☐
e. We have a placement system for first-year students, and we gathered and analyzed data on its effectiveness	☐	☐
f. Our department's program assessment activities led to changes in our mathematics program	☐	☐

N. Issues of Professional Concern (cont.)

The next four questions deal with general education requirements at your institution.

N3. Does your institution require all associate's degree graduates to have a quantitative course (which may or may not be within the mathematics department) as part of their general education requirements? (Check one box.)

a. Yes, all associate degree's graduates ☐ → go to N4.

b. Not (a), but all Associate of Arts or Associate of Science graduates must have credit ☐ → go to N4.

c. Neither (a) or (b) ☐ → go to Section O.

N4. If you chose (a) or (b) in O3, must all students (to whom the quantitative requirement applies) fulfill it by taking a course in your <u>mathematics</u> department?

Yes .... ☐

No .... ☐

N5. What is the lowest level course in your department that can be used to fulfill the general education quantitative requirement in N3? (Check one box.)

a. A course below the level of Intermediate Algebra .... ☐ Go to N1.

b. Intermediate Algebra or its equivalent, or any course that is more advanced than Intermediate Algebra .... ☐ Go to O1

c. Not Intermediate Algebra, but any course that is more advanced than Intermediate Algebra .... ☐ Go to O1

d. Only certain courses that are more advanced than Intermediate Algebra... ☐ Go to N6, otherwise go to O1

N6. Which of the following departmental courses can be used to fulfill the general education quantitative requirement?

Course	Yes	No
a. College Algebra and/or Precalculus	☐	☐
b. Calculus (any course)	☐	☐
c. Introduction to Mathematical Modeling..	☐	☐
d. A basic Probability and/or Statistics course	☐	☐
e. Quantitative Literacy or Liberal Arts Mathematics or Quantitative Reasoning	☐	☐
f. Some other course(s) in our department not listed above	☐	☐

O. Mathematics Enrollments Outside Your Mathematics Department/Program (Fall 2015)

Data to answer the following questions often are beyond the information normally available to a mathematics department chair. Thank you for investing invest the extra effort needed to give an accurate account of all enrollments in the following courses that are **not** taught in the mathematics department/program. *(Give enrollments, not the number of sections taught.)*

Instructions:

- Please include only the data for the mathematics courses and programs that are considered to be administered or managed by your mathematics department.
- Report all enrollments at your campus or in your multi-campus system that are **not** taught in the mathematics department/program (and so are not listed in Section F).
- Please consult appropriate sources outside the mathematics program such as schedules, registrar's data, or the heads of these programs to get accurate data on enrollments.

COURSE	Mathematics Enrollments Outside the Mathematics Department			
	Develop-mental Education Department/ Division (a)	Occupational Programs (b)	Business (c)	Other Dept/Division (d)
O1. Arithmetic/Pre-Algebra				
O2. Elementary Algebra (high school level)				
O3. Intermediate Algebra (high school level)				
O4. Business Mathematics				
O5. Statistics/Probability				
O6. Technical Mathematics				

P. Comments and Suggestions

Two-Year College Mathematics Questionnaire

P1. If you have found some question(s) difficult to interpret or answer, please let us know. We welcome comments or suggestions to improve future surveys (e.g., CBMS2020).

Comments: ____

____

____

____

____

____

Thank you for completing this questionnaire. We know it was a time-consuming process and we hope that the resulting survey report, which we hope to publish in spring 2017, will be of use to you and your department.

Please keep a copy of your responses to this questionnaire in case questions arise.

Appendix VII

Four-Year Statistics Questionnaire

STATISTICS QUESTIONNAIRE

CBMS2015

CONFERENCE BOARD OF THE MATHEMATICAL SCIENCES

SURVEY OF UNDERGRADUATE PROGRAMS IN THE MATHEMATICAL SCIENCES

General Information

Statistics Questionnaire

As part of a random sample, your department has been chosen to participate in the NSF-funded CBMS2015 National Survey of Undergraduate Mathematical Sciences Programs. The presidents of all U.S. mathematical sciences organizations have endorsed it and ask for your cooperation, even though it is a very complicated survey.

We assure you that no individual departmental data, except the names of responding departments, will be released.

This survey provides data about the nation's undergraduate statistical effort that is available from no other source. You can see the results of a similar survey fielded five years ago by going to www.ams.org/cbms, where the CBMS 2010 report is available online.

All departments in this survey are in universities and colleges that offer at least a bachelor's degree.

They may or may not offer an undergraduate major in statistics. Most of the statistics departments in our random sample also offer higher degrees in statistical sciences.

We have classified your department as belonging to a university or four-year college. If this is not correct, please contact Ellen Kirkman, Survey Director, at 336-758-5351 or at Kirkman@wfu.edu.

Please report on undergraduate programs in the statistical sciences (including probability) that are under the direction of your department. Do not include data for other departments or for branches or campuses of your institution that are budgetarily separate from your own. Also, if your department is broader than just statistics (e.g., Department of Statistics and Computer Science or Statistics and Operations Research), please report on all the courses offered by your department.

This survey may be completed either online or using a hard-copy questionnaire. We recommend using the online system because it will do some of the work for you; e.g., it will automatically skip those questions that are not applicable (based on the response you give), gray out portions of questions that do not apply, remind you of previous responses, and provide definitions when you let your cursor hover over certain highlighted words.

If you have any questions while filling out this survey form, please call the Survey Director, Ellen Kirkman, at 336-758-5351 or contact her by e-mail at Kirkman@wfu.edu. For help with the online questionnaire, call Westat at 855-680-1849 or send an email to cbms2015@westat.com.

Please return your completed questionnaire by October 31, 2015, either online or by mailing a hard copy to:

CBMS Survey
Westat
1600 Research Boulevard, RB 3103
Rockville, MD 20850-3129

Please retain a copy of your responses to this questionnaire in case questions arise.

A. General Information

Statistics Questionnaire

A1. Name of your Institution: ____________________

A2. Name of your Department: ____________________

A3. We have classified your department as being part of a university or four-year college. Do you agree?

Yes .... ☐ ⟶ If Yes, go to A4 below.

No .... ☐ ⟶ If No, please call Ellen Kirkman, Survey Director, at 336-758-5351.

A4. If your college or university does not recognize tenure, check this box. ☐

A5. Contact person in your department: [ ]

A6. Contact person's e-mail address: [ ]

A7. Contact person's phone number including area code: (   )

A8. Contact person's mailing address:

a. Street .... [ ]

b. Street2............................. [ ]

c. City.................................. [ ]

d. State... [ ]

e. Zip code .... [ ]

B. Dual-Enrollment Courses

Statistics Questionnaire

Definition: We use the term dual-enrollment courses to refer to courses conducted on a high school campus and taught by high school teachers, for which high school students may obtain high school credit and, simultaneously, college credit through your institution.

B1. Does your department participate in any dual-enrollment programs of this type?

Yes .... ☐ → If Yes, go to B2.

No .... ☐ → If No, go to B4.

B2. Please complete the following table concerning your dual-enrollment program (as defined above) for the previous term (spring 2015) and the current fall term of 2015.

Course	Total Dual Enrollments	
	Last Term= Spring 2015	This Term= Fall 2015
a. Statistics		

B3. Are the high school instructors in the dual-enrollment courses reported in B2 required to participate in a teaching evaluation program conducted by your institution?

Yes .... ☐

No .... ☐

B. Dual-Enrollment Courses (continued)

B4. Does your department assign any of its own full-time or part-time faculty to teach courses conducted on a high school campus for which high school students may receive both high school and college credit (through your institution)?

Yes................. ☐ ⟶ If Yes, go to B6.

No .... ☐ ⟶ If No, go to Section C.

B5. In Fall 2015 how many students are enrolled in the courses conducted on a high school campus and taught by your full-time or part-time faculty and through which high school students may receive both high school and college credit (through your institution)?

Number of students............................ ☐

B6. Does your institution participate in a program that allows high school students to enroll in statistics courses on your campus for high school credit and, simultaneously, college credit?

Yes .... ☐

No .... ☐

In subsequent sections we ask about course enrollments in your department; please ***do not*** *include any of the enrollments reported in this Section B.*

C. Distance Learning

Statistics Questionnaire

Definition: Distance learning courses are those courses offered by your institution for credit, in which the majority of the instruction occurs with the instructor and the students separated by time and /or place (e.g. courses in which the majority of the course is taught online, or by computer software, or by other technologies) including MOOCs that are offered for credit. (a MOOC is a "massive open online course").

C1. Does your institution give (transfer) credit for any distance learning courses in statistics that are not taught by faculty in your institution?

Yes .... ☐

No .... ☐

C2. Does your institution have a specific limit on the number of credits earned (or number of courses taken) in distance learning classes that may be counted toward graduation?

Yes .... ☐

No .... ☐

C3. Has your department taught any distance learning courses during the calendar years 2013-2015?

Yes................. ☐ → go to C4.

No .... ☐ → If No, skip to Section D.

C4. Which best characterizes the format/structure of the majority of your distance learning courses? (Check one box)

Completely online: Instruction takes place completely online.............................. ☐

Blended/Hybrid: Instruction takes place in a combination of face-to-face and online formats.. ☐

Other .... ☐

C5. Which one response best describes the general pattern for how the instructional materials used in your distance learning courses are determined? (Check one box.)

Course instructors create materials .... ☐

Course instructors choose commercially produced materials.......... ☐

Course instructors choose a combination of both........................... ☐

C. Distance Learning (continued)

C6. In most of your distance learning courses, how are the majority of the tests administered? (Choose one response.)

- Not monitored (e.g., online or by correspondence) .... ☐
- Online, but using some kind of monitoring technology .... ☐
- At a monitored testing site .... ☐
- Combination of the above .... ☐

C7. Are there any courses that you offer in both non-distance learning and in distance learning formats?

Yes .... ☐ ⟶ If Yes, go to C8 below.

No .... ☐ ⟶ If No, go to C10.

C8. Do the course instructors in your distance learning courses generally: (Check one response on each line.)

	Yes	No
a. Hold office hours to meet with students on campus as in comparable non-distance learning courses taught on campus? ...	☐	☐
b. Participate in evaluation of instruction in the same way as faculty who teach comparable non-distance learning courses?	☐	☐

C9. Which, if any, of the following practices apply to the majority of distance learning courses in your department? (Check one response on each line.)

	Yes	No
a. Same common departmental tests and examinations as in the non-distance-learning course	☐	☐
b. Same common course as in the non-distance-learning course	☐	☐
c. Same course projects as in the non-distance-learning course	☐	☐
d. More course projects than in non-distance-learning course	☐	☐

C10. In the three calendar years 2013-2015 has your department taught (for credit) any distance learning courses that could be characterized as a MOOC?

Yes .... ☐ ⟶ If Yes, go to C11 below.

No .... ☐ ⟶ If No, go to Section D.

C. Distance Learning (continued)

Statistics Questionnaire

C11. In which of the following content areas has your department taught a MOOC (for credit) during 2013-2015? (Check all that apply.)

- ☐ Introductory Statistics
- ☐ Statistics course requiring previous statistical knowledge
- ☐ Teacher Preparation
- ☐ Other (specify) ____________________

C12. What is the total number of students enrolled in MOOCs (for credit) offered by your department in Fall 2015?

____

D. Faculty Profile (Fall 2015)

Please indicate whether the following types of faculty are actively teaching one or more courses in fall 2015.

Definitions

- **Full-time faculty.** Faculty who are full-time employees in the institution and more than half-time in the department. For example, if a tenured physics professor with a joint appointment in your department teaches a total of two courses in fall 2015, with exactly one being in your department (i.e., statistics is 50% of the fall teaching assignment), then that person would be counted as part-time in your department.
- **Permanent faculty.** If your institution does not recognize tenure, please report full-time departmental faculty who are permanent on line D1a and report all other faculty on the remaining lines as appropriate.
- **Other full-time faculty**. Full-time faculty who are not tenured or tenure-eligible, faculty with renewable positions, postdoctoral faculty, visiting faculty.

Faculty Type	**Teach in Fall 2015**	
	Yes	**No**
D1. Full-time faculty		
a. Tenured or tenure-eligible faculty	☐	☐
b. Other full-time faculty...	☐	☐
D2. Part-time faculty	☐	☐
D3. Graduate teaching assistant(s) who teach courses independently (not counting the teaching of recitation sessions)	☐	☐

E. Probability and Statistics Courses (Fall 2015)

In the next several pages, you will enter data about courses your department is teaching. For each course that is taught, you will be asked to enter the fall 2015 enrollment and the number of sections of the course. Depending upon the type of course, you will be asked about distance learning enrollment and the numbers of each kind of faculty (tenure-eligible, part-time, etc.) who are teaching the course. Also, you may not teach some of your advanced courses in every term; for those courses we also ask whether the course was offered in spring 2015 or will be offered in spring 2016 (please combine the winter and spring terms if your institution uses the quarter system); please answer these questions regardless of whether you offer the courses in fall 2015.

The following instructions apply throughout Section E (pages 8-11).

- Report distance learning enrollments separately from other enrollments. Distance learning courses are those courses offered by your institution for credit, in which the majority of the instruction occurs with the instructor and the students separated by time and /or place (e.g. courses in which the majority of the course is taught online, or by computer software, or by other technologies), including MOOCs that are offered for credit. (A MOOC is a "massive open online course").
- Do NOT include any dual-enrollment sections or enrollments in these tables. (In this questionnaire, a *dual-enrollment* section is one that is conducted on <u>a high school campus</u>, taught by a high school teacher, and allows students to receive high school credit and, simultaneously, college credit from your institution for the course. These courses were reported in Section B.)
- For Introductory Statistics classes, you will be asked to list separately classes taught in a large lecture format (with recitation/problem/laboratory sections) and sections that meet as a class with an instructor at a regularly scheduled time (and do not split into recitation sections). For example, you will be asked for both the number of large lecture courses (E1-1 column c) and the total number of recitation sections for all the large lectures (E1-2 column c). There are other formats for handling large classes, but please treat any large class that is broken up into smaller units as a "lecture/recitation" class (even if there is no lecture); if neither the lecture/recitation or individual class format seems an appropriate description of the enrollment, enter the enrollment under "other".
- For all courses except as marked in E1 and E2, please do not treat recitation sessions as separate sections. Instead, please treat both the lecture component and any associated recitation sessions as a single section.
- Report a section of a course as being taught by a *graduate teaching assistant (GTA)* if and only if that section is taught *independently* by the GTA, i.e., when it is the GTA's own course and the GTA is the instructor of record.
- If your institution does not recognize tenure, report sections taught by your permanent full-time faculty in column (d) and sections taught by other full-time faculty in column (e). .If your institution does recognize tenure but has faculty with renewable contracts, report these faculty as other full-time faculty (column e)
- Full-time faculty teaching in your department and holding joint appointments with other departments should be counted in column (d) if they are tenured, tenure-eligible, or permanent (if your institution does not recognize tenure) in your department. Faculty who are not tenured, tenure-eligible, or permanent in your department should be counted in column (f) if their fall 2010 teaching in your department is less than or equal to 50% of their total fall teaching assignment, and they should be reported in column (e) otherwise. (Example: If a tenured physics professor with a joint appointment in your department teaches a total of two courses in fall 2015, with exactly one being in your department, then that person would be counted as part-time in your department.)
- Do not fill in any shaded boxes.
- Any unshaded box that is left blank will be interpreted as reporting a count of zero.
- Except where specifically stated to the contrary, the tables in Section E deal with enrollments in fall term 2015
- If a section is co-taught by multiple faculty, categorize the section in terms of the most senior faculty member teaching that course.
- If your department is broader than just statistics (e.g., Department of Statistics and Computer Science or Statistics and Operations Research), please use E24 to report on the courses outside of probability and statistics.
- If a course is cross-listed in both statistics and another department (such as mathematics, psychology, or engineering), count all students regardless of how the course is listed on the students' transcripts.

E. Probability and Statistics Courses (Fall 2015) (continued)

◆ Cells left blank will be interpreted as zeros.

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments[2] (b)	Number of sections corres-ponding to column (b) (c)	Of the number in column (c), how many sections are taught by: Full-time faculty[3]: Tenured, or tenure-eligible (d)	Full-time faculty[3]: Other full-time faculty with Ph.D. (e)	Full-time faculty[3]: Other full-time faculty without Ph.D. (f)	Part-time faculty (g)	Graduate teaching assistants[4] (h)
STATISTICS								
COURSES Designed FOR NON-MAJORS/MINORS (General Education Courses)								
E1: Introductory Statistics (no calculus prerequisite)								
E1-1. Lecture with separately scheduled recitation/problem/ laboratory sessions[5]								
E1-2. Number of recitation/problem/ laboratory sessions associated with courses reported in E1-1[6]								
E1-3. Individual sections, not in E1-1, that meet as a class with an instructor at a regularly scheduled time								
E1-4. Other sections not listed above								

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.

[2] Do not include any dual-enrollment courses, i.e., courses taught on a high school campus by a high school instructor for which high school students may obtain both high school credit and, simultaneously, college credit through your institution.

[3] Count faculty with joint appointments in column (d) or (e) if more than 50 percent of their fall 2015 teaching assignments are within your department, and in column (f) otherwise.

[4] Sections taught independently by GTAs .

[5] Report an introductory statistics class along with its recitation/problem/laboratory sessions as one section in column (c) of E1-1 and E2-1.

[6] Example: suppose your department offers four 100-student sections of a course and that each is divided into five discussion sessions that meet separately from the lectures. Report 4*5=20 recitation/problem/laboratory sessions associated with the course, even if each discussion meets several times per week.

E. Probability and Statistics Courses (Fall 2015) (continued)

Please refer to the course reporting instructions at the beginning of Section E.

◆ Cells left blank will be interpreted as zeros.

Name of Course (or equivalent)	Total distance education enrollments[1] (a)	Total enrollment NOT in distance education and NOT dual enrollments [2] (b)	Number of sections corres-ponding to column (b) (c)	Of the number in column (c), how many sections are taught by: Full-time faculty[3] Tenured or tenure-eligible faculty (d)	Full-time faculty: Other full-time faculty with Ph.D. (e)	Full-time faculty: Other full-time faculty without Ph.D. (f)	Part-time faculty (g)	Graduate teaching assistants[4] (h)
STATISTICS								
COURSES Designed FOR NON-MAJORS/MINORS (General Education Courses)								
E2: Introductory Statistics (calculus prerequisite) (for non-majors)								
E2-1. Lecture with separately scheduled recitation/problem/ laboratory sessions[5]								
E2-2. Number of recitation/problem/ laboratory sessions associated with courses reported in E2-1[6]								
E2-3. Individual sections, not in E1-1, that meet as a class with an instructor at a regularly scheduled time								
E2-4. Other sections not listed above								
Other Introductory Statistics Courses								
E3. Statistics for pre-service elementary or middle grade teachers								
E4. Statistics for pre-service high school teachers								
E5. Other introductory-level Probability or Statistics courses for non-majors/minors								

[1] Students receive the majority of their instruction online, or by computer software, or by other technology where the instructor is NOT physically present, including MOOCs that are offered for credit.

[2] Do not include any dual-enrollment courses, i.e., courses taught on a high school campus by a high school instructor for which high school students may obtain both high school credit and, simultaneously, college credit through your institution.

[3] Count faculty with joint appointments in column (d) or (e) if more than 50 percent of their fall 2015 teaching assignments are within your department, and in column (f) otherwise.

[4] Sections taught independently by GTAs.

[5] Report an introductory statistics class along with its recitation/problem/laboratory sessions as one section in column (c) of E1-1 and E2-1.

[6] Example: suppose your department offers four 100-student sections of a course and that each is divided into five discussion sessions that meet separately from the lectures. Report 4*5=20 recitation/problem/laboratory sessions associated with the course, even if each discussion meets several times per week.

E. Probability and Statistics Courses (Fall 2015) (continued)

◆ Cells left blank will be interpreted as zeros.

Name of Course (or equivalent)	Total enrollment fall 2015 (a)	Number of sections corresponding to column (a) (b)	Number of sections corresponding to column (b) taught by tenured or tenure-faculty (c)	Was this course taught in ANY term of the previous academic year? (d)		Will this course be offered in the next term (spring 2016)? (e)	
PROBABILITY & STATISTICS							
Upper Level				Yes	No	Yes	No
E6. Introductory probability and/or statistics for majors/minors (no calculus prerequisite)				☐	☐	☐	☐
E7. Combined Probability & Statistics (calculus prerequisite)				☐	☐	☐	☐
E8. Probability (calculus prerequisite)				☐	☐	☐	☐
E9. Mathematical Statistics (calculus prerequisite)				☐	☐	☐	☐
E10. Stochastic Processes				☐	☐	☐	☐
E11. Applied Statistical Analysis				☐	☐	☐	☐
E12. Data Science/analytics				☐	☐	☐	☐
E13. Design & Analysis of Experiments				☐	☐	☐	☐
E14. Regression (and Correlation)				☐	☐	☐	☐
E15. Biostatistics				☐	☐	☐	☐
E16. Nonparametric Statistics				☐	☐	☐	☐
E17. Categorical Data Analysis				☐	☐	☐	☐
E18. Sample Survey Design & Analysis				☐	☐	☐	☐
E19. Statistical Computing or software				☐	☐	☐	☐
E20. Bayesian Statistics				☐	☐	☐	☐
E21. Statistical Consulting				☐	☐	☐	☐
E22. Senior Seminar/Independent Studies				☐	☐	☐	☐
E23. All other upper level Probability & Statistics							
E24. All departmental courses other than Probability or Statistics							

E. Probability and Statistics Courses (Fall 2015) (continued)

Statistics Questionnaire

E25. Do you offer any advanced undergraduate courses in statistics (E6-E24) as distance-learning courses?

Yes.................. ☐ → If Yes, go to E26 below.

No .... ☐ → If No, go to Section F.

E26. Please indicate which advanced undergraduate statistics courses you offer as distance-learning courses. (Check all that apply.)

Definition: Distance learning courses are those courses offered by your institution for credit, in which the majority of the instruction occurs with the instructor and the students separated by time and /or place (e.g. courses in which the majority of the course is taught online, or by computer software, or by other technologies) including MOOCs that are offered for credit. (a MOOC is a "massive open online course").

Course	Offer as distance learning
E6. Introductory Probability and/or Statistics for Majors/Minors (no calculus prerequisite)	☐
E7. Combined Probability & Statistics (calculus prerequisite)	☐
E8. Probability (calculus prerequisite)	☐
E9. Mathematical Statistics (calculus prerequisite)	☐
E10. Stochastic Processes	☐
E11. Applied Statistical Analysis	☐
E12. Data Science/Analytics	☐
E13. Design & Analysis of Experiments	☐
E14. Regression (and Correlation)	☐
E15. Biostatistics	☐
E16. Nonparametric Statistics	☐
E17. Categorical Data Analysis	☐
E18. Sample Survey Design & Analysis	☐
E19. Statistical Computing and/or Software	☐
E20. Bayesian Statistics	☐
E21. Statistical Consulting	☐
E22. Senior Seminar/ Independent Studies	☐
E23. Other upper level Probability & Statistics	☐
E24. Other mathematical science courses	☐

F. Undergraduate Program (Fall 2015)

Statistics Questionnaire

If you do not offer a major in statistics, check here ☐ and go to F5. Otherwise go to F1.

F1. Report the total number of your departmental majors who received their bachelor's degrees from your institution between July 1, 2014, and June 30, 2015. Include joint majors and double majors[1] .... ☐

F2. Of the undergraduate degrees described in F1, please report the number who majored in each of the following categories. Each student should be reported only once. Include all double and joint majors[1] in your totals. Use the Other category for a major in your department who does not fit into one of the earlier categories.

Area of Major	Male	Female
a. Statistics		
b. Biostatistics		
c. Actuarial Science		
d. Joint[1] Statistics and Computer Science		
e. Joint[1] Statistics and Mathematics		
f. Joint[1] Statistics and (Business or Economics)		
g. Statistics Education		
h. Other		

[1] A "double major" is a student who completes the degree requirements of two separate majors, one in statistics and one in another program or department. A "joint major" is a student who completes a single major in your department that integrates courses from statistics and some other program or department and typically requires fewer credit hours that the sum of the credit hours required by the separate majors.

F. Undergraduate Program (Fall 2015) (continued)

Statistics Questionnaire

F3. To what extent must majors in your department complete the following? Check one box in each row.

	Required of all majors	Required of some but not all majors	Not required of any major
a. Calculus I	☐	☐	☐
b. Calculus II	☐	☐	☐
c. Multivariable Calculus	☐	☐	☐
d. Linear Algebra/Matrix Theory	☐	☐	☐
e. At least one computer science course	☐	☐	☐
f. At least one applied mathematics course (not including a, b, c, d above)	☐	☐	☐
g. A capstone experience (e.g., a senior project, a senior thesis, a senior seminar, or an internship)	☐	☐	☐
h. An exit exam (written or oral)	☐	☐	☐
i. At least one upper level Probability course	☐	☐	☐
j. At least one upper-level Mathematical Statistics course	☐	☐	☐
k. At least one applied statistics course	☐	☐	☐
l. At least one upper-level Linear Models course	☐	☐	☐
m. One Bayesian Inference course	☐	☐	☐

F4. Please give your best estimate of the percentage of your department's graduating majors from the previous academic year 2014-2015 (reported in F1) in each of the following categories. Please make the totals add to 100 percent.

a. Who went into pre-college teaching	%
b. Who went to graduate school in the statistical sciences	%
c. Who went to professional school or to graduate school outside of the statistical sciences	%
d. Who took jobs in business, industry, government, etc.	%
e. Who had other post-graduation plans known to the department	%
f. Whose plans are not known to the department	%

F. Undergraduate Program (Fall 2015) (continued)

Statistics Questionnaire

F5. Many departments today use a spectrum of program-assessment methods. Please indicate whether each of the following apply to your department's undergraduate program-assessment efforts during the last six years.

	Yes	No
a. We conducted a review of our undergraduate program that included one or more reviewers from outside of our institution............	☐	☐
b. We asked graduates of our undergraduate program to comment on and suggest changes in our undergraduate program.....................	☐	☐
c. Other departments at our institution were invited to comment on the preparation that their students received in our courses.................	☐	☐
d. Data on our students' progress in subsequent statistics courses were gathered and analyzed	☐	☐
e. We have assessed teaching objectives in courses required in our major	☐	☐
f. We have a placement system for first-year students and we gathered and analyzed data on its effectiveness	☐	☐
g. Our department's program assessment activities led to changes in our undergraduate program	☐	☐

F6. Which of the following are significant sources of information to the department about the types of pedagogy used in instruction in your department? (Check all that apply.)

a. Syllabi for classes .... ☐
b. Teaching portfolios .... ☐
c. Peer evaluations of instructors......................... ☐
d. Self–evaluations of instructors .... ☐
e. Department discussions of teaching practices ☐
f. None of these are available .... ☐ go to F10

F7. Which of the following pedagogical strategies are used by some member of your department faculty: (Check all that are used.)

a. Inquiry based class .... ☐
b. "Flipped classroom" .... ☐
c. Class conducted largely online .... ☐
d. Activity based learning .... ☐
e. Technology used to develop conceptual understanding........... ☐

F8. Has your department seen major changes over the last ten years in the kinds of pedagogy used in your department?

Yes .... ☐ Go to F9

No .... ☐ Go to F10

F. Undergraduate Program (Fall 2015) (continued)

Statistics Questionnaire

F9. Which of the following factors were significant reasons for the changes made to the kinds pedagogy used in your department over the last ten years? (Check all that apply.)

a. Educational research ☐
b. Advocacy of some faculty member in our department ☐
c. Advocacy by another department ☐
d. Advocacy by institution's administrators ☐
e. Advocacy by a professional organization ☐

F10. For each of the following opportunities, indicate whether or not it is available to your undergraduate statistics students through your department or institution.

	Yes	No
a. Honors sections of departmental courses	☐	☐
b. An undergraduate statistics club	☐	☐
c. Special statistics programs to encourage women	☐	☐
d. Special statistics programs to encourage minorities	☐	☐
e. Opportunities to participate in statistics contests	☐	☐
f. Special statistics lectures/colloquia not part of a statistics club	☐	☐
g. Statistics outreach opportunities in local K–12 schools	☐	☐
h. Undergraduate research opportunities in statistics	☐	☐
i. Independent study opportunities in statistics	☐	☐
j. Assigned faculty advisers in statistics	☐	☐
k. Opportunity to write a senior thesis in statistics	☐	☐
l. A career day for statistics majors	☐	☐
m. Special advising about graduate school opportunities in statistical sciences	☐	☐
n. Opportunity for an internship experience or part-time employment in a professional statistical opportunity	☐	☐
o. Opportunity to participate in a senior seminar	☐	☐
p. Supervised consultation working in a consulting lab with clients	☐	☐
q. Opportunity to tutor, grade papers, or TA in the department	☐	☐

F. Undergraduate Program (Fall 2015) (continued)

F11. Give your best estimate of the number of all of your majors who have participated in each of the following activities over the past year September 1, 2014 – August 31, 2015;

a. Undergraduate research project in statistics _________
b. Internship in statistics __________
c. Statistical consulting to client __________

F12. a. Does your department offer a minor in statistics?

Yes.................. ☐ ⟶ If Yes, go to F12b.

No .... ☐ ⟶ If No, go to F13.

F12.b. How many students graduated with a minor in statistics from your department between July 1, 2014 and June 30, 2015? _____

F13. Does your institution allow a student to meet an institutional or divisional graduation requirement in the mathematical sciences using an Advanced Placement course (taken while the student was in high school)?

Yes .... ☐

No .... ☐

F. Undergraduate Program (Fall 2015) (continued)

Statistics Questionnaire

F14. Responses to this question will be used to project total enrollment in the current (2015-2016) academic year based on the pattern of your departmental enrollments in 2014–2015. Do NOT include any numbers from dual-enrollment courses in answering question F14. Please provide head counts, not full-time equivalents.

1

a. Previous fall (2014) total student enrollment in your department's undergraduate courses (remember: do not include dual-enrollment courses[1]): ....

b. Previous academic year (2014–2015) total enrollment in your department's undergraduate courses, excluding dual enrollments and excluding enrollments in summer school 2015: ....

c. Total enrollment in your department's undergraduate courses in summer school 2015: ....

[1] In this question, the term "dual enrollment courses" is used to mean courses taught on a high school campus, by high school teachers, for which high school students may obtain high school credit and, simultaneously, college credit through your institution.

G. Introductory Statistics Instruction

The following questions are about instruction in course E1: Introductory Statistics for non-majors/minors (no calculus prerequisite) on page 9.

G1. How many different kinds of introductory statistics courses designed for non-majors (general education courses) that have no calculus prerequisite does your department offer? (e.g. statistics for social scientists, for life scientists, etc.)

- 1 .... ☐
- 2 .... ☐
- 3 .... ☐
- More than 3 ..... ☐

The following questions are about instruction in course E1: Introductory Statistics (no calculus prerequisite) on page 9. If you offer more than one such course, choose the course that is aimed at the most general audience.

G2. In most sections of course E1, the percentage of class sessions in which real data are used is generally approximately:

- 0-20%.............. ☐
- 21-40% .... ☐
- 41-60% .... ☐
- 61-80% .... ☐
- 81-100%.......... ☐

G3. In most sections of course E1, the percentage of class sessions in which in-class demonstrations and/or in-class problem solving activities/discussions generally take place is approximately:

- 0-20%.............. ☐
- 21-40% .... ☐
- 41-60% .... ☐
- 61-80% .... ☐
- 81-100%.......... ☐

G. Introductory Statistics Instruction (continued)

Statistics Questionnaire

G4. Which, if any, of the following kinds of technology are used in the majority of sections of course(s) E1?

	Yes	No
a. Graphing calculators	☐	☐
b. Statistical packages (e.g., R, JMP,SAS, SPSS, Minitab)	☐	☐
c. Educational software(e.g. software linked to the textbook)	☐	☐
d. Applets	☐	☐
e. Spreadsheets (e.g. Excel, GoogleDocs, Access)	☐	☐
f. Web-based resources including data sources or data analysis	☐	☐
g. Classroom response systems (e.g., clickers)	☐	☐
a. Online textbooks	☐	☐
b. Online videos	☐	☐

G5. Do the majority of the sections of course(s) E1 require assessments beyond homework, exams, and quizzes (assessments such as projects, oral presentations, written reports)?

Yes .... ☐

No .... ☐

G6. Which, if any, of the following topics are covered in the course E1? (Check all that apply.)

a. Conditional probability .... ☐

b. Simulation to explore randomness .... ☐

c. c. Resampling techniques (e.g. bootstrapping, randomization tests) .... ☐

d. None of these topics .... ☐

G7. Are there other introductory statistics courses at your institution, offered by departments outside of the mathematical sciences?

Yes .... ☐ ⟶ If Yes, go to G8.

No .... ☐ ⟶ If No, go to Section H.

G8. Enter the Fall 2015 total enrollment in all such introductory courses, offered outside of the mathematical sciences, at your institution. _______

H. Pre-service Teacher Education in Statistics

Question regarding the statistical preparation for secondary (generally grades 9-12) pre-service teachers of statistics:

H1. Considering the teacher preparation program at your institution, for each of the following core areas indicate whether the core area is required of all students seeking certification that leads to obtaining credentials to teach statistics at the secondary school level (generally grades 9-12) in public high schools of your state, if the course is generally taken by those seeking certification (if it is not required), and if in that core area your department offers a special course that is specifically designed for pre-service secondary statistics teachers.

Course	Required		Generally Taken		Special Course Offered	
	Yes	No	Yes	No	Yes	No
a. Introductory Statistics	☐	☐	☐	☐	☐	☐
b. Probability	☐	☐	☐	☐	☐	☐
c. Probability and/or statistics with calculus prerequisite	☐	☐	☐	☐	☐	☐
d. Upper level statistics course	☐	☐	☐	☐	☐	☐
e. Applied statistics course	☐	☐	☐	☐	☐	☐
f. Other (name)	☐	☐	☐	☐	☐	☐

H2. How many semester hours of courses in statistics from your department are required by your institution's program of certification for pre-service middle grades (6-8) teachers? _______

H3. How many semester hours of courses in statistics from your department are required by your institution's program of certification for pre-service elementary grades (K-5) teachers?

____

I. Comments and Suggestions

Statistics Questionnaire

If you found some question(s) difficult to interpret or answer, please let us know. We welcome suggestions to improve future surveys (e.g., CBMS 2020).

Comments: ______________________________

____

____

____

____

____

Thank you for completing this questionnaire. We know it was a time-consuming process and we hope that the resulting survey report, which we hope to publish in spring 2017, will be of use to you and your department.

Please keep a copy of your responses to this questionnaire in case questions arise.

Appendix VIII

Estimates and Standard Errors

TABLE S.1	Four-Year College & University Mathematics & Statistics Departments			Two Year College Mathematics Programs
		2015 by Dept		
	2015	Math	Stat	2015
Mathematics	2213	2213	--	1639
SE	*139.7*	*139.7*	--	*124.3*
Statistics	457	313	144	280
SE	*24.8*	*24.2*	*4.0*	*59.6*
Computer Science	68	68	--	1918
SE	*11.0*	*11.0*	--	--
Total	10546			6216
SE	*161.2*	*157.4*	*4.0*	*114.6*

TABLE S.2	Mathematics Departments		Statistics Departments		Two-Year College Mathematics Programs	
Course level	2015	*SE*	2015	*SE*	2015	*SE*
Mathematics courses						
Precollege level	253	*26.0*	--	--	782	*65.0*
Introductory level (including Precalculus)	1000	*80.0*	--	--	445	*39.0*
Calculus level	807	*62.0*	--	--	152	*15.0*
Advanced level	154	*12.0*	--	--	0	*0.0*
Other (2-year)	--	--	--	--	259	*31.0*
Total Mathematics courses	2213	*140.0*	--	--	1639	*124.0*
Probability and Statistics courses						
Introductory level	253	*20.0*	94	*3.0*	280	*60.0*
Upper level	60	*6.0*	50	*2.0*	0	*0.0*
Total Probability and Statistics courses	313	*24.0*	144	*4.0*	280	*60.0*
Computer Science courses						
Lower level	45	*7.0*	--	--	--	
Middle level	16	*3.0*	--	--	--	
Upper level	6	*2.0*	--	--	--	
Total Computer Science courses	68	*11.0*	--	--	--	
Grand Total	2594	*157.0*	144	*4.0*	1918	*115.0*

TABLE S.3		
Major	2014-15	*SE*
Mathematics (except as reported below)	12794	*1524.6*
Mathematics Education	2880	*339.3*
Statistics (except Actuarial Science)	1509	*97.8*
Actuarial Mathematics	2354	*427.9*
All Joint Majors (combined)	1821	*330.7*
Other (includes Operations Research prior to 2010)	907	*147.9*
Total Mathematics, Statistics & Joint degrees	22266	*2008.4*
Number of women	9643	*978.0*
Computer Science degrees	3968	*998.8*
Number of women	1302	*495.2*
Total degrees	26234	*2586.7*
Number of women	10946	*1313.8*

TABLE S.4	Percentage of sections taught by					
Four-Year Colleges & Universities	Tenured/ tenure-eligible %	Other full-time %	Part-time %	Graduate teaching assistants %	Unknown %	Total enrollment in 1000s
Mathematics Department courses						
Mathematics courses						
Precollege level 2015	nc	nc	nc	nc	nc	244
SE	*nc*	*nc*	*nc*	*nc*	*nc*	*25.7*
Introductory level 2015	nc	nc	nc	nc	nc	954
SE	*nc*	*nc*	*nc*	*nc*	*nc*	*74.4*
Calculus level 2015	52	24	10	7	7	790
SE	*2.2*	*1.6*	*1.5*	*1.0*	*1.6*	*60.7*
Upper level 2015	70				30	154
SE	*5.0*				*5.0*	*12.2*
Statistics courses						
Introductory level 2015	41	21	25	4	8	235
SE	*2.4*	*2.0*	*2.1*	*1.1*	*2.0*	*18.6*
Upper level 2015 sections	53				47	60
SE	*0.1*				*0.1*	*6.1*
Computer Science courses						
Lower level 2015	46	20	14	0	21	44
SE	*6.5*	*4.1*	*3.4*	*0.0*	*6.7*	*6.8*
Statistics Department Courses						
Introductory level 2015	14	25	10	31	20	90
SE	*1.4*	*1.6*	*1.0*	*2.3*	*2.5*	*2.92*
Upper level 2015	55				45	50
SE	*2.9*				*2.9*	*2.3*
Two-Year College Mathematics Programs	Full-time		Part-time			
All 2015 sections	64		36			1693
SE	*64.0*		*36.0*			*99.7*

TABLE S.5	Percentage of sections taught by						
Four-Year Colleges & Universities	Tenured/ tenure-eligible %	Other full-time %	Part-time %	Graduate teaching assistants %	Un-known %	Enroll-ment in 1000s	Average section size
Mainstream Calculus I							
Lecture with separate recitation	39	33	15	5	9	145	63
SE	*3.1*	*3.6*	*3.3*	*1.0*	*3.4*	*20.9*	*3.6*
Sections that meet as a class	57	18	10	8	7	108	27
SE	*3.6*	*2.8*	*1.7*	*2.5*	*2.2*	*13.4*	*0.7*
Other sections	26	38	15	21	0	2	22
SE	*9.4*	*17.2*	*12.5*	*16.2*	*0.0*	*1.8*	*11.5*
Course total 2015	50	24	12	7	8	255	40
SE	*2.6*	*2.4*	*1.7*	*1.8*	*1.7*	*22.9*	*2.0*
Mainstream Calculus II							
Lecture with separate recitation	49	34	8	4	5	72	61
SE	*4.1*	*3.6*	*2.8*	*0.8*	*1.6*	*9.8*	*3.7*
Sections that meet as a class	56	22	6	7	9	52	26
SE	*4.6*	*2.9*	*1.4*	*2.1*	*3.4*	*7.7*	*1.6*
Other sections	58	17	0	25	0	1	23
SE	*32.4*	*13.0*	*0.0*	*19.4*	*0.0*	*0.9*	*9.8*
Course total 2015	54	26	7	6	7	125	39
SE	*3.3*	*2.4*	*1.3*	*1.5*	*2.1*	*10.7*	*1.9*
Total Mainstream Calculus I & II 2015	51	6	8	5	7	381	40
SE	*2.5*	*2.1*	*1.3*	*1.7*	*1.7*	*31.3*	*1.8*
Two-Year Colleges	Full-time %		Part-time %				
Mainstream Calculus I 2015	82		18			62	26
SE	*2.6*		*2.6*			*6.2*	*1.1*
Mainstream Calculus II 2015	88		12			32	26
SE	*2.8*		*2.8*			*3.6*	*1.3*
Total Mainstream Calculus I & II 2015	84		16			94	26
SE	*2.1*		*2.1*			*9.5*	*1.1*

TABLE S.6	Percentage of sections taught by						
Four-Year Colleges & Universities	Tenured/ tenure-eligible %	Other full-time %	Part-time %	Graduate teaching assistants %	Un-known %	Enroll-ment in 1000s	Average section size
Non-Mainstream Calculus I							
Lecture with separate recitation	29	47	17	2	6	30	84
SE	*4.9*	*5.9*	*4.4*	*0.6*	*3.0*	*6.9*	*12.4*
Sections that meet as a class							
SE	*3.7*	*4.1*	*4.6*	*3.6*	*3.0*	*7.3*	*1.4*
Other sections							
SE	*0.0*	*34.3*	*0.0*	*34.3*	*0.0*	*0.7*	*37.3*
Course total 2015	28	29	19	17	7	91	42
SE	*3.0*	*3.7*	*3.9*	*2.7*	*2.5*	*10.5*	*1.9*
Non-Mainstream Calculus II, III, etc. [3]							
Course total 2015	32	19	36	6	7	16	37
SE	*8.2*	*4.7*	*13.0*	*3.1*	*5.3*	*4.3*	*3.2*
Total Non-Mnstrm Calculus I & II, III, etc.	29	27	22	15	7	106	42
SE	*3.2*	*3.5*	*5.1*	*2.5*	*2.3*	*13.2*	*2.0*
Two-Year Colleges	Full-time %		Part-time %				
Non-Mainstream Calculus I	71		29			23	26
(2005, 2010)	(73,75)		(27,25)			(20,19)	(23,21)
SE	*10.2*		*10.2*			*6.4*	*1.4*
Non-Mainstream Calculus II	100		0			0	26
SE						*0.06*	
Total Non-Mnstrm Calculus I & II	71		29			23	26
SE	*10.2*		*10.2*			*6.4*	*1.4*

TABLE S.7	Percentage of sections taught by						
Four-Year Colleges & Universities Mathematics Departments	Tenured/ tenure-eligible %	Other full-time %	Part-time %	Graduate teaching assistants %	Un-known %	Enroll-ment in 1000s	Average section size
Introductory Statistics (F1) (no calculus prerequisite)							
Lecture with separate recitation	41	28	14	1	16	42	47
SE	*6.0*	*4.0*	*3.8*	*0.3*	*6.0*	*6.4*	*5.5*
Sections that meet as a class	38	22	28	4	8	146	29
SE	*2.7*	*2.5*	*2.4*	*1.4*	*2.1*	*14.3*	*1.3*
Other sections	29	63	9	0	0	0	9
SE	*19.8*	*27.5*	*8.6*	*0.0*	*0.0*	*0.2*	*5.7*
Course total (F1)	38	23	26	4	9	188	32
SE	*2.6*	*2.1*	*2.2*	*1.2*	*2.4*	*15.1*	*1.1*
Introductory Statistics (F2) (calculus prerequisite) (not for majors)							
Lecture with separate recitation	56	8	33	2	2	10	46
SE	*16.3*	*4.8*	*19.2*	*1.4*	*2.0*	*2.9*	*8.5*
Sections that meet as a class	64	13	15	3	5	24	29
SE	*5.7*	*4.7*	*4.7*	*2.1*	*3.4*	*5.6*	*1.6*
Other sections	100	0	0	0	0	0	33
SE	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.3*	*2.3*
Course total (F2)	63	12	18	2	5	34	33
SE	*5.2*	*3.8*	*5.2*	*1.6*	*2.7*	*5.8*	*1.6*
Statistics for Pre-service Teachers (F3,F4)							
Course total (F3, F4)	39	10	11	42	0	1	16
SE	*14.2*	*8.3*	*7.5*	*18.3*	*0.0*	*0.4*	*5.8*
Other intoductory level Probability & Statistics courses (F5)							
Course total (F5)	33	22	34	0	10	11	33
SE	*9.8*	*11.3*	*8.7*	*0.0*	*6.7*	*2.8*	*3.1*
Total All Intro. Probability & Statistics courses Course total (F1+F2+F3+F4+F5)	41	21	25	4	8	235	32
SE	*2.4*	*2.0*	*2.1*	*1.1*	*2.0*	*18.6*	*0.9*
Two-Year Colleges	Full-time %		Part-time %				
Total All Introductory Probability and Statistics Courses	80		20			247	26
SE	*4.8*		*4.8*			*59.9*	*4.8*

TABLE S.8	Percentage of sections taught by						
Statistics Departments	Tenured/ tenure-eligible %	Other full-time %	Part-time %	Graduate teaching assistants %	Un-known %	Enroll-ment in 1000s	Average section size
Introductory Statistics (no calculus prerequisite) (E1)							
Lecture with separate recitation	6	20	7	36	31	40	60
SE	*1.0*	*1.7*	*1.1*	*4.1*	*3.9*	*1.8*	*3.7*
Sections that meet as a class	25	30	12	28	5	25	62
SE	*3.2*	*3.5*	*1.8*	*3.9*	*1.0*	*1.9*	*3.1*
Other sections	0	6	42	52	0	1	21
SE	*0.0*	*25.5*	*4.1*	*21.4*	*0.0*	*0.4*	*2.1*
Course total	13	23	10	33	21	66	59
SE	*1.5*	*1.6*	*1.1*	*2.7*	*2.6*	*2.1*	*2.4*
Introductory Statistics (calculus prerequisite) (for non-majors) (E2)							
Lecture with separate recitation	14	31	11	14	30	11	72
SE	*2.5*	*3.8*	*3.0*	*2.3*	*5.5*	*1.0*	*7.2*
Sections that meet as a class	34	34	7	22	2	7	59
SE	*3.9*	*3.7*	*0.8*	*2.8*	*1.1*	*0.9*	*7.7*
Other sections							
SE	*9.9*	*14.9*	*0.0*	*24.8*	*0.0*	*0.4*	*11.8*
Course total	20	33	8	24	15	20	60
SE	*2.5*	*2.3*	*1.5*	*3.1*	*3.3*	*1.4*	*4.1*
Statistics for Pre-service Teachers (E3,E4)							
Course total (E3, E4)	43	57	0	0	0	0	18
SE	*27.0*	*27.0*	*0.0*	*0.0*	*0.0*	*0.0*	*8.4*
Other intoductory level Probability & Statistics courses (E5)							
Course total (E5)	6	24	6	32	31	4	103
SE	*2.5*	*2.3*	*3.4*	*3.4*	*4.4*	*0.7*	*16.1*
Total All Intro. Probability & Statistics courses							
Course total (E1+E2+E3+E4+E5)	**14**	**25**	**10**	**31**	**20**	**90**	**60**
SE	***1.4***	***1.5***	***1.0***	***2.3***	***2.5***	***2.9***	***2.4***

TABLE S.9	Percentage of sections taught using			
Two-Year Colleges	Common Department exams %	Homework Management system %	Enrollment in 1000s	Average section size
Mainstream Calculus I	88	37	62	26
SE	*3.1*	*4.2*	*6.2*	*1.1*
Mainstream Calculus II	85	34	32	26
SE	*4.0*	*5.4*	*3.6*	*1.3*
Total Mainstream Calculus I & II	86	34	94	26
SE	*3.3*	*4.5*	*9.5*	*1.1*

TABLE S.10	Percentage of sections taught using			
Two-Year Colleges	Common Department exams %	Homework Management system %	Enrollment in 1000s	Average section size
Non-Mainstream Calculus I	9	66	23	26
SE	*4.0*	*13.1*	*6.4*	*1.4*
Non-Mainstream Calculus II	0	0	0	26
SE	.	.	*0.1*	.
Total Non-Mainstream Calculus I & II	9	66	23	26
SE	*4.0*	*13.1*	*6.4*	*1.4*

TABLE S.11	Percentage of sections taught using			
Two-Year Colleges	Common Department exams %	Homework Management system %	Enrollment in 1000s	Average section size
Elementary Statistics	39	55	221	25
SE	*14.1*	*12.0*	*54.7*	*5.0*

TABLE S.12 (A)	% of Math Depts.	SE	% of Stat Depts.	SE
Offer elementary statistics course with no calculus prerequisite	78	*3.9*	92	*2.0*
Number of different kinds of introductory statistics courses for non-majors:				
1	72	*5.4*	23	*2.8*
2	24	*5.2*	26	*2.8*
3	3	*0.9*	22	*2.6*
More than 3	1	*0.6*	30	*2.6*
Percentage of class sessions in which real data is used is:				
0-20%	28	*6.0*	15	*2.7*
21-40%	23	*4.3*	14	*2.2*
41-60%	19	*3.5*	15	*1.7*
61-80%	12	*3.4*	21	*2.9*
81-100%	19	*3.9*	35	*2.9*
Percentage of class sessions in which in-class demonstrations or problem solving activities take place is:				
0-20%	19	*3.6*	13	*2.3*
21-40%	22	*4.8*	23	*2.9*
41-60%	23	*2.9*	21	*2.6*
61-80%	17	*4.0*	5	*0.7*
81-100%	19	*3.2*	39	*2.9*
Majority of sections use the following kinds of technology:				
Graphing calculators	67	*4.7*	47	*3.2*
Statistical packages	48	*5.5*	68	*2.8*
Educational software	50	*4.8*	53	*3.2*
Applets	24	*4.2*	41	*3.2*
Spreadsheets	68	*4.6*	55	*3.2*
Web-based resources	50	*5.2*	68	*2.7*
Classroom response systems	6	*2.4*	50	*3.2*
Online textbooks	41	*5.1*	50	*3.2*
Online videos	31	*4.5*	35	*3.1*
Percentage of departments where the majority of sections require assessments beyond homework, exams, and quizzes	39	*4.9*	32	*3.1*

TABLE S.13	2015	*SE*
Four-Year Colleges & Universities		
Mathematics Departments		
Full-time faculty	22532	*312.5*
Part-time faculty	7682	*281.9*
Statistics Departments (PhD)		
Full-time faculty	1237	*47.8*
Part-time faculty	128	*19.8*
Two-Year College Mathematics Programs		
Full-time faculty	9800	*893.1*
Part-time faculty	17888	*1908.8*

TABLE S.14				
Four-Year Colleges and Universities	Fall 2015			
Mathematics Departments	Total	TTE	Other full-time	Postdoc
Full-time faculty	22532	15270	7261	1317
SE	*312.5*	*214.5*	*217.5*	*60.7*
Having doctoral degree	18743	14869	3874	1317
SE	*251.5*	*212.4*	*123.2*	*60.7*
Having other degree	3789	401	3387	
SE	*150.5*	*46.2*	*143.3*	
Statistics Departments				
Full-time faculty	1432	1031	401	116
SE	*51.4*	*39.1*	*22.3*	*14.8*
Having doctoral degree	1373	1031	342	116
SE	*53.3*	*39.1*	*21.5*	*14.8*
Having other degree	59	0	59	
SE	*7.6*	*0.0*	*7.6*	
Total Math & Stat Depts	23964	16302	7662	1433
SE	*316.7*	*218.0*	*218.6*	*62.5*
Two-Year College Mathematics	Total full-time faculty	Full-time permanent	Other full-time	
Full-time faculty	9800	8314	1487	
SE	*894.3*	*839.5*	*273.3*	
Grand Total	33764	24616	9149	1433

TABLE S.15

Four-Year Colleges and Universities	Fall 2015				
Mathematics Departments	Total	Tenured	Tenure-eligible	Other full-time	Postdoc
Full-time faculty	22532	11979	3291	7261	1317
SE	*312.5*	*180.1*	*79.1*	*217.5*	*60.7*
Number of women	6981	2688	1171	3122	288
SE	*118.4*	*69.9*	*42.9*	*86.2*	*18.5*
Statistics Departments					
Full-time faculty	1432	772	260	401	116
SE	*51.4*	*33.2*	*13.7*	*22.3*	*14.8*
Number of women	392	153	90	149	22
SE	*15.8*	*10.3*	*7.1*	*8.6*	*4.0*

	July 1, 2010 - June 30, 2015
Number of PhD's from US Math & Stat Depts	9121
Number of women among new PhDs	2854 (31%)

Two-Year College Mathematics Programs	Total full-time	Full-time age < 40
Full-time permanent faculty	8314	2045
SE	*839.5*	*292.1*
Number of women	4345	1107
SE	*574.2*	*175.3*

TABLE S.16

Four-Year College & University Mathematics Departments	Percentage of tenured/tenure-eligible faculty										Average age 2015
	<30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	>69	
	%	%	%	%	%	%	%	%	%	%	
Tenured men	0	1	4	7	9	10	9	10	6	6	54.9
SE	*0.0*	*0.0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	
Tenured women	0	1	2	3	3	3	2	2	1	0	51.0
SE	*0.0*	*0.0*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.0*	*0.0*	
Tenure-eligible men	1	6	4	2	0	0	0	0	0	0	36.3
SE	*0.1*	*0.1*	*0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	
Tenure-eligible women	1	3	2	1	0	0	0	0	0	0	37.0
SE	*0.0*	*0.1*	*0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	
Total tenured & tenure-eligible faculty	2	10	12	13	12	14	11	12	7	6	
SE	*0.2*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.2*	*0.0*	

	Percentage of permanent full-time faculty								
Two-Year College Mathematics Program	<30	30-34	35-39	40-44	45-49	50-54	55-59	>59	
Full-time permanent faculty	4	6	14	14	18	16	13	15	47.7
SE	*1.2*	*1.0*	*2.6*	*1.7*	*1.9*	*1.9*	*1.6*	*1.2*	0.48

TABLE S.17

All Statistics Departments	Percentage of tenured/tenure-eligible faculty										Average age 2015
	<30	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	>69	
	%	%	%	%	%	%	%	%	%	%	
Tenured men	0	1	5	7	7	8	9	9	7	7	55.3
SE	*0.3*	*1.0*	*1.8*	*2.0*	*2.5*	*2.6*	*2.3*	*2.5*	*1.9*	*1.7*	
Tenured women	0	1	2	3	3	2	1	1	1	0	47.9
SE	*0.0*	*0.9*	*1.3*	*1.4*	*1.6*	*1.8*	*1.4*	*1.6*	*1.2*	*0.6*	
Tenure-eligible men	3	8	4	3	0	0	0	0	0	0	34.6
SE	*1.1*	*1.9*	*1.8*	*1.2*	*0.5*	*0.4*	*0.4*	*0.3*	*0.0*	*0.0*	
Tenure-eligible women	1	5	2	0	0	0	0	0	0	0	34.5
SE	*0.9*	*1.7*	*1.3*	*1.0*	*0.7*	*0.6*	*0.6*	*0.3*	*0.2*	*0.0*	
Total tenured & tenure-eligible faculty	**4**	**15**	**13**	**13**	**11**	**10**	**10**	**10**	**7**	**7**	
SE	***0.5***	***1.1***	***1.0***	***1.0***	***0.9***	***0.9***	***0.9***	***1.0***	***0.8***	***0.8***	

TABLE S.18						
Mathematics Departments	Asian %	Black, not Hispanic %	Mexican American/ Puerto Rican/ other Hispanic %	White, not Hispanic %	AIAN & NHPI %	Unknown %
Tenured Men	6	1	1	32	0	1
SE	*0.2*	*0.1*	*0.1*	*0.3*	*0.0*	*0.1*
Tenured Women	2	0	0	9	0	0
SE	*0.1*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*
Tenure-eligible men	2	0	0	7	0	0
SE	*0.1*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*
Tenure-eligible women	1	0	0	4	0	0
SE	*0.1*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*
Postdoctoral men	1	0	0	3	0	0
SE	*0.0*	*0.0*	*0.0*	*0.1*	*0.0*	*0.0*
Postdoctoral women	0	0	0	1	0	0
SE	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Full-time men not included above	1	0	1	11	0	1
SE	*0.1*	*0.1*	*0.1*	*0.2*	*0.0*	*0.1*
Full-time women not included above	1	0	0	10	0	0
SE	*0.1*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*
Total full-time men	11	2	2	53	0	2
SE	*0.2*	*0.1*	*0.1*	*0.4*	*0.0*	*0.1*
Total full-time women	4	1	1	24	0	1
SE	*0.1*	*0.1*	*0.1*	*0.3*	*0.0*	*0.1*

TABLE S.19

All Statistics Departments	Asian %	Black, not Hispanic %	Mexican American/ Puerto Rican/ other Hispanic %	White, not Hispanic %	AIAN & NHPI %	Unknown %
Tenured Men	13	0	1	28	0	1
SE	*0.2*	*0.1*	*0.1*	*0.3*	*0.0*	*0.1*
Tenured Women	5	0	0	5	0	0
SE	*0.1*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*
Tenure-eligible men	5	0	0	6	0	0
SE	*0.1*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*
Tenure-eligible women	3	0	0	3	0	0
SE	*0.1*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*
Postdoctoral men	3	0	1	3	0	0
SE	*0.0*	*0.0*	*0.0*	*0.1*	*0.0*	*0.0*
Postdoctoral women	1	0	0	1	0	0
SE	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Full-time men not included above	1	0	0	9	0	1
SE	*0.1*	*0.1*	*0.1*	*0.2*	*0.0*	*0.1*
Full-time women not included above	2	0	0	6	0	0
SE	*0.1*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*
Total full-time men	22	1	2	45	0	2
SE	*0.9*	*0.2*	*0.3*	*1.1*	*0.2*	*0.3*
Total full-time women	11	0	1	15	0	1
SE	*0.7*	*0.0*	*0.2*	*0.8*	*0.0*	*0.2*

TABLE S.20

Four-Year College & University	2014-2015	Number of tenured/ tenure-eligible faculty 2015
Mathematics Departments		
Univ (PhD)	182	5594
SE	*6.8*	
Univ (MA)	128	2983
SE	*10.8*	
Coll (BA)	251	6693
SE	*14.0*	
Total deaths and retirements in all Mathematics Departments	561	15270
SE	*19.0*	
Doctoral Statistics Departments: Total deaths and retirements	29	869

TABLE SP.1	Percentage whose institutions have a certification program for:		
	K-5	6-8	Secondary (9-12)
Mathematics Departments			
Univ (PhD)	52	47	75
SE	*6.0*	*8.3*	*5.3*
Univ (MA)	63	64	92
SE	*10.2*	*9.0*	*4.8*
Coll (BA)	52	50	75
SE	*4.5*	*4.5*	*4.7*
Total Math Depts	53	51	77
SE	*3.5*	*3.5*	*3.5*

TABLE SP.2	Percentage of TYCs with an organized program in which students can complete their entire mathematics course or licensure requirements	
	Estimate	*SE*
Pre-service elementary teachers	28	*5.3*
Pre-service middle school teachers	14	*3.0*
Pre-service secondary teachers	7	*2.6*
In-service elementary teachers	12	*3.6*
In-service middle school teachers	6	*2.5*
In-service secondary teachers	4	*1.9*
Career-switchers aiming for elementary teaching	16	*3.6*
Career-switchers aiming for middle school teaching	13	*3.5*
Career-switchers aiming for secondary teaching	5	*1.8*

TABLE SP.3	Percentage of TYCs	*SE*
Assign a mathematics faculty member to coordinate K–8 teacher education in mathematics	35	*6.3*
Offer a special mathematics course for preservice K–8 teachers	55	*5.3*
Offer a special mathematics course for preservice secondary teachers	19	*3.2*
Offer mathematics pedagogy courses in the mathematics department	9	*4.8*
Offer mathematics pedagogy courses outside of the mathematics department	6	*2.4*

TABLE SP.4	Percentage of departments with K-5 certification programs that require various numbers of mathematics courses for certification							
Number of semester hours in mathematics department required for K-5 certification	Univ (PhD) %	*SE*	Univ (MA) %	*SE*	Coll (BA) %	*SE*	All Math %	*SE*
0 required	8	*3.0*	0	*0.0*	2	*0.9*	2	*0.8*
1-3 required	9	*5.7*	0	*0.0*	6	*4.7*	6	*3.4*
4-6 required	20	*7.7*	37	*7.6*	19	*6.0*	22	*4.7*
7-9 required	22	*7.1*	26	*10.2*	23	*8.5*	23	*6.2*
10-12 required	17	*3.4*	13	*9.0*	11	*5.2*	12	*3.9*
More than 12 required	24	*4.7*	24	*7.4*	38	*9.3*	34	*6.7*
Number of semester hours in fundamental ideas of mathematics required for K-5 certification	Univ (PhD) %	*SE*	Univ (MA) %	*SE*	Coll (BA) %	*SE*	All Math %	*SE*
0 required	12	*2.0*	5	*5.0*	17	*6.5*	14	*4.5*
1-3 required	6	*3.8*	3	*2.2*	10	*5.5*	8	*3.9*
4-6 required	41	*8.0*	40	*6.9*	46	*9.6*	45	*6.8*
7-9 required	16	*5.1*	21	*10.0*	11	*6.5*	13	*4.9*
10-12 required	11	*5.3*	16	*9.3*	1	*0.7*	5	*1.6*
More than 12 required	14	*6.8*	15	*5.8*	15	*5.9*	15	*4.3*

TABLE SP.5	Percentage of departments with grade 6-8 certification programs that require various numbers of mathematics courses for certification							
Number of semester hours in mathematics department required for 6-8 certification	Univ (PhD) %	*SE*	Univ (MA) %	*SE*	Coll (BA) %	*SE*	All Math %	*SE*
0 required	4	*1.3*	0	*0.0*	1	*0.7*	1	*0.5*
1-3 required	0	*0.0*	0	*0.0*	0	*0.0*	0	*0.0*
4-6 required	14	*5.7*	10	*5.1*	4	*2.9*	7	*2.4*
7-9 required	5	*4.0*	3	*2.0*	2	*1.1*	3	*1.0*
10-12 required	6	*4.4*	10	*5.9*	5	*3.2*	6	*2.5*
More than 12 required	71	*9.1*	77	*3.3*	87	*4.2*	83	*3.2*
Number of semester hours in fundamental ideas of mathematics required for 6-8 certification	Univ (PhD) %	*SE*	Univ (MA) %	*SE*	Coll (BA) %	*SE*	All Math %	*SE*
0 required	15	*5.8*	10	*5.1*	15	*6.6*	14	*4.6*
1-3 required	4	*3.1*	.	*.*	11	*6.0*	8	*4.1*
4-6 required	28	*9.0*	19	*7.3*	26	*7.6*	25	*5.4*
7-9 required	25	*14.5*	16	*8.0*	17	*6.1*	18	*4.7*
10-12 required	15	*5.1*	10	*5.5*	4	*1.9*	7	*1.9*
More than 12 required	13	*8.3*	45	*8.7*	28	*7.9*	29	*5.6*

TABLE SP.6	Percentage of departments with secondary certification program where:											
	Course is required				Course is generally taken, but not required				Math dept offers special course in the subject for secondary pre-service teachers			
Course	Univ (Ph.D) %	Univ (MA) %	Coll (BA) %	All math %	Univ (Ph.D) %	Univ (MA) %	Coll (BA) %	All math %	Univ (Ph.D) %	Univ (MA) %	Coll (BA) %	All math %
Advanced Calculus/ Analysis	69	64	49	54	13	13	16	15	9	3	10	8
SE	*8.8*	*6.5*	*7.6*	*5.9*	*5.3*	*6.5*	*5.2*	*3.9*	*4.5*	*2.0*	*4.8*	*3.5*
Modern Algebra	72	89	81	81	9	12	14	13	23	4	2	6
SE	*4.0*	*6.4*	*4.2*	*3.2*	*3.9*	*6.5*	*4.5*	*3.4*	*5.9*	*2.2*	*0.9*	*1.3*
Number Theory	25	37	11	17	26	24	24	24	7	.	9	7
SE	*8.1*	*7.5*	*3.5*	*3.2*	*6.2*	*5.5*	*5.8*	*4.2*	*2.5*	*.*	*4.7*	*3.2*
Geometry	85	89	90	89	18	7	10	11	53	5	13	18
SE	*3.2*	*3.8*	*4.2*	*3.0*	*7.9*	*3.8*	*4.3*	*3.2*	*9.8*	*4.2*	*4.6*	*3.9*
Discrete Mathematics	56	52	62	60	8	9	16	14	12	5	4	5
SE	*7.3*	*10.5*	*6.7*	*5.1*	*5.2*	*5.1*	*4.1*	*3.0*	*5.4*	*4.1*	*1.6*	*1.6*
Statistics	66	88	85	83	23	7	12	13	4	8	3	4
SE	*2.9*	*5.6*	*4.2*	*3.1*	*10.3*	*3.7*	*3.9*	*3.0*	*2.9*	*5.0*	*1.3*	*1.3*
Probability	62	68	50	55	15	2	18	15	6	9	6	7
SE	*6.6*	*8.1*	*7.9*	*5.3*	*6.0*	*1.5*	*5.1*	*3.6*	*2.8*	*5.3*	*4.5*	*3.2*
History of Math	60	77	39	48	16	7	17	16	39	5	11	15
SE	*6.1*	*8.7*	*6.4*	*4.7*	*6.6*	*3.9*	*4.2*	*3.1*	*9.6*	*3.8*	*4.5*	*3.8*

TABLE SP.7	Percentage of departments with secondary certification program where:								
	Course is required			Course is generally taken, but not required			Math dept offers special course in the subject for secondary pre-service teachers		
Course	Univ (Ph.D) %	Univ (MA) %	All math %	Univ (Ph.D) %	Univ (MA) %	All math %	Univ (Ph.D) %	Univ (MA) %	All math %
Introductory Statistics	36	57	41	36	0	27	17	29	20
SE	*3.5*	*9.7*	*3.6*	*4.9*	*0.0*	*4.0*	*3.2*	*7.6*	*3.0*
Probability	24	33	26	13	14	13	8	14	9
SE	*3.0*	*10.5*	*3.2*	*2.5*	*7.2*	*2.5*	*1.4*	*7.2*	*2.0*
Probability and/or statistics with calculus prerequisite	36	67	42	4	14	7	12	0	9
SE	*3.5*	*8.9*	*3.6*	*1.1*	*7.2*	*2.0*	*1.5*	*0.0*	*1.1*
Upper level statistics course	12	17	13	9	43	18	8	0	6
SE	*2.1*	*8.5*	*2.4*	*2.3*	*9.7*	*3.1*	*1.4*	*0.0*	*1.1*
Applied statistics course	12	17	13	9	29	14	4	0	3
SE	*2.5*	*8.5*	*2.6*	*2.4*	*9.1*	*3.0*	*1.0*	*0.0*	0.7
Other	5	0	4	5	0	4	4	0	4
SE	*1.3*	*0.0*	*1.0*	*1.2*	*0.0*	*1.0*	*1.1*	*0.0*	*0.9*
Number of semester hours required for K-5 grade teachers (%)									
None	85	50	73						
SE	*2.7*	*8.9*	*3.4*						
1-3 hours	0	0	0						
SE	*0.0*	*0.0*	*0.0*						
4-6 hours	11	50	23						
SE	*2.7*	*8.9*	*3.4*						
More than 6 hours	5	0	3						
SE	*0.3*	*0.0*	*0.2*						
Number of semester hours required for 6-8 grade teachers									
None	49	25	42						
SE	*4.3*	*8.1*	*3.9*						
1-3 hours	33	63	42						
SE	*3.8*	*8.9*	*3.8*						
4-6 hours	9	13	10						
SE	*2.4*	*6.3*	*2.5*						
More than 6 hours	9	0	6						
SE	1.2	0.0	0.8						

TABLE SP.8	Mathematics Depts				Statistics Depts			Two-Year Colleges
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total	
Give credit for distance learning not taught by faculty in your institution:								
Yes	60	74	60	62	52	42	50	58
SE	*4.9*	*7.8*	*7.0*	*5.2*	*3.2*	*7.3*	*3.0*	*5.1*
No	40	26	40	38	48	58	50	42
SE	*4.9*	*7.8*	*7.0*	*5.2*	*3.2*	*7.3*	*3.0*	*5.1*
Set a limit on the number of credits earned in distance learning classes	33	33	37	36	34	18	31	1
SE	*4.7*	*7.9*	*5.0*	*3.7*	*3.3*	*5.9*	*2.9*	*0.5*
Percentage offering distance learning	63	73	45	52	69	50	64	87
SE	*4.2*	*5.1*	*6.9*	*5.2*	*3.3*	*7.4*	*3.1*	*4.1*
Format of majority of distance learning:								
Complete online	63	60	74	69	70	50	66	69
SE	*11.2*	*6.7*	*7.9*	*5.4*	*3.6*	*11.6*	*3.5*	*5.7*
Hybrid	36	33	21	26	18	50	23	22
SE	*11.2*	*8.7*	*7.6*	*5.3*	*2.9*	*11.6*	*3.1*	*4.98*
Other	1	7	5	5	13	.	10	8
SE	*0.3*	*4.1*	*2.2*	*1.5*	*2.8*	*.*	*2.3*	*4.0*
Instructional materials created by:								
Faculty	37	30	37	36	54	67	56	14
SE	*9.6*	*6.4*	*6.0*	*4.6*	*4.0*	*10.9*	*3.7*	*4.4*
Commercially produced materials	9	6	11	9	3	.	3	19
SE	*3.9*	*3.5*	*5.5*	*3.5*	*1.3*	*.*	*1.1*	*3.9*
Combination of both	55	65	52	55	43	33	41	67
SE	*8.8*	*7.0*	*7.5*	*5.2*	*3.9*	*10.9*	*3.7*	*5.2*
How distance learning students take majority of tests:								
Not at a monitored testing site	15	15	26	22	10	17	11	11
SE	*9.8*	*7.6*	*8.7*	*5.8*	*2.8*	*8.6*	*2.7*	*3.7*
Online, using monitoring technology	10	14	23	19	16	17	16	10
SE	*2.8*	*4.7*	*6.2*	*3.9*	*3.2*	*8.6*	*3.0*	*3.5*
At proctored testing site	49	34	34	37	32	50	35	47
SE	*8.4*	*5.5*	*8.7*	*5.9*	*3.9*	*11.6*	*3.7*	*5.2*
Combination of both	25	37	18	23	41	17	37	32
SE	*4.9*	*7.4*	*5.5*	*4.0*	*3.5*	*8.6*	*3.2*	*6.0*

TABLE SP.9		
Requirements of faculty whose entire teaching load is distance-learning courses regarding time required to be on campus to meet with students	% of TYCs	
	Estimate	SE
Never	5	*2.0*
Only for scheduled meeting or student appointment	12	*3.2*
A specified number of office hours per week	32	*6.7*
Not applicable or unreported	51	*8.1*

TABLE SP.10	Math				Stat			TYC
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total	
Some courses in both non-distance and distance-learning formats	91	94	90	91	85	100	88	na
SE	*4.5*	*4.4*	*4.9*	*3.2*	*2.6*	*0.0*	*2.2*	*na*
Of those with courses in both formats, the percentage where:								
Instructors hold comparable office hours on campus	71	52	57	59	64	83	68	na
SE	*5.1*	*6.9*	*7.6*	*4.8*	*4.2*	*8.6*	*3.7*	*na*
Instructors participate in evaluation in same way	89	81	89	87	89	100	91	93
SE	*3.4*	*6.5*	*6.2*	*4.1*	*3.0*	*0.0*	*2.4*	*3.1*
Same use of common exams as in face-to-face	52	64	58	58	44	50	45	67
SE	*9.7*	*9.8*	*13.1*	*8.0*	*4.3*	*11.6*	*4.0*	*5.0*
Same course outlines as in face-to-face	94	91	95	94	85	100	88	97
SE	*3.6*	*5.4*	*3.3*	*2.4*	*3.5*	*0.0*	*2.9*	*2.6*
Same course projects as in face-to-face	85	73	78	79	62	100	69	77
SE	*5.3*	*9.0*	*8.7*	*5.5*	*4.1*	*0.0*	*3.5*	*4.5*
More course projects than in face-to-face	10	18	14	14	9	.	7	12
SE	*4.3*	*5.4*	*6.3*	*4.1*	*1.3*	.	*1.0*	*3.6*

TABLE SP.11.A	Mathematics Departments							
	Univ (PhD)	SE	Univ (MA)	SE	College (BA)	SE	Total	SE
E23. Introduction to Proofs	2	1.8	.	.	3	2.2	2	1.6
E24-1. Modern Algebra I	2	1.8	.	.	.	.	0	0.3
E24-2. Modern Algebra II								
E25. Number Theory								
E26. Combinatorics								
E27. Actuarial Mathematics								
E28. Logic/Foundations (not E23)								
E29. Discrete Structures	1	0.2	.	.	.	.	0	0.0
E30. History of Mathematics	4	2.3	.	.	1	0.4	1	0.5
E31. Geometry	2	1.4	.	.	.	.	0	0.2
E32-1. Advanced Calculus I and/or Real Analysis I	1	0.2	.	.	.	.	0	0.0
E32-2. Advanced Calculus II and/or Real Analysis II								
E33. Advanced Mathematics for Engineering and Physical Sciences								
E34. Advanced Linear Algebra (beyond E17, E19)	2	1.4	.	.	.	.	0	0.2
E35. Vector Analysis								
E36. Advanced Differential Equations (beyond E18)								
E37. Partial Differential Equations								
E38. Numerical Analysis I and II	.	.	3	3.0	.	.	0	0.4
E39. Applied Mathematics (Modeling)	.	.	4	3.7	.	.	1	0.5
E409. Complex Variables	.	.	4	3.7	1	0.6	1	0.7
E41. Topology	.	.	4	3.7	.	.	1	0.5
E42. Mathematics of Finance (not E26, E38)								
E43. Codes and Cryptology								
E44. Biomathematics								
E45. Operations Research (all courses)	.	.	.	.	0	0.3	0	0.2
E46. Senior Seminar/ Independent Study in Mathematics								
E47. Other advanced-level mathematics	.	.	7	4.9	0	0.3	1	0.7
E48. Mathematics for Secondary School Teachers	.	.	7	4.9	1	0.6	1	0.8

TABLE SP.11.B	Mathematics Departments				Statistics Departments		
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total
E6. Introductory Probability and/or Statistics for Majors/Minors (no calculus prerequisite)	2	3	5	4	11	15	12
SE	*2.0*	*2.3*	*2.7*	*2.0*	*2.1*	*5.1*	*2.0*
E7. Combined Probability & Statistics (calculus prerequisite)	2	3	.	1	4	17	7
SE	*1.9*	*2.3*	*.*	*0.4*	*0.5*	*5.6*	*1.3*
E8. Probability (calculus prerequisite)	5	7	0	2	.	8	2
SE	*2.4*	*4.5*	*0.3*	*0.7*	*.*	*4.1*	*1.0*
E9. Mathematical Statistics (calculus prerequisite)	3	7	0	2	.	8	2
SE	*1.9*	*4.5*	*0.3*	*0.7*	*.*	*4.1*	*1.0*
E10. Stochastic Processes	.	3	.	0			
SE	*.*	*2.3*	*.*	*0.3*			
E11. Applied Statistical Analysis	2	3	.	1	6	8	7
SE	*1.9*	*2.3*	*.*	*0.4*	*1.1*	*4.1*	*1.3*
E12. Data Science/Analytics	2	6	.	1	3	8	4
SE	*1.9*	*3.9*	*.*	*0.6*	*1.6*	*4.1*	*1.5*
E13. Design & Analysis of Experiments	2	3	0	1	7	8	7
SE	*1.9*	*2.3*	*0.3*	*0.5*	*1.3*	*4.1*	*1.4*
E14. Regression (and Correlation)	2	3	.	1	2	.	2
SE	*1.9*	*2.3*	*.*	*0.4*	*1.0*	*.*	*0.8*
F15. Biostatistics	.	3	.	0	2	.	2
SE	*.*	*2.3*	*.*	*0.3*	*1.0*	*.*	*0.8*
E16. Nonparametric Statistics	.	3	.	0			
SE	*.*	*2.3*	*.*	*0.3*			
E17. Categorical Data Analysis	.	3	.	0			
SE	*.*	*2.3*	*.*	*0.3*			
E18. Sample Survey Design & Analysis	.	3	.	0	2	8	3
SE	*.*	*2.3*	*.*	*0.3*	*0.0*	*4.1*	*0.9*
E19. Statistical Computing and/or Software	2	3	.	1	4	8	5
SE	*1.9*	*2.3*	*.*	*0.4*	*1.1*	*4.1*	*1.3*
E20. Bayesian Statistics	na	na	na	na			
SE	*na*	*na*	*na*	*na*			
E21. Statistical Consulting	na	na	na	na	.	8	2
SE	*na*	*na*	*na*	*na*	*.*	*4.1*	1.0
E22. Senior Seminar/ Independent Studies	.	5	.	1			
SE	*.*	*2.3*	*.*	*0.3*			
E23. Other upper-level Probability & Statistics	2	5	0	1	2	15	6
SE	*1.9*	*2.3*	*0.3*	*0.5*	*1.0*	*5.1*	*1.5*
E24. Other mathematical science courses	na	na	na	na	.	8	2
SE	*na*	*na*	*na*	*na*	*.*	*4.1*	*1.0*

TABLE SP.12							
Percentage with special opportunities for undergraduates	Honors sections of courses for majors %	Math or Stat club %	Special programs for women %	Special programs for minorities %	Math or Stat contests %	Special Math or Stat colloquia for undergrads &	Outreach in K–12 schools %
Mathematics Departments Univ (PhD)	69	94	41	25	91	77	61
SE	*5.2*	*3.0*	*9.4*	*4.4*	*6.3*	*6.6*	*7.3*
Univ (MA)	39	91	37	31	78	87	77
SE	*4.7*	*5.0*	*7.4*	*6.0*	*7.6*	*5.0*	*6.8*
Coll (BA)	28	56	16	8	64	53	43
SE	*5.7*	*4.6*	*3.8*	*3.4*	*4.2*	*6.4*	*5.6*
Total Mathematics Departments	35	67	22	14	70	61	50
SE	*4.4*	*3.0*	*3.2*	*2.7*	*3.3*	*4.7*	*4.2*
Statistics Departments Univ (PhD)	38	55	18	13	56	70	18
SE	*3.0*	*3.4*	*2.9*	*1.9*	*3.5*	*3.2*	*2.5*
Univ (MA)	50	18	.	8	45	42	42
SE	*7.4*	*6.1*	*.*	*4.1*	*7.8*	*7.3*	*7.3*
Total Statistics Depts	41	46	14	12	54	63	24
SE	*2.9*	*3.0*	*2.2*	*1.7*	*3.2*	*3.0*	*2.6*
Two-Year College Mathematics Programs	28	32	15	15	40	21	46
SE	*4.2*	*4.7*	*3.2*	*3.1*	*4.7*	*4.1*	*4.4*

TABLE SP.13

Percentage with additional opportunities for undergraduates	Undergrad. Research opportunity %	Indep. Studies opportunity %	Assigned advisors in dept. %	Senior thesis opportunity %	Math career day %	Graduate school advising %	Internship opportunity %	Senior seminar opportunity %	Consulting lab with clients %	Tutor, grade papers, or TA %
Mathematics Departments										
Univ (PhD)	94	90	88	73	46	67	69	50	89	21
SE	*3.0*	*6.3*	*3.6*	*5.8*	*6.4*	*9.2*	*7.6*	*6.2*	*2.0*	*7.5*
Univ (MA)	89	93	93	59	23	58	69	71	82	19
SE	*4.3*	*4.3*	*3.9*	*7.9*	*8.3*	*6.6*	*5.1*	*9.6*	*7.6*	*6.1*
Coll (BA)	72	85	85	52	21	51	61	61	82	15
SE	*5.0*	*4.0*	*3.4*	*5.1*	*3.6*	*6.7*	*5.4*	*3.4*	*4.1*	*3.6*
Total mathematics depts	77	87	86	56	25	55	63	60	83	17
SE	*3.8*	*3.0*	*2.5*	*3.7*	*2.8*	*5.0*	*4.3*	*2.8*	*3.2*	*2.9*
Statistics Departments										
Univ (PhD)	91	95	73	60	50	90	72	46	41	80
SE	*1.5*	*1.7*	*3.2*	*3.0*	*3.5*	*2.5*	*3.3*	*3.4*	*3.4*	*2.5*
Univ (MA)	69	92	83	42	27	50	69	27	54	62
SE	*6.6*	*4.1*	*5.6*	*7.3*	*7.0*	*7.4*	*6.6*	*7.0*	*7.1*	*6.9*
Total statistics depts	86	94	76	56	45	80	71	42	44	75
SE	*2.0*	*1.6*	*2.8*	*2.9*	*3.2*	*2.6*	*2.9*	*3.1*	*3.1*	*2.5*
Two-Year College Mathematics Programs	17	41	49	na	na	na	na	na	na	na
SE	*3.3*	*5.6*	*5.7*	*na*	*na*	*na*	*na*	*na*	*na*	*na*

TABLE SP.14

Activity	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Undergraduate research project in the mathematical sciences	12168	2091	1733	8344	575	534	42
SE	*2479.8*	*228.3*	*333.0*	*2453.9*	*45.2*	*44.3*	*9.0*
Internship in mathematical sciences	6031	1198	766	4068	714	680	34
SE	*1751.4*	*170.5*	*246.0*	*1725.7*	*49.1*	*48.8*	*6.1*
Mathematical or statistical consulting to client	975	243	170	562	317	300	17
SE	*228.1*	*111.1*	*71.4*	*189.4*	*41.7*	*41.5*	*3.2*

TABLE SP.15

	Univ (PhD)	Univ (MA)	Coll (BA)	All departments
Offered course in:	Offered course %	Offered course %	Offered course %	Offered course %
Mathematics and finance or business	46	44	31	35
SE	*7.5*	*7.9*	*5.1*	*3.9*
Mathematics and biology	47	36	14	22
SE	*7.8*	*7.7*	*2.9*	*2.6*
Mathematics and the study of the environment	16	8	3	6
SE	*6.1*	*3.7*	*2.3*	*2.1*
Mathematics and engineering or the physical sciences	29	23	13	17
SE	*6.4*	*6.4*	*3.4*	*2.8*
Mathematics and economics	15	11	9	10
SE	*4.2*	*4.4*	*3.4*	*2.5*
Mathematics and social sciences other than economics	5	16	7	8
SE	*2.9*	*7.1*	*2.9*	*2.4*
Mathematics and education	33	59	40	41
SE	*4.2*	*6.2*	*5.7*	*4.3*
Mathematics and the humanities	8	9	14	13
SE	*2.3*	*5.3*	*5.0*	*3.6*
Mathematics and computer science	27	41	30	31
SE	*7.3*	*6.4*	*6.2*	*4.7*
Other	10	6	10	10
SE	*3.2*	*4.3*	*3.2*	*2.4*

TABLE SP.16

	Four-year Mathematics			Two-year Mathematics			Four-year Statistics		
Percentage of departments with dual-enrollment courses	26%			63%			12%		
SE	*4.11%*			*6.4%*			*1.82%*		
Number of dual enrollments in:	Dual Enrollments		Other enrollments	Dual enrollments		Other enrollments	Dual enrollments		Other enrollments
	spring 2015	fall 2015	fall 2015	spring 2015	fall 2015	fall 2015	spring 2015	fall 2015	fall 2015
College algebra	15534	30310	255416	32937	57523	292138	na	na	na
SE	*3774.3*	*8361.6*	*24928.3*	*12324.8*	*17454.3*	*33948.2*	*na*	*na*	*na*
Precalculus	15090	15702	122302	18869	13178	87014	na	na	na
SE	*5182.9*	*7081.6*	*9220.1*	*4294.1*	*3275.3*	*12416.7*	*na*	*na*	*na*
Calculus I	6329	14480	344988	4596	6358	91993	na	na	na
SE	*1643.4*	*4588.6*	*30415.6*	*1185.9*	*1642.9*	*10919.6*	*na*	*na*	*na*
Statistics	3866	3292	226441	11919	7064	251279	299	1179	89756
SE	*1036.6*	*1079.5*	*18794.8*	*3406.8*	*1811.0*	*56864.2*	*45.3*	*354.1*	*2858.8*
Other	8016	4780	na	8478	10046	na	na	na	na
SE	*3362.7*	*1043.2*	*na*	*2821.9*	*3871.5*	*na*	*na*	*na*	*na*
Departmental teaching evaluations required in dual-enrollment courses			34%			72%			26%
SE			*7.2%*			*4.7%*			*5.3%*

TABLE SP.17	Four-year Mathematics Departments	Two-year Mathematics Departments	Statistics Departments
Assign their own members to teach dual-enrollment courses	6	44	
SE	*1.8*	*6.5*	
Number of students enrolled	4014	*	0
SE	*1648.6*	*10577.2*	*0.0*

TABLE SP.18

Mathematics Department Requirements	Required in all majors			Required in some but not all majors			Not required in any major		
	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %	College (BA) %
Modern Algebra I	34	34	54	40	62	27	26	4	19
SE	*7.3*	*5.7*	*8.5*	*8.4*	*6.1*	*7.2*	*5.5*	*3.5*	*4.9*
Real Analysis I	31	49	36	49	45	23	20	6	41
SE	*7.2*	*10.7*	*5.9*	*6.5*	*10.2*	*5.4*	*8.5*	*4.0*	*6.4*
Modern Algebra I or Real Analysis I (major may choose either to fulfill this requirement)	21	33	24	23	27	14	56	40	62
SE	*5.8*	*8.6*	*5.0*	*5.8*	*10.5*	*4.9*	*5.5*	*9.7*	*7.8*
A one-year upper-level sequence	48	26	28	19	43	6	33	31	66
SE	*8.1*	*10.7*	*5.0*	*5.8*	*14.0*	*2.5*	*5.8*	*7.7*	*5.9*
At least one computer science course	55	67	69	19	13	6	26	20	25
SE	*6.5*	*6.2*	*7.0*	*4.3*	*4.4*	*3.1*	*4.5*	*7.6*	*5.9*
At least one statistics course	31	46	59	37	47	8	32	8	34
SE	*6.8*	*8.0*	*5.4*	*8.3*	*7.6*	*2.3*	*8.3*	*4.1*	*5.0*
At least one applied mathematics course beyond course E21	32	36	43	47	40	16	21	24	41
SE	*7.9*	*6.8*	*4.9*	*6.9*	*6.3*	*4.3*	*4.2*	*6.6*	*5.9*
A capstone experience (senior project, thesis, seminar, internship)	32	68	76	27	17	5	41	15	19
SE	*7.8*	*8.0*	*4.5*	*4.2*	*6.6*	*1.8*	*6.7*	*6.5*	*4.4*
An exit exam (written or oral)	3	10	31	3	15	2	94	75	67
SE	*2.2*	*4.7*	*5.8*	*2.0*	*5.1*	*0.9*	*2.9*	*5.7*	*5.9*

TABLE SP.19 A	Required in all majors			Required in some but not all majors			Not required in any major		
Percentage of statistics departments that require:	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %	College (BA) %
(a) Calculus I	100	100	91	.	.	9			
SE	*0.0*	*0.0*	*8.4*	.	.	*8.4*			
(b) Calculus II	100	100	83	.	.	17			
SE	*0.0*	*0.0*	*12.2*	.	.	*12.2*			
(c) Multivariable Calculus	100	100	67	.	.	17	.	.	16
SE	*0.0*	*0.0*	*21.6*	.	.	*12.2*	.	.	*17.2*
(d) Linear algebra/Matrix theory	92	100	83	6	.	17	2	.	.
SE	*6.1*	*0.0*	*12.2*	*5.9*	.	*12.2*	*0.7*	.	.
(e) At least one Computer Science course	60	85	67	8	7	33	32	7	.
SE	*9.0*	*11.5*	*21.6*	*8.1*	*7.7*	*21.6*	*8.7*	*7.6*	.
(f) At least one applied mathematics course, not incl. (a), (b), (c), (d)	42	47	.	8	.	16	49	53	84
SE	*12.6*	*8.7*	.	*8.1*	.	*17.2*	*12.4*	*8.7*	*17.2*
(g) A capstone experience (e.g., a senior thesis or project, seminar, or internship)	16	100	83	18	.	.	66	.	17
SE	*7.7*	*0.0*	*12.2*	*8.1*	.	.	*12.8*	.	*12.2*
(h) An exit exam (oral or written)	.	.	9	8	.	.	92	100	91
SE	.	.	*8.4*	*7.1*	.	.	*7.1*	*0.0*	*8.4*
(i) One Probability Course	100	75	83	.	7	9	.	18	9
SE	*0.0*	*30.0*	*16.8*	.	*7.7*	*8.4*	.	*25.1*	*8.4*
(j) One Mathematical Statistics Course	100	85	50	.	15	17	.	.	33
SE	*0.0*	*11.5*	*26.4*	.	*11.5*	*12.2*	.	.	*32.4*
(k) One applied statistics course	74	85	75	8	15	25	18	.	.
SE	*9.8*	*11.5*	*19.1*	*7.1*	*11.5*	*19.1*	*10.7*	.	.
(l) One Linear Models Course	29	43	67	8	57	9	62	.	25
SE	*14.5*	*24.1*	*21.6*	*7.1*	*24.1*	*8.6*	*14.2*	.	*19.1*
(m) One Bayesian Inference Course	7	19	.	8	8	25	84	73	75
SE	*6.4*	*15.3*	.	*7.1*	*9.0*	*19.9*	*9.3*	*11.6*	*19.9*

TABLE SP.19.B	Required in all majors		Required in some but not all majors		Not required in any major	
Percentage of statistics departments that require:	Univ (PhD) %	Univ (MA) %	Univ (PhD) %	Univ (MA) %	Univ (PhD) %	Univ (MA) %
(a) Calculus I	97	83	3	17		
SE	*1.8*	*8.6*	*1.8*	*8.6*		
(b) Calculus II	97	83	3	17		
SE	*1.8*	*8.6*	*1.8*	*8.6*		
(c) Multivariable Calculus	88	50	5	33	8	17
SE	*2.1*	*11.6*	*0.8*	*10.9*	*1.9*	*8.6*
(d) Linear algebra/Matrix theory	86	50	11	33	3	17
SE	*2.6*	*11.6*	*2.4*	*10.9*	*1.1*	*8.6*
(e) At least one Computer Science course	86	67	6	17	7	17
SE	*2.8*	*10.9*	*2.4*	*8.6*	*1.6*	*8.6*
(f) At least one applied mathematics course, not incl. (a), (b), (c), (d)	23	33	28	.	49	67
SE	*2.7*	*10.9*	*3.4*	*.*	*3.6*	*10.9*
(g) A capstone experience (e.g., a senior thesis or project, seminar, or internship)	4	9	3	9	3	11
SE	*35.0*	*17.0*	*14.0*	*17.0*	*51.0*	*67.0*
(h) An exit exam (oral or written)	2	.	6	17	92	83
SE	*0.6*	*.*	*2.1*	*8.6*	*2.2*	*8.6*
(i) One Probability Course	75	50	11	17	13	33
SE	*3.4*	*11.6*	*2.7*	*8.6*	*2.5*	*10.9*
(j) One Mathematical Statistics Course	89	33	8	33	3	33
SE	*2.4*	*10.9*	*2.1*	*10.9*	*1.1*	*10.9*
(k) One applied statistics course	79	50	19	50	2	.
SE	*3.1*	*11.6*	*3.0*	*11.6*	*0.6*	*.*
(l) One Linear Models Course	60	17	9	.	31	83
SE	*3.5*	*8.6*	*2.6*	*.*	*2.9*	*8.6*
(m) One Bayesian Inference Course	11	17	15	.	74	83
SE	*2.3*	*8.6*	*2.4*	*.*	*3.1*	*8.6*

TABLE SP.20	Academic Years 2014-2015 & 2015-2016			
Upper-level mathematics courses	All Math Depts 2014-2016 %	PhD Math %	MA Math %	BA Math %
Modern Algebra I	78	81	89	75
SE	*3.4*	*5.6*	*3.8*	*4.6*
Modern Algebra II	27	57	48	17
SE	*3.7*	*6.1*	*9.2*	*4.5*
Number Theory	37	59	65	27
SE	*4.2*	*6.3*	*6.4*	*5.2*
Combinatorics	22	39	45	15
SE	*2.5*	*4.3*	*7.2*	*2.9*
Actuarial Mathematics	21	38	40	14
SE	*2.6*	*3.8*	*6.6*	*3.0*
Foundations/Logic	12	15	19	10
SE	*2.5*	*4.6*	*7.5*	*3.1*
Discrete Structures	21	20	27	20
SE	*3.0*	*4.2*	*6.9*	*4.0*
History of Mathematics	47	58	66	41
SE	*4.1*	*6.0*	*5.5*	*5.3*
Geometry	71	79	77	68
SE	*2.7*	*5.3*	*6.0*	*3.6*
Math for Secondary Teachers	33	45	59	26
SE	*3.7*	*6.8*	*8.6*	*4.6*
Adv Calculus/ Real Analysis I	72	84	95	65
SE	*3.6*	*6.4*	*3.2*	*4.8*
Adv Calculus/Real Analysis II	31	78	49	17
SE	*3.6*	*6.2*	*5.9*	*4.6*
Adv Mathematics for Engineering/Physics	12	36	16	5
SE	*1.9*	*5.6*	*6.6*	*1.8*
Advanced Linear Algebra	22	56	54	8
SE	*2.6*	*6.8*	*7.2*	*2.2*
Introduction to Proofs	56	65	76	50
SE	*4.3*	*6.3*	*3.3*	*5.5*

TABLE SP.20 (continued)	Academic Years 2013-2014 & 2015-2016			
Upper-level math courses, continued	All Math Depts 2014-2016 %	PhD Math %	MA Math %	BA Math %
Vector Analysis	11	32	9	7
SE	*2.6*	*7.9*	*4.7*	*2.8*
Advanced Differential Equations	16	58	23	5
SE	*2.2*	*7.6*	*4.3*	*1.3*
Partial Differential Equations	29	71	61	14
SE	*3.0*	*6.6*	*5.5*	*3.0*
Numerical Analysis I and II	43	66	74	33
SE	*4.1*	*5.8*	*7.0*	*5.1*
Applied Math/Modeling	36	45	53	31
SE	*4.5*	*8.1*	*10.8*	*5.5*
Complex Variables	43	64	55	36
SE	*3.7*	*9.6*	*8.3*	*4.7*
Topology	28	51	53	18
SE	*2.7*	*7.3*	*7.1*	*3.2*
Mathematics of Finance	13	35	23	7
SE	*2.1*	*7.0*	*5.5*	*1.9*
Codes & Cryptology	11	19	18	8
SE	*2.2*	*4.2*	*7.0*	*2.7*
Biomathematics	8	26	10	4
SE	*1.3*	*5.3*	*3.5*	*1.1*
Operations Research	18	15	35	16
SE	*2.9*	*3.8*	*4.9*	*3.8*
Math senior seminar/Ind study	66	63	81	65
SE	*3.7*	*5.6*	*7.8*	*4.5*
All other advanced-level mathematics	25	34	47	19
SE	*4.0*	*5.1*	*4.2*	*5.4*

TABLE SP.21	AY 2014-15 & 2015-16				AY 2015-16 & 2015-16		
Upper-level statistics courses	All Math Depts %	PhD Math %	MA Math %	BA Math %	All Stat Depts %	PhD Stat %	MA Stat %
Introductory Probability and/or Statistics	18	14	28	16	48	54	31
SE	*2.7*	*4.7*	*5.4*	*3.4*	*3.0*	*3.4*	*6.6*
Mathematical Statistics	34	47	42	30	73	82	46
SE	*4.3*	*5.4*	*6.0*	*5.5*	*2.6*	*2.5*	*7.1*
Probability	37	53	41	32	70	77	46
SE	*2.97*	*5.6*	*3.9*	*3.7*	*2.6*	*2.6*	*7.1*
Combined Probability and Statistics	32	33	45	30	48	48	46
SE	*4.17*	*3.8*	*5.2*	*5.9*	*3.1*	*3.4*	*7.1*
Stochastic Processes	12	26	25	6	49	55	31
SE	*2.33*	*5.5*	*8.0*	*2.6*	*3.1*	*3.5*	*6.6*
Applied Statistical Analysis	12	19	29	7	46	46	46
SE	*2.32*	*5.5*	*7.6*	*2.3*	*3.2*	*3.5*	*7.1*
Experimental Design	9	13	26	5	59	58	62
SE	*1.86*	*4.9*	*6.9*	*1.8*	*3.1*	*3.4*	*6.9*
Regression & Correlation	15	19	38	10	78	84	62
SE	*1.90*	*3.0*	*6.7*	*2.1*	*2.5*	*2.4*	*6.9*
Biostatistics	7	11	9	6	36	40	23
SE	*1.45*	*2.9*	*4.2*	*1.8*	*3.0*	*3.5*	*6.0*
Nonparametric Statistics	6	9	14	4	44	46	38
SE	*1.24*	*2.7*	*3.9*	*1.4*	*3.1*	*3.4*	*6.9*
Categorical Data Analysis	4	8	11	2	30	35	15
SE	*1.18*	*2.4*	*6.6*	*0.9*	*2.8*	*3.3*	*5.1*
Sample Survey Design	4	6	13	2	50	56	31
SE	*1.12*	*2.8*	*4.9*	*1.0*	*3.0*	*3.4*	*6.6*
Stat Software & Computing	11	17	23	8	62	64	54
SE	*1.89*	*3.4*	*4.0*	*2.5*	*3.1*	*3.5*	*7.1*
Data Science	7	11	17	5	36	38	31
SE	*2.07*	*3.4*	*5.8*	*2.6*	*3.0*	*3.4*	*6.6*
Bayesian Statistics	na	na	na	na	47	55	23
SE	*na*	*na*	*na*	*na*	*2.9*	*3.3*	*6.0*
Statistical Consulting	na	na	na	na	34	38	23
SE	*na*	*na*	*na*	*na*	*3.0*	*3.4*	*6.0*
Senior Seminar/ Independent Study	9	13	20	6	56	59	46
SE	*1.6*	*3.4*	*5.5*	*1.9*	*3.0*	*3.3*	*7.1*

TABLE SP.22	Mathematics Departments			Statistics Departments	
Departmental estimates of post-college plans	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %
Students who went into pre-college teaching	12	25	26	1	1
SE	*1.8*	*4.7*	*3.5*	*0.2*	*0.5*
Students who went to graduate school in the mathematical or statistical sciences	11	13	12	17	10
SE	*1.4*	*2.7*	*1.4*	*1.0*	*3.4*
Students who went to graduate or professional school outside of mathematics/statistics	8	4	7	10	1
SE	*1.2*	*1.5*	*1.9*	*0.9*	*0.6*
Students who took jobs in business, government, etc.	27	19	34	34	20
SE	*2.7*	*5.2*	*3.1*	*2.1*	*7.4*
Students who had other plans known to the department	3	3	4	3	0
SE	*0.6*	*1.1*	*1.7*	*0.3*	*0.0*
Students whose plans are not known to the department	40	36	16	36	68
SE	*4.0*	*9.7*	*2.0*	*2.8*	*11.3*

TABLE SP.23	Four-year Mathematics Departments			Statistics Departments	
Percentage using various assessment tools	Univ (PhD) %	Univ (MA) %	College (BA) %	Univ (PhD) %	Univ (MA) %
Consult outside reviewers	36	57	40	44	42
SE	*6.7*	*6.8*	*6.9*	*3.6*	*7.3*
Survey program graduates	67	83	59	70	67
SE	*5.5*	*6.2*	*5.4*	*3.3*	*7.0*
Consult other departments	44	42	38	46	17
SE	*6.7*	*5.0*	*4.7*	*3.6*	*5.6*
Study data on students' progress in later courses	63	77	62	21	33
SE	*6.4*	*6.2*	*7.4*	*2.7*	*7.0*
Assessed teaching objectives	78	81	85	98	67
SE	*3.3*	*7.7*	*4.7*	*0.5*	*7.0*
Evaluate placement system	72	52	57	18	25
SE	*6.2*	*9.5*	*4.8*	*2.8*	*6.5*
Change undergraduate program due to assessment	80	76	70	76	75
SE	*5.1*	*5.1*	*7.4*	*2.9*	*6.5*

TABLE SP.24							
Activity	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Yes	88	97	83	87	86	84	92
SE	*2.5*	*2.0*	*7.8*	*3.3*	*2.3*	*2.8*	*3.8*
No	12	3	17	13	14	16	8
SE	*2.5*	*2.0*	*7.8*	*3.3*	*2.3*	*2.8*	*3.8*

TABLE SP.25							
Activity	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Sylabbi for classes	87	95	96	84	98	98	100
SE	*3.1*	*2.1*	*3.4*	*4.2*	*0.8*	*1.0*	*0.0*
Teaching for portfolios	16	23	28	12	36	35	42
SE	*2.4*	*3.8*	*7.7*	*2.8*	*2.9*	*3.1*	*7.3*
Peer evaluation of instructors	64	78	74	60	64	60	75
SE	*3.5*	*4.7*	*8.1*	*4.5*	*3.0*	*3.4*	*6.4*
Self-evaluation of instructors	51	28	47	57	29	22	50
SE	*4.7*	*4.9*	*6.9*	*6.1*	*2.9*	*3.0*	*7.4*
Department discussions of teaching practices	69	66	64	71	73	68	92
SE	*5.0*	*5.9*	*4.7*	*6.7*	*2.8*	*3.4*	*4.1*
Note of these are available	2	2	3	1			
SE	*0.7*	*1.6*	*2.2*	*0.8*			

TABLE SP.26							
Activity	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Inquiry based class	58	56	71	57	54	56	45
SE	*5.5*	*5.5*	*5.8*	*7.2*	*3.1*	*3.3*	*7.8*
Flipped classroom	58	61	52	59	39	35	55
SE	*4.1*	*5.8*	*9.6*	*5.3*	*2.9*	*3.1*	*7.8*
Class conducted largely online	38	49	53	33	48	49	45
SE	*5.5*	*7.1*	*6.1*	*7.2*	*3.0*	*3.2*	*7.8*
Activity based learning	66	64	71	65	77	70	100
SE	*5.3*	*6.6*	*9.1*	*7.3*	*2.7*	*3.4*	*0.0*
Technology used to develop conceptual understanding	86	82	91	86	84	84	82
SE	*3.0*	*5.1*	*5.1*	*3.9*	*2.7*	*3.0*	*6.0*

TABLE SP.27							
Activity	All Math Depts	PhD Math	MA Math	BA Math	All Stat Depts	PhD Stat	MA Stat
Department experienced major changes over the last 10 years	60	62	65	58	80	78	85
SE	*4.5*	*4.6*	*8.4*	*6.1*	*2.6*	*3.0*	*5.1*
Of those experiencing change, the percent attributing the change to:							
Educational research	61	67	77	56	49	53	36
SE	*5.7*	*8.3*	*8.5*	*7.6*	*3.6*	*4.0*	*7.5*
Advocacy of some faculty member in the department	91	99	90	90	88	88	91
SE	*3.2*	*0.3*	*6.4*	*4.4*	*2.4*	*2.9*	*4.5*
Advocacy by another department	16	23	14	15	16	21	0
SE	*4.5*	*4.9*	*7.3*	*6.2*	*2.5*	*3.4*	*.*
Advocacy by institution's administrators	37	47	30	35	47	48	45
SE	*4.7*	*10.0*	*8.5*	*6.2*	*3.5*	*3.9*	*7.8*
Advocacy by a professional organization	39	31	33	43	38	36	45
SE	*4.5*	*9.2*	*6.3*	*6.3*	*3.5*	*3.9*	*7.8*

TABLE SP.28	Mathematics Departments			
Number of tracks	Univ (PhD)	Univ (MA)	College (BA)	Total
Offer a minor in statistics (%)	13	52	10	16
SE	*3.3*	*7.5*	*2.1*	*2.1*
Number of graduates	305	323	384	1012
SE	*154.2*	*110.9*	*97.4*	*213.4*
Offer a major in statistics (%)	25	26	4	10
SE	*5.7*	*8.2*	*1.6*	*1.8*

TABLE SP.29

	Doctoral Math	SE	Masters Math	SE	Bachelors Math	SE	All Math	SE	Doctoral Stat	SE	Masters Stat	SE	All Stat	SE
Postdocs during 2014-2015 academic year	1297	99.8	46	16.1	119	52.3	1463	113.8	100	29.6	0	0.0	100	29.6
Number who left the position for fall 2015	501	53.7	33	14.9	106	49.3	640	74.4	30	9.6	0	0.0	30	9.6
Percent who left the position for fall 2015	38.6%	0.0	70.5%	0.0	88.8%	0.1	43.7%	0.0	30%	0.1		-	30%	
Of those who left the position for fall 2015:														
Number who took tenure-track position	180	26.6	8	3.9	72	39.5	260	47.8	7	3.3	0	0.0	7	3.3
Percent who took tenure-track position	36%	0.0	25%	0.1	68%	0.1	41%	0.0	24%	0.1		-	24%	
Number who took another postdoc position	111	18.9	6	4.7	0	0.0	117	19.5	4	1.9	0	0.0	4	1.9
Percent who took another postdoc position	22%	0.0	18%	0.1	0%	0.0	18%	0.0	13%	0.1			13%	
Number who took renewable appointment for fall 2015	67	15.9	13	9.5	29	11.8	109	22.0	15	8.5	0	0.0	15	8.5
Percent who took renewable appointment for fall 2015	13%	0.0	41%	0.1	27%	0.1	17%	0.0	51%	0.1			51%	
Number who took non-renewable appointment for fall 2015	30	9.9	0	0.0	0	0.0	30	9.9	2	1.2	0	0.0	2	1.2
Percent who took non-renewable appointment for fall 2015	6%	0.0	0%	0.0	0%	0.0	5%	0.0	6%	0.0			6%	
Number who took non-academic appointment for fall 2015	29	5.8	3	2.4	5	4.2	36	7.5	2	1.2	0	0.0	2	1.2
Percent who took non-academic appointment for fall 2015	6%	0.0	9%	0.1	4%	0.0	6%	0.0	6%	0.0			6%	
Number unemployed for fall 2015	2	1.3	0	0.0	0	0.0	2	1.3	0	0.0	0	0.0	0	0.0
Percent unemployed for fall 2015	0%	0.0	0%	0.0	0%	0.0	0%	0.0	0%	0.0			0%	
Number whose status is unknown for fall 2015	83	13.6	2	1.8	0	0.0	86	13.7	0	0.0	0	0.0	0	0.0
Percent whose status is unknown for fall 2015	17%	0.0	7%	0.1	0%	0.0	13%	0.0	0%	0.0			0%	

TABLE SP.30

Section B	Doctoral Math	*SE*	Masters Math	*SE*	Bachelors Math	*SE*	All Math	*SE*	Doctoral Stat	*SE*	Masters Stat	*SE*	All Stat	*SE*
Renewable positions filled for 2014-2015	1641	*76.5*	850	*101.9*	1778	*136.9*	4269	*187.0*	214	*24.9*	51	*15.1*	265	*29.1*
Number that Left renewable position for 2015	229	*26.6*	122	*25.5*	375	*60.2*	726	*70.6*	15	*4.9*	5	*4.2*	20	*6.5*
Percent that Left renewable position for 2016	14%	*0.8%*	14%	*1.1%*	21%	*1.8%*	17%	*0.8%*	7%	*2.0%*	11%	*5.7%*	8%	*1.9%*
Renewable positions filled for 2015-2016	1645	*73.4*	865.2	*101.7*	1808	*136.3*	4319	*185.3*	253	*33.0*	35	*8.9*	288	*34.2*
Number Active in teaching	1625	*73.2*	865.2	*101.7*	1794	*136.4*	4285	*185.2*	244	*33.2*	35	*8.9*	278	*34.3*
Percent Active in teaching	99%	*0.3%*	100%	*0.0%*	99%	*0.4%*	99%	*0.2%*	96%	*1.7%*	100%	*0.0%*	97%	*1.5%*
Number Active in research	276	*30.4*	92	*18.6*	311	*59.1*	679	*69.0*	92	*34.2*	3	*2.1*	94	*34.3*
Percent Active in research	17%	*0.9%*	11%	*1.3%*	17%	*1.6%*	16%	*0.8%*	36%	*3.0%*	8%	*6.1%*	33%	*2.8%*
Number that Attend research conf. with support	175	*22.4*	80	*20.0*	341	*61.3*	595	*68.2*	39	*19.4*	3	*2.1*	42	*19.5*
Percent that Attend research conf. with support	11%	*0.7%*	9%	*1.2%*	19%	*1.7%*	14%	*0.8%*	15%	*2.5%*	8%	*6.1%*	14%	*2.3%*
Number that Attend teaching conf. with support	377	*60.7*	219	*31.9*	666	*77.6*	1262	*103.5*	37	*8.2*	0	-	37	*8.2*
Percent that Attend teaching conf. with support	23%	*0.9%*	25%	*1.8%*	37%	*2.1%*	29%	*1.0%*	15%	*2.4%*	0%	*0.0%*	13%	*2.1%*
Number that Serve on dept. committees	866	*129.4*	512	*63.3*	1145	*107.8*	2524	*179.9*	137	*29.5*	21	*10.2*	159	*31.2*
Percent that Serve on dept. committees	53%	*0.9%*	59%	*2.1%*	63%	*2.0%*	58%	*1.0%*	54%	*3.2%*	62%	*11.1%*	55%	*3.1%*
Number that Advise undergrad. research projects	200	*30.0*	90	*19.6*	363	*59.9*	653	*69.8*	40	*13.1*	11	*6.3*	50	*14.5*
Percent that Advise undergrad. research projects	12%	*0.8%*	10%	*1.2%*	20%	*1.7%*	15%	*0.8%*	16%	*2.5%*	31%	*10.5%*	18%	*2.5%*
Number that Serve as academic advisor	337	*33.0*	208	*35.3*	725	*98.6*	1271	*109.8*	77	*25.3*	11	*6.3*	88	*26.1*
Percent that Serve as academic advisor	20%	*0.9%*	24%	*1.7%*	40%	*2.1%*	29%	*1.0%*	30%	*3.1%*	31%	*10.5%*	31%	*3.0%*
Number that Serve on univ. committees	234	*27.9*	176	*21.9*	711	*95.4*	1121	*101.8*	31	*6.2*	13	*3.9*	44	*7.3*
Percent that Serve on univ. committees	14%	*0.8%*	20%	*1.7%*	39%	*2.0%*	26%	*1.0%*	12%	*2.2%*	38%	*11.1%*	15%	*2.3%*
Number that Serve as course coordinator	540	*36.0*	179	*21.8*	504	*63.0*	1224	*75.8*	51	*9.6*	19	*6.0*	69	*11.3*
Percent that Serve as course coordinator	33%	*1.0%*	21%	*1.7%*	28%	*1.9%*	28%	*1.0%*	20%	*2.8%*	54%	*11.4%*	24%	*2.8%*

TABLE SP.31

Section C	Doctoral Math	*SE*	Masters Math	*SE*	Bachelors Math	*SE*	All Math	*SE*	Doctoral Stat	*SE*	Masters Stat	*SE*	All Stat	*SE*
Number of Fixed-term positions filled for 2014-2015	511	*63.1*	311	*58.0*	680	*94.1*	1503	*127.3*	48	*10.2*	5	*2.7*	53	*10.5*
Number that left fixed-term position for 2015	159	*25.7*	81	*19.8*	212	*34.2*	453	*47.1*	26	*8.3*	5	*2.7*	31	*8.7*
Percent that left fixed-term position for 2015	31%	*2.0%*	26%	*2.8%*	31%	*3.3%*	30%	*1.7%*	54%	*8.9%*	100%	*0.0%*	58%	*8.0%*
Number of Fixed-term positions filled for 2015-2016	574	*61.94*	383	*64.5*	658.5	*88.0*	1615	*125.5*	55	*9.8*	13	*6.0*	68	*11.5*
Number Active in teaching	567	*61.99*	383	*64.5*	655.9	*88.1*	1606	*125.5*	49	*9.5*	13	*6.0*	62	*11.2*
Percent Active in teaching	99%	*0.4%*	100%	*0.0%*	100%	*0.3%*	99%	*0.2%*	89%	*4.0%*	100%	*0.0%*	91%	*3.2%*
Number Active in research	214	*40.3*	45	*11.8*	268	*52.6*	526	*67.3*	28	*9.4*	3	*2.1*	31	*9.7*
Percent Active in research	37%	*1.8%*	12%	*2.0%*	41%	*3.2%*	33%	*1.5%*	52%	*8.4%*	20%	*15.8%*	46%	*7.4%*
Number that Attend research conf. with support	153	*37.5*	27	*8.5*	242	*45.5*	422	*59.6*	10	*8.0*	3	*2.1*	12	*8.2*
Percent that Attend research conf. with support	27%	*1.7%*	7%	*1.6%*	37%	*3.3%*	26%	*1.5%*	18%	*6.5%*	20%	*15.8%*	18%	*6.1%*
Number that Attend teaching conf. with support	61	*24.6*	41	*10.6*	159	*29.6*	260	*39.9*	0	*0.0*	0	*0.0*	0	*0.0*
Percent that Attend teaching conf. with support	11%	*1.4%*	11%	*2.0%*	24%	*3.1%*	16%	*1.4%*	0%	*0.0%*	0%	*0.0%*	0%	*0.0%*
Number that Serve on dept. committees	73	*27.6*	117	*31.7*	246	*50.8*	437	*65.9*	10	*8.0*	3	*2.1*	12	*8.2*
Percent that Serve on dept. committees	13%	*1.4%*	31%	*2.8%*	37%	*3.1%*	27%	*1.5%*	18%	*6.5%*	20%	*15.8%*	18%	*6.1%*
Number that Advise undergrad. research projects	19	*8.1*	32	*16.2*	176	*45.5*	227	*49.0*	4	*2.8*	0	*0.0*	4	*2.8*
Percent that Advise undergrad. research projects	3%	*0.8%*	8%	*1.7%*	27%	*3.2%*	14%	*1.4%*	7%	*3.2%*	0%	*0.0%*	6%	*2.5%*
Number that Serve as academic advisor	18	*8.0*	14	*7.3*	113	*43.9*	145	*45.2*	4	*2.8*	0	*0.0*	4	*2.8*
Percent that Serve as academic advisor	3%	*0.6%*	4%	*1.1%*	17%	*2.7%*	9%	*1.2%*	7%	*3.2%*	0%	*0.0%*	6%	*2.5%*
Number that Serve on university committees	7	*3.2*	27	*8.9*	78	*27.3*	113	*28.9*	0	*0.0*	0	*0.0*	0	*0.0*
Percent that Serve on university committees	1%	*0.6%*	7%	*1.6%*	12%	*2.5%*	7%	*1.1%*	0%	*0.0%*	0%	*0.0%*	0%	*0.0%*
Number that Serve as course coordinator	44	*10.6*	26	*8.5*	100	*27.6*	170	*30.7*	0	*0.0*	0	*0.0*	0	*0.0*
Percent that Serve as course coordinator	8%	*1.0%*	7%	*1.6%*	15%	2.6%	11%	*1.2%*	0%	*0.0%*	0%	*0.0%*	0%	*0.0%*

TABLE E.1.A	Mathematics Departments							
Bachelor's degrees in Math Depts	Univ (PhD)	SE	Univ (MA)	SE	Coll (BA)	SE	Total Math Depts	SE
Mathematics Majors (including applied)								
Men	3431	556.4	1436	356.2	2529	400.1	7396	771.6
Women	1645	255.0	1365	544.2	2388	580.0	5398	835.0
Percentage of women	*32%*	0.0	*49%*	0.1	*49%*	0.0	*42%*	**0.0**
Total Math degrees	5076	798.9	2801	889.8	4917	947.2	12794	1524.6
Mathematics Education Majors								
Men	235	43.6	412	104.0	497	130.2	1143	172.3
Women	401	109.2	480	98.9	851	127.7	1732	195.0
Percentage of women	*63%*	0.1	*54%*	0.0	*63%*	0.1	*60%*	**0.0**
Total Math Ed degrees	636	139.9	891	198.5	1348	227.2	2875	332.5
Statistics Majors								
Men	98	25.6	77	35.8	95	40.7	270	60.0
Women	28	8.6	56	31.9	62	31.9	147	46.0
Percentage of women	*22%*	0.1	*42%*	0.1	*40%*	0.1	*35%*	**0.1**
Total Stat degrees	126	29.7	133	65.2	157	63.6	416	95.8
Computer Science Majors								
Men	7	6.0	483	169.2	2177	627.1	2666	649.6
Women	3	3.0	217	89.9	1082	486.9	1302	495.2
Percentage of women	*33%*	na	*31%*	0.1	*33%*	0.1	*33%*	**0.1**
Total CS degrees	10	9.0	700	229.7	3259	972.0	3968	998.8
Actuarial Mathematics Majors								
Men	997	225.0	207	105.6	167	68.6	1371	257.6
Women	635	147.2	134	67.9	75	30.4	844	164.8
Percentage of women	*39%*	0.0	*39%*	0.0	*31%*	0.1	*38%*	0.0
Total Actuarial Math degrees	1632	370.4	341	173.3	243	94.4	2215	419.4
Joint Mathematics Majors								
Men	212	81.4	224	135.1	491	142.4	927	212.4
Women	109	37.5	168	114.6	156	48.5	433	129.9
Percentage of women	*34%*	0.0	*43%*	0.1	*24%*	0.1	*32%*	0.0
Total Joint degrees	321	117.2	393	249.4	646	171.1	1360	324.1
Other Mathematics Majors								
Men	357	84.7	87	30.5	16	12.8	460	86.1
Women	251	60.2	37	13.1	10	8.5	298	60.1
Percentage of women	*41%*	0.0	*30%*	0.0	*38%*	0.5	*39%*	0.0
Total other Math degrees	608	144.8	124	43.5	26	15.2	758	145.0
Total degrees - Men	5337	809.4	2925	586.8	5971	999.7	14233	1410.6
Total degrees - Women	3072	458.4	2458	596.4	4624	1047.0	10154	1287.6
Percentage of women	*37%*	0.0	*46%*	0.0	*44%*	0.0	*42%*	0.0
Total all degrees	8409	1250.7	5383	1143.6	10595	1892.1	24387	2535.2

TABLE E.1.B	Statistics Departments					
Bachelor's degrees in Math and Stat Depts	Univ (PhD)	*SE*	Univ (MA)	*SE*	Total Stat Depts	*SE*
Statistics Majors						
Men	540	*36.8*	55	*12.8*	594	*38.9*
Women	418	*22.8*	42	*9.9*	460	*24.8*
Percentage of women	*44%*	*0.0*	*43%*	*0.0*	*44%*	*0.0*
Total Statistics degrees	958	*57.2*	97	*22.5*	1055	*61.4*
Biostatistics						
Men	17	*4.7*	0	*0.0*	17	*4.7*
Women	21	*6.2*	0	*0.0*	21	*6.2*
Percentage of women	*55%*	*0.0*	*NA*	*.*	*55%*	*0.0*
Total Biostatistics degrees	**38**	***10.9***	**0**	***0.0***	38	*10.9*
Actuarial Science						
Men	58	*10.7*	7	*3.2*	65	*11.2*
Women	73	*12.1*	1	*0.6*	74	*12.1*
Percentage of women	*56%*	*0.0*	*17%*	*na*	*53%*	*0.0*
Total Actuarial Science degrees	131	*22.8*	8	*3.8*	139	*23.1*
Joint Statistics and Computer Science						
Men	46	*6.0*	0	*0.0*	46	*6.0*
Women	18	*2.2*	0	*0.0*	18	*2.2*
Percentage of women	*28%*	*0.0*	*0%*	*na*	*28%*	*0.0*
Total Joint Statistics and Computer Science degrees	**64**	***7.9***	**0**	***0.0***	64	*7.9*
Joint Statistics and Mathematics						
Men	*124*	*13.4*	*0*	*0.0*	*124*	*13.4*
Women	*72*	*7.1*	*0*	*0.0*	*72*	*7.1*
Percentage of women	*37%*	*0.0*	*0%*	*na*	*37%*	*0.0*
Total Joint Statistics and Mathematics degrees	**196**	***20.2***	**0**	***0.0***	196	*20.2*
Joint Statistics and (Business or Economics)						
Men	*116*	*19.8*	*0*	*0.0*	*116*	*19.8*
Women	*84*	*10.5*	*0*	*0.0*	*84*	*10.5*
Percentage of women	*42%*	*0.0*	*0%*	*na*	*42%*	*0.0*
Total Joint Statistics and (Business or Economics) degrees	**200**	***29.8***	**0**	***0.0***	200	*29.8*
Statistics Education						
Men	*2*	*0.0*	*0*	*0.0*	*2*	*0.0*
Women	*3*	*0.0*	*0*	*0.0*	*3*	*0.0*
Percentage of women	*60%*	*0.0*	*0%*	*na*	*60%*	*0.0*
Total Statistics Education degrees	**5**	***0.0***	**0**	***0.0***	5	*0.0*
Other						
Men	*62*	*10.2*	*29*	*14.1*	*90*	*17.4*
Women	*47*	*7.4*	*12*	*5.8*	*59*	*9.4*
Percentage of women	*43%*	*0.0*	*29%*	*na*	*39%*	*0.0*
Total Other degrees	*109*	*16.3*	*41*	*19.9*	*149*	*25.7*
Total degrees - Men	965	*58.1*	90	*18.9*	1055	*61.1*
Total degrees - Women	737	*40.0*	55	*10.9*	792	*41.5*
Percentage of women	*43%*	*0.0*	*38%*	*0.0*	*43%*	*0.0*
Total all degrees	1702	*96.3*	145	*29.40*	1847	*100.7*
Total degrees - Women	40.0	*10.9*	41.5			
Percentage of women	0.6%	*2.1%*	0.5%			
Total all degrees	96.3	*29.4*	100.7			

Table E.1.C.

Institutions with a:	Annual Survey	*SE*	CBMS	*SE*
Doctoral Mathematics Departments	13477	*70.0*	10256	*1405.5*
Masters Mathematics Departments	4701	*141.0*	5383	*1143.6*
Bachelor's Mathematics Departments	12204	*270.0*	10595	*1892.1*
Grand Total	30382	*348.0*	26234	*2849.0*

Table E.1.D.

Institutions with a:	CBMS	*SE*
Doctoral Mathematics Department	10256	*1405.5*
Masters Mathematics Department	5383	*1143.6*
Bachelor's Mathematics Department	10595	*1892.1*
Grand Total	26234	*2849.0*

TABLE E.2	Fall 2015 (2005, 2010) enrollments (in 1000s)						
	Mathematics Departments				Statistics Departments		
	Univ (PhD)	Univ (MA)	Coll (BA)	Total Math Depts	Univ (PhD)	Univ (MA)	Total Stat Depts
Mathematics Courses							
Precollege	80	48	125	253			
SE	*16.0*	*11.2*	*18.1*	*26.5*			
Introductory (incl. Precalc)	408	226	365	1000			
SE	*53.8*	*37.6*	*46.2*	*79.6*			
Calculus level	474	157	176	807			
SE	*45.8*	*36.6*	*21.4*	*62.3*			
Advanced Mathematics	81	30	43	154			
SE	*10.1*	*4.2*	*5.4*	*12.2*			
Total Math courses	1043	461	709	2213			
SE	*95.1*	*72.8*	*73.8*	*139.7*			
Statistics Courses							
Introductory Statistics	57	62	134	253	78	16	94
SE	*9.2*	*11.6*	*14.4*	*20.2*	*2.3*	*1.8*	*2.9*
Upper Statistics	17	24	20	60	45	5	50
SE	*2.0*	*5.1*	*2.5*	*6.1*	*2.1*	*0.8*	*2.3*
Total Stat Courses	74	85	154	313	124	20	144
SE	*10.9*	*15.4*	*15.7*	*24.2*	*3.4*	*2.2*	*4.0*
Computer Science Courses							
Lower Computer Science	4	5	36	45			
SE	*2.2*	*2.3*	*6.3*	*7.0*			
Middle Computer Science	1	2	14	16			
SE	*0.3*	*1.0*	*3.2*	*3.4*			
Upper Computer Science	0	2	5	6			
SE	*0.0*	*0.9*	*1.3*	*1.5*			
Total CS courses	5	8	55	68			
SE	*2.4*	*4.0*	*9.8*	*10.8*			
Total all courses	1122	554	918	2594	124	20	144
SE	*104.7*	*80.0*	*88.8*	*157.4*	*3.4*	*2.2*	*4.0*

TABLE E.3	Number of sections: Fall 2015 (Fall 2010)						
	Mathematics Departments				Statistics Departments		
	Univ (PhD)	Univ (MA)	Coll (BA)	Total Math Depts	Univ (PhD)	Univ (MA)	Total Stat Depts
Mathematics Courses							
Precollege level	2235	1578	4206	8020			
SE	*387.5*	*418.2*	*523.5*	*764.2*			
Introductory (incl. Precalc)	8245	6999	16948	32192			
SE	*962.1*	*1161.0*	*4678.9*	*4895.9*			
Calculus	8323	4579	8285	21186			
SE	*933.5*	*752.3*	*951.6*	*1523.0*			
Advanced Mathematics	3676	2633	4461	10771			
SE	*511.7*	*917.7*	*648.6*	*1233.0*			
Total Math courses	22479	15788	33901	72168			
SE	*2372.3*	*2596.1*	*5724.3*	*6669.5*			
Statistics Courses							
Introductory Statistics	1319	1493	4562	7374	1256	238	1494
SE	*253.4*	*304.2*	*445.8*	*572.3*	*74.1*	*34.6*	*81.8*
Upper Statistics	752	1432	1776	3960	796	174	970
SE	*107.2*	*538.6*	*716.9*	*903.0*	*36.0*	*23.9*	*43.2*
Total Stat Courses	2072	2925	6338	11334	2052	412	2464
SE	*334.5*	*610.0*	*922.7*	*1141.8*	*88.1*	*51.6*	*102.1*
Computer Science Courses							
Lower Computer Science	109	186	1987	2282			
SE	*56.4*	*86.4*	*380.9*	*394.6*			
Middle Computer Science	31	69	1128	1227			
SE	*13.8*	*41.4*	*294.2*	*297.5*			
Upper Computer Science	0	84	375	460			
SE	*0.0*	*43.0*	*86.1*	*96.2*			
Total CS courses	140	339	3490	3970			
SE	*59.8*	*157.4*	*691.8*	*712.0*			
Total all courses	24692	19053	43728	87472	2052	412	2464
SE	*2664.0*	*2630.5*	*6314.2*	*7261.3*	*88.1*	*51.6*	*102.1*

TABLE E.4	Four-year Mathematics Departments		Two-year Mathematics Departments		Statistics Departments	
	Distance-learning Enrollments	Other Enrollments	Distance-learning Enrollments	Other Enrollments	Distance-learning Enrollments	Other Enrollments
Precollege Level	8405	244475	89035	693252		
SE	*1941.0*	*25721.2*	*16109.0*	*55794.2*		
College Algebra, Trigonometry, & Pre-Calculus	45226	954356	55227	390066		
SE	*9043.3*	*74355.6*	*7414.6*	*34706.3*		
Calculus I (mainstream and non-mainstream)	8968	346343	7455	84537		
SE	*3757.9*	*30642.4*	*1617.4*	*9007.5*		
Calculus II (mainstream and non-mainstream)	3410	125126	1813	32523		
SE	*1957.3*	*10653.8*	*480.4*	*3617.2*		
Differential Equations & Linear Algebra	1492	137567	480	13559		
SE	*555.9*	*11250.9*	*350.7*	*1797.9*		
Introductory Statistics	18696	234558	30608	220671	4291	89620
SE	3859.4	18627.2	4236.1	54738.0	535.4	2924.5

TABLE E.5	Number of calculus-level sections taught by					
	Tenured/ tenure-eligible	Other full-time	Part-time	Graduate Teaching Assistant	Unknown	Total Sections
Mathematics Departments						
Univ (PhD)	2803	2962	733	1370	454	8323
SE	*317.3*	*459.1*	*105.4*	*225.0*	*79.6*	*933.5*
Univ (MA)	2365	994	797	84	339	4579
SE	*269.7*	*225.2*	*339.8*	*20.2*	*195.2*	*752.3*
Coll (BA)	5896	1078	585	0	727	8285
SE	*592.4*	*247.6*	*122.8*	*0.0*	*297.1*	*951.6*
Total	11064	5034	2115	1454	1520	21186
SE	*720.5*	*567.6*	*376.3*	*226.8*	*363.2*	*1523.0*

TABLE E.6	Number of introductory statistics sections taught by					
	Tenured/ tenure-eligible	Other full-time	Part-time	Graduate Teaching Assistant	Unknown	Total Sections
Mathematics Departments						
Univ (PhD)	268	392	239	245	175	1319
SE	*79.2*	*89.0*	*75.1*	*81.2*	*98.4*	*253.4*
Univ (MA)	781	467	216	0	29	1493
SE	*196.6*	*99.7*	*69.9*	*0.0*	*20.4*	*304.2*
Coll (BA)	2006	725	1389	30	411	4562
SE	*236.8*	*121.5*	*201.7*	*20.3*	*98.4*	*445.8*
Total	3055	1584	1844	275	615	7374
SE	*304.6*	*180.6*	*221.2*	*83.7*	*153.4*	*572.3*
Statistics Departments						
Univ (PhD)	136	281	111	466	263	1256
SE	*11.3*	*19.0*	*13.4*	*45.2*	*39.6*	*74.1*
Univ (MA)	75	97	33	3	31	238
SE	*20.0*	*17.4*	*7.2*	*0.9*	*8.7*	*34.6*
Total	210	378	144	468	295	1494
SE	*23.0*	*25.7*	*15.2*	*45.2*	*40.5*	*81.8*

TABLE E.7

Mathematics Departments	Sections taught by TTE	Total sections	Statistics Departments	Sections taught by TTE	Total sections
Advanced Mathematics courses					
Univ (PhD)	2519	3676			
SE	*334.6*	*511.7*			
Univ (MA)	1769	2633			
SE	*279.5*	*917.7*			
Coll (BA)	3236	4461			
SE	*383.6*	*648.6*			
Total advanced mathematics	7525	10771			
SE	*578.1*	*1233.0*			
Advanced Statistics courses			Advanced Statistics courses		
Univ (PhD)	452	752	Univ (PhD)	394	796
SE	*84.9*	*107.2*	*SE*	*18.9*	*36.0*
Univ (MA)	656	1432	Univ (MA)	1010	1776
SE	*133.3*	*538.6*	*SE*	*20.5*	*23.9*
Coll (BA)	1010	1776			
SE	*145.8*	*716.9*			
Total advanced statistics	2118	3960	Total advanced statistics	533	970
SE	*215.0*	*903.0*	*SE*	*27.9*	*43.2*
Total all advanced courses	9643	14731	Total all advanced courses	533	970
SE	*758.3*	*1559.5*	*SE*	*27.9*	*43.2*

TABLE E.8	Number of lower-level computer science sections taught by					
	Tenured/ tenure-eligible/ permanent	Other full-time	Part-time	Graduate Teaching Assistant	Unknown	Total Sections
Mathematics Departments						
Univ (PhD)	30	71	8	0	0	109
SE	*15.4*	*40.1*	*6.4*	*0.0*	*0.0*	*56.4*
Univ (MA)	112	48	26	0	0	186
SE	*50.4*	*29.1*	*23.2*	*0.0*	*0.0*	*86.4*
Coll (BA)	899	339	277	0	472	1987
SE	*167.0*	*114.6*	*71.3*	*0.0*	*205.1*	*380.9*
Total	1042	458	311	0	472	2282
SE	*175.1*	*124.9*	*75.2*	*0.0*	*205.1*	*394.6*

TABLE E.9	Number of middle-level computer science sections taught by					
	Tenured/ tenure-eligible/ permanent	Other full-time	Part-time	Graduate Teaching Assistant	Unknown	Total Sections
Mathematics Departments						
Univ (PhD)	17	0	5	0	9	31
SE	*7.6*	*0.0*	*4.0*	*0.0*	*8.1*	*13.8*
Univ (MA)	55	4	9	0	0	69
SE	*30.9*	*3.9*	*7.7*	*0.0*	*0.0*	*41.4*
Coll (BA)	549	311	161	0	107	1128
SE	*151.1*	*141.3*	*77.2*	*0.0*	*96.8*	*294.2*
Total	621	316	174	0	116	1227
SE	*154.4*	*141.3*	*77.6*	*0.0*	*97.1*	*297.5*

TABLE E.10	Average section size Fall 2015							
	Mathematics Depts				Statistics Depts			All departments
	Univ (PhD)	Univ (MA)	Coll (BA)	Overall Math	Univ (PhD)	Univ (MA)	Overall Stat	2015
Mathematics courses								
Precollege	34	30	29	30				30
SE	*2.9*	*1.9*	*3.4*	*2.0*				*2.0*
Introductory (incl. Precalc)	47	31	20	30				30
SE	*2.8*	*2.4*	*4.8*	*3.8*				*3.8*
Calculus level	55	34	21	37				37
SE	*3.0*	*3.4*	*0.8*	*1.4*				*1.4*
Advanced Mathematics	22	11	10	14				14
SE	*1.4*	*4.4*	*1.1*	*1.4*				*1.4*
Statistics courses								
Introductory Statistics	40	39	27	32	59	65	60	37
SE	*3.3*	*2.6*	*0.8*	*0.9*	*2.7*	*6.7*	*2.4*	*1.0*
Upper Statistics	23	16	11	15	57	27	52	22
SE	*2.2*	*9.4*	*6.2*	*3.9*	*2.4*	*2.6*	*2.0*	*4.4*
CS courses								
Lower CS	38	24	18	19				19
SE	*3.0*	*4.9*	*1.7*	*1.7*				*1.7*
Middle CS	20	22	13	13				13
SE	*9.5*	*3.0*	*1.6*	*1.6*				*1.6*
Upper CS	NA	19	13	14				14
SE	.	*2.0*	*1.6*	*1.5*				*1.5*

TABLE E.11	Average recitation section size		
For Lecture/Recitation Courses	Univ (PhD)	Univ (MA)	College (BA)
Calculus Courses			
Mainstream Calculus I	31	34	17
SE	*1.4*	*14.5*	*3.8*
Mainstream Calculus II	29	14	9
SE	*1.5*	*7.4*	*3.9*
Other Calculus I	36	16	9
SE	*1.7*	*12.3*	*3.0*
Introductory Statistics			
in Mathematics Depts	33	19	26
SE	*4.0*	*10.2*	*2.7*
in Statistics Depts	25	28	na
SE	*3.5*	*2.9*	*na*

TABLE F.1	Univ (PhD)					Univ (MA)					Coll (BA)				
	Tenured	Tenure-eligible	OFT	Post-docs	Part-time	Tenured	Tenure-eligible	OFT	Post-docs	Part-time	Tenured	Tenure-eligible	OFT	Post-docs	Part-time
Mathematics Depts															
Doctoral Faculty	4591	998	2336	1150	588	2309	608	398	31	441	4780	1582	747	137	911
SE	*57.8*	*20.1*	*63.8*	*53.0*	*25.0*	*70.8*	*30.2*	*41.4*	*9.6*	*74.1*	*152.9*	*68.5*	*96.9*	*27.9*	*92.9*
Doctoral (F)	635	260	652	234	151	587	244	307	3	148	1346	614	420	51	289
SE	*15.2*	*10.2*	*19.8*	*12.7*	*8.7*	*26.1*	*19.5*	*17.9*	*2.3*	*30.9*	*60.8*	*34.8*	*40.1*	*13.2*	*35.1*
Non-doctoral Faculty	5	0	833	0	857	56	10	942	0	1469	238	93	2005	0	3416
SE	*1.1*	*0.0*	*34.4*	-	*54.3*	*10.1*	*3.5*	*62.9*	-	*114.0*	*31.1*	*19.1*	*124.1*	-	*192.3*
Non-doctoral (F)	2	0	480	0	361	18	9	540	0	686	99	45	882	0	1612
SE	*0.6*	*0.0*	*21.3*	-	*22.1*	*5.3*	*3.4*	*40.1*	-	*55.2*	*17.9*	*10.7*	*56.0*	-	*94.0*
Total Mathematics	4596	998	3170	1150	1445	2365	618	1339	31	1911	5018	1675	2752	137	4326
SE	*57.7*	*20.1*	*67.4*	-	*62.9*	*71.8*	*30.7*	*76.6*	-	*136.4*	*154.8*	*70.1*	*192.1*	-	*238.5*
Total Mathematics (F)	637	260	1133	234	512	605	252	847	3	835	1445	659	1303	51	1901
SE	*15.2*	*10.2*	*29.7*	-	*24.7*	*26.2*	*20.5*	*43.3*	-	*62.7*	*63.0*	*36.3*	*68.4*	-	*105.9*

Statistics Depts	Univ (PhD)					Univ (MA)				
Doctoral Faculty	649	220	226	113	91	123	40	13	3	21
SE	*28.4*	*9.7*	*21.1*	*14.7*	*16.9*	*17.2*	*9.7*	*3.9*	*2.1*	*7.1*
Doctoral (F)	137	71	107	22	19	16	19	8	0	5
SE	*7.9*	*4.9*	*7.6*	*4.0*	*4.1*	*6.5*	*5.1*	*4.3*	*0.0*	*4.2*
Non-doctoral Faculty	0	0	143	0	37	0	0	19	0	5
SE	*0.0*	*0.0*	*4.6*	-	*6.7*	*0.0*	*0.0*	*6.0*	-	*2.7*
Non-doctoral (F)	0	0	129	0	19	0	0	8	0	3
SE	*0.0*	*0.0*	*3.5*	-	*3.8*	*0.0*	*0.0*	*2.8*	-	*2.1*
Total Statistics	649	220	369	113	128	123	40	32	3	27
SE	*28.4*	*9.7*	*21.3*	-	*19.8*	*17.2*	*9.7*	*6.5*	-	*7.8*
Total Statistics (F)	137	71	237	22	38	16	19	16	0	8
SE	*7.9*	*4.9*	*8.0*	-	*6.3*	*6.5*	*5.1*	*3.3*	-	*4.3*

TABLE F.1.1	Tenured	Tenure-eligible	OFT	Post-docs	Part-time
Mathematics Depts	Univ (PhD) + Univ (MA) + Coll (BA)				
Doctoral Faculty	11681	3188	3481	1317	1940
SE	*178.1*	*77.5*	*123.2*	*60.7*	*121.4*
Doctoral (F)	2568	1118	1379	288	588
SE	*67.9*	*41.2*	*48.2*	*18.5*	*47.6*
Non-doctoral Faculty	298	103	3780	0	5742
SE	*32.7*	*19.5*	*143.3*	*-*	*230.0*
Non-doctoral (F)	120	54	1903	0	2659
SE	*18.7*	*11.2*	*72.0*	*-*	*111.2*
Total Mathematics	11979	3291	7261	1317	7682
SE	*180.1*	*79.1*	*217.5*	*60.7*	*281.9*
Total Mathematics (F)	2688	1171	3282	288	3248
SE	*69.9*	*42.9*	*86.2*	*18.5*	*125.5*
Statistics Depts	Univ (PhD) + Univ (MA)				
Doctoral Faculty	772	260	239	116	112
SE	*33.2*	*13.7*	*21.5*	*14.8*	*18.3*
Doctoral (F)	153	90	115	22	25
SE	*10.3*	*7.1*	*8.7*	*4.0*	*5.9*
Non-doctoral Faculty	0	0	162	0	43
SE	*0.0*	*0.0*	*7.6*	*-*	*7.2*
Non-doctoral (F)	0	0	137	0	21
SE	*0.0*	*0.0*	*4.5*	*-*	*4.3*
Total Statistics	772	260	401	116	155
SE	*33.2*	*13.7*	*22.3*	*14.8*	*21.3*
Total Statistics (F)	153	90	253	22	46
SE	*10.3*	*7.1*	*8.6*	*4.0*	*7.6*

TABLE F.2	Univ (PhD)				Univ (MA)				Coll (BA)				**Total**			
	Tenured	Tenure-eligible	Other full-time	Post-docs	Tenured	Tenure-eligible	Other full-time	Post-docs	Tenured	Tenure-eligible	Other full-time	Post-docs	Tenured	Tenure-eligible	Other full-time	Post-docs
Men, 2015	3958	739	2037	916	1760	366	493	28	3573	1015	1450	85	9292	2120	3979	1030
SE	*54.9*	*15.4*	*49.0*	*42.4*	*63.6*	*23.8*	*47.6*	*9.4*	*115.2*	*50.0*	*150.8*	*17.0*	*142.5*	*57.5*	*165.5*	*46.7*
Women, 2015	637	260	1133	234	605	252	847	3	1445	659	1303	51	2688	1171	3282	288
SE	*15.2*	*10.2*	*29.7*	*12.7*	*26.2*	*20.5*	*43.3*	*2.3*	*63.0*	*36.3*	*68.4*	*13.2*	*69.9*	*42.9*	*86.2*	*18.5*
Total, 2015	4596	998	3170	1150	2365	618	1339	31	5018	1675	2752	137	11979	3291	7261	1317
SE	*57.7*	*20.1*	*67.4*	*53.0*	*71.8*	*30.7*	*76.6*	*9.6*	*154.8*	*70.1*	*192.1*	*27.9*	*180.1*	*79.1*	*217.5*	*60.7*

TABLE F.3	Doctoral Statistics Departments				Masters Statistics Departments				**Total**			
	Tenured	Tenure-eligible	Other full-time	Postdocs	Tenured	Tenure-eligible	Other full-time	Postdocs	Tenured	Tenure-eligible	Other full-time	Postdocs
Men, 2015	512	148	132	91	107	21	16	3	618	170	148	94
SE	*25.0*	*9.1*	*15.8*	*12.6*	*11.6*	*7.8*	*4.6*	*2.1*	*27.6*	*11.9*	*16.4*	*12.7*
Women, 2015	137	71	237	22	16	19	16	0	153	90	253	22
SE	*7.9*	*4.9*	*8.0*	*4.0*	*6.5*	*5.1*	*3.3*	*0.0*	*10.3*	*7.1*	*8.6*	*4.0*
Total, 2015	649	220	369	113	123	40	32	3	772	260	401	116
SE	*28.4*	*9.7*	*21.3*	*14.7*	*17.2*	*9.7*	*6.5*	*2.1*	*33.2*	*13.7*	*22.3*	*14.8*

TABLE F.4 (Standard errors only)	<30 %	30-34 %	35-39 %	40-44 %	45-49 %	50-54 %	55-59 %	60-64 %	65-69 %	>69 %
Mathematics Depts.										
Univ (PhD)										
Tenured Men	0.0	0.1	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.3
Tenured Women	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Tenure-eligible men	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Tenure-eligible women	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Univ (PhD)	0.1	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Univ (MA)										
Tenured Men	0.0	0.2	0.5	0.6	0.6	0.6	0.6	0.7	0.5	0.5
Tenured Women	0.0	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.1
Tenure-eligible men	0.2	0.5	0.4	0.3	0.1	0.1	0.0	0.0	0.0	0.0
Tenure-eligible women	0.2	0.4	0.3	0.2	0.2	0.1	0.1	0.0	0.0	0.0
Total Univ (MA)	0.4	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.6	0.6
Coll (BA)										
Tenured Men	0.0	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2
Tenured Women	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
Tenure-eligible men	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Tenure-eligible women	0.1	0.2	0.2	0.1	0.1	0.0	0.1	0.0	0.0	0.0
Total Coll (BA)	0.3	0.6	0.6	0.6	0.6	0.6	0.5	0.6	0.4	0.4
Statistics Depts.										
Univ (MA)										
Tenured Men	2.0	4.0	9.9	11.5	12.9	14.6	12.6	13.6	10.0	9.6
Tenured Women	0.0	4.7	7.4	7.3	9.2	8.8	7.6	8.6	6.2	3.1
Tenure-eligible men	5.6	9.6	9.1	6.9	1.2	1.9	2.1	2.0	0.0	0.0
Tenure-eligible women	4.9	8.9	6.7	5.3	3.5	3.5	3.6	0.8	1.0	0.0
Total Univ (MA)	1.8	3.3	3.8	3.6	3.0	2.2	2.5	3.6	3.4	2.2
Univ (PhD)										
Tenured Men	0.0	0.5	1.6	2.0	2.4	2.6	2.3	2.6	1.9	1.9
Tenured Women	0.0	0.7	1.3	1.3	1.7	1.4	1.4	1.6	1.0	0.6
Tenure-eligible men	0.9	1.5	1.7	1.1	0.2	0.4	0.2	0.1	0.0	0.0
Tenure-eligible women	0.9	1.5	1.2	0.8	0.7	0.1	0.5	0.2	0.2	0.0
Total Univ (PhD)	0.5	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.7	0.8

TABLE F.5	Percentage of Full-time Faculty					
	Asian %	Black, not Hispanic %	Mexican American/ Puerto Rican/ other Hispanic %	White, not Hispanic %	AIAN or NHPI %	Unknown %
PhD Mathematics Departments						
All full-time men	15	1	3	55	0	2
SE	*0.2*	*0.1*	*0.1*	*0.3*	*0.0*	*0.1*
All full-time women	5	0	1	16	0	1
SE	*0.1*	*0.0*	*0.1*	*0.2*	*0.0*	*0.1*
MA Mathematics Departments						
All full-time men	11	2	3	46	0	2
SE	*0.6*	*0.2*	*0.4*	*0.9*	*0.1*	*0.3*
All full-time women	6	1	1	26	0	1
SE	*0.4*	*0.2*	*0.2*	*0.8*	*0.1*	*0.2*
BA Mathematics Departments						
All full-time men	6	2	1	53	0	2
SE	*0.3*	*0.2*	*0.2*	*0.7*	*0.1*	*0.2*
All full-time women	4	1	1	30	0	1
SE	*0.3*	*0.1*	*0.1*	*0.6*	*0.0*	*0.1*
All Statistics Departments						
All full-time men	22	1	2	45	0	2
SE	*0.9*	*0.2*	*0.3*	*1.1*	*0.2*	*0.3*
All full-time women	11	0	1	15	0	1
SE	*0.7*	*0.0*	*0.2*	*0.8*	*0.0*	*0.2*

TABLE F.6	Percentage of part-time Faculty					
	Asian %	Black, not Hispanic %	Mexican American/ Puerto Rican/ other Hispanic %	White, not Hispanic %	AiAN or NHPI	Unknown %
PhD Mathematics Departments						
All part-time men	8	2	2	47	0	4
SE	*0.4*	*0.2*	*0.2*	*0.8*	*0.1*	*0.3*
All part-time women	5	1	1	28	0	2
SE	*0.4*	*0.1*	*0.2*	*0.7*	*0.1*	*0.2*
MA Mathematics Departments						
All part-time men	5	3	4	38	0	7
SE	*0.6*	*0.4*	*0.6*	*1.4*	*0.1*	*0.6*
All part-time women	2	1	2	34	0	5
SE	*0.4*	*0.2*	*0.5*	*1.3*	*0.0*	*0.6*
BA Mathematics Departments						
All part-time men	3	3	1	45	0	4
SE	*0.3*	*0.4*	*0.2*	*1.0*	*0.1*	*0.4*
All part-time women	2	1	1	35	1	4
SE	*0.3*	*0.2*	*0.2*	*1.0*	*0.2*	*0.3*
All Statistics Departments						
All part-time men	11	2	1	55	0	3
SE	*1.9*	*0.8*	*0.4*	*3.4*	*0.0*	*0.7*
All part-time women	8	1	1	18	0	0
SE	*2.0*	*0.4*	*0.7*	*2.8*	*0.0*	*0.0*

TABLE FY.1

Course & Department Type	Tenured/tenure-eligible % PhD	MA	BA	Other full-time % PhD	MA	BA	Part-time % PhD	MA	BA	Graduate teaching assistants % PhD	MA	BA	Unknown % PhD	MA	BA	Average Section Size PhD	MA	BA	Enrollment (1000s) PhD	MA	BA
Percentage of sections taught by																					
Mainstream Calculus I																					
Lecture with separate recitation	28	32	75	48	26	18	12	24	1	7	4	0	5	14	6	98	45	26	93	40	12
SE	*3.6%*	*3.7%*	*4.8%*	*4.6%*	*6.2%*	*4.6%*	*2.6%*	*7.6%*	*1.3%*	*1.8%*	*1.6%*	*0.0%*	*1.7%*	*8.2%*	*3.9%*	*7.6*	*11.3*	*1.4*	*10.9*	*17.7*	*2.8*
Sections that meet as a class	26	62	72	31	26	8	12	7	10	27	0	0	3	5	10	32	30	23	39	18	51
SE	*2.8%*	*10.9%*	*4.4%*	*5.4%*	*9.5%*	*2.0%*	*4.6%*	*2.4%*	*1.6%*	*5.8%*	*0.0%*	*0.0%*	*1.5%*	*3.4%*	*3.6%*	*0.9*	*1.4*	*0.8*	*10.5*	*3.9*	*7.7*
Other sections	27	0	35	32	0	65	7	100	0	34	0	0	0	0	0	32	0	9	2	0	0
SE	*19.4%*	.	*63.4%*	*48.5%*	.	*63.4%*	*4.9%*	.	*0.0%*	*24.3%*	.	*0.0%*	*0.0%*	.	*0.0%*	*1.7*	.	*10.8*	*1.8*	*0.0*	*0.2*
Total Mainstream Calculus I	27	44	72	38	25	11	12	18	9	19	2	0	4	11	9	60	38	24	134	58	63
SE	*1.8%*	*6.3%*	*3.7%*	*4.1%*	*5.1%*	*1.9%*	*2.9%*	*5.4%*	*1.4%*	*4.2%*	*0.7%*	*0.0%*	*1.0%*	*4.4%*	*3.0%*	*5.0*	*6.8*	*0.8*	*13.6*	*16.5*	*8.2*
Mainstream Calculus II																					
Lecture with separate recitation	33	66	65	52	11	23	5	17	0	5	6	0	6	0	12	90	37	22	54	13	5
SE	*4.2%*	*7.9%*	*15.4%*	*4.2%*	*3.0%*	*10.6%*	*1.2%*	*8.2%*	*0.0%*	*1.3%*	*1.5%*	*0.0%*	*1.7%*	*0.0%*	*7.2%*	*5.5*	*4.5*	*1.9*	*9.3*	*2.9*	*1.5*
Sections that meet as a class	27	60	69	38	18	15	8	4	6	25	0	0	3	18	9	38	28	20	21	7	24
SE	*3.9%*	*10.0%*	*7.6%*	*4.0%*	*7.8%*	*4.8%*	*2.2%*	*2.3%*	*1.9%*	*4.9%*	*0.0%*	*0.0%*	*1.5%*	*8.8%*	*5.2%*	*2.7*	*3.0*	*1.1*	*5.9*	*2.1*	*4.5*
Other sections	38	NA	100	25	NA	0	0	NA	0	38	NA	0	0	NA	0	29	NA	10	1	0	0
SE	.	.	*0.0%*	.	.	*0.0%*	.	.	*0.0%*	.	.	*0.0%*	.	.	*0.0%*	.	.	*10.0*	*0.9*	*0.0*	*0.1*
Total Mainstream Calculus II	30	64	69	44	14	17	6	12	5	15	4	0	4	7	10	64	33	20	76	21	29
SE	*2.9%*	*5.7%*	*7.0%*	*2.1%*	*3.6%*	*5.0%*	*0.9%*	*5.1%*	*1.6%*	*3.3%*	*1.0%*	*0.0%*	*1.0%*	*4.1%*	*4.3%*	*3.9*	*3.1*	*1.0*	*8.5*	*3.9*	*5.2*
Total Mainstream Calculus I & II	28	50	71	40	22	13	10	16	7	18	3	0	4	10	9	62	37	23	210	79	92
SE	*2.0%*	*5.4%*	*4.5%*	*3.2%*	*4.3%*	*2.6%*	*1.8%*	*4.7%*	*1.2%*	*3.8%*	*0.8%*	*0.0%*	*1.0%*	*4.2%*	*3.2%*	*4.5*	*5.6*	*0.7*	*20.9*	*19.4*	*12.9*

TABLE FY.2

	Percentage of sections taught by																				
	Tenured/ tenure-eligible %			Other full-time %			Part-time %			Graduate teaching assistants %			Unknown %			Average Section Size			Enrollment (1000s)		
Course & Department Type	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA
Non-Mainstream Calculus I																					
Lecture with separate recitation	25	33	56	51	23	44	14	44	0	2	0	0	8	0	0	96	56	19	26	3	1
SE	*4.6%*	*18.8%*	*51.6%*	*5.3%*	*9.2%*	*51.6%*	*4.0%*	*12.9%*	*0.0%*	*0.9%*	*0.0%*	*0.0%*	*4.5%*	*0.0%*	*0.0%*	*20.2*	*24.2*	*1.5*	*6.7*	*1.9*	*0.3*
Sections that meet as a class	15	38	39	16	32	29	10	24	30	47	0	0	13	6	2	38	32	29	29	14	17
SE	*4.1%*	*12.2%*	*7.0%*	*3.1%*	*9.9%*	*9.0%*	*3.5%*	*15.8%*	*7.1%*	*8.0%*	*0.0%*	*0.0%*	*6.1%*	*5.6%*	*2.3%*	*2.2*	*1.9*	*2.3*	*4.7*	*4.6*	*3.2*
Other sections	0	NA	NA	56	NA	NA	0	NA	NA	44	NA	NA	0	NA	NA	61	NA	NA	2	0	0
SE	*0.0%*	.	.	*34.3%*	.	.	*0.0%*	.	.	*34.3%*	.	.	*0.0%*	.	.	*37.3*	.	.	*0.7*	*0.0*	*0.0*
Total Non-Mainstream Calculus I	17	37	40	26	31	30	11	26	28	35	0	0	11	5	2	54	34	29	57	17	17
SE	*3.1%*	*10.1%*	*6.8%*	*4.2%*	*9.2%*	*8.7%*	*3.3%*	*13.8%*	*6.8%*	*6.2%*	*0.0%*	*0.0%*	*4.4%*	*5.1%*	*2.2%*	*2.6*	*2.6*	*2.2*	*8.9*	*4.6*	*3.1*
Total Non-Mainstream Calculus II, III, etc.	32	32	35	29	14	11	19	55	17	15	0	0	4	0	37	41	39	22	6	8	1
SE	*8.5%*	*19.0%*	*25.3%*	*9.5%*	*3.3%*	*12.6%*	*8.4%*	*22.0%*	*14.1%*	*7.5%*	*0.0%*	*0.0%*	*1.6%*	*0.0%*	*35.6%*	*6.1*	*3.9*	*7.7*	*1.6*	*4.0*	*0.6*
Total Non-Mainstream Calculus I, II, III, etc.	19	36	39	27	26	28	12	34	27	32	0	0	10	4	5	52	35	28	63	25	18
SE	*3.3%*	*11.2%*	*6.4%*	*3.8%*	*8.4%*	*8.6%*	*3.0%*	*17.2%*	*6.0%*	*6.0%*	*0.0%*	*0.0%*	*4.0%*	*3.7%*	*3.5%*	*2.9*	*2.9*	*2.5*	*10.2*	*7.7*	*3.3*

TABLE FY.3

Course & Mathematics Department Type	Percentage of sections taught by: Tenured/ tenure-eligible %			Other full-time %			Part-time %			Graduate teaching assistants %			Unknown %			Average Section Size			Enrollment (1000s)		
	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA	PhD	MA	BA
Introductory Statistics (F1) (non-calculus)																					
Lecture with separate recitation	17	49	43	52	39	19	3	8	19	7	0	0	20	4	19	141	41	31	15	9	18
SE	*7.5%*	*10.2%*	*8.7%*	*9.2%*	*9.2%*	*3.4%*	*2.9%*	*5.4%*	*5.5%*	*2.4%*	*0.0%*	*0.0%*	*5.2%*	*4.2%*	*8.8%*	*24.5*	*10.1*	*2.5*	*4.6*	*3.1*	*3.2*
Sections that meet as a class	13	46	42	31	38	16	17	16	34	23	0	0	16	0	8	30	39	26	26	34	85
SE	*3.6%*	*6.2%*	*3.3%*	*8.5%*	*8.1%*	*2.4%*	*5.3%*	*4.6%*	*3.2%*	*8.4%*	*0.0%*	*0.2%*	*10.2%*	*0.5%*	*2.0%*	*4.2*	*3.7*	*1.0*	*4.7*	*9.0*	*10.4*
Other sections	9	NA	38	91	NA	49	0	NA	13	0	NA	0	0	NA	0	2	NA	12	0	0	0
SE	*66.1%*	*.*	*36.8%*	*66.1%*	*.*	*51.0%*	*0.0%*	*.*	*15.4%*	*0.0%*	*.*	*0.0%*	*0.0%*	*.*	*0.0%*	*18.5*	*.*	*7.9*	*0.0*	*0.0*	*0.2*
Total Introductory Statistics (non-calculus)	13	46	42	34	38	16	16	14	32	21	0	0	17	1	9	42	39	27	41	43	104
SE	*3.4%*	*5.0%*	*3.3%*	*7.1%*	*6.5%*	*2.2%*	*4.7%*	*3.8%*	*2.7%*	*6.9%*	*0.0%*	*0.1%*	*9.2%*	*1.1%*	*2.1%*	*3.7*	*3.5*	*0.9*	*5.4*	*9.1*	*11.1*
Introductory Statistics (F2) (calculus prerequisite for non-majors/minors)																					
Lecture with separate recitation	54	86	41	29	7	0	9	0	59	8	0	0	0	7	0	53	79	27	2	5	3
SE	*7.4%*	*15.1%*	*30.4%*	*13.0%*	*7.6%*	*0.0%*	*9.8%*	*0.0%*	*30.4%*	*6.9%*	*0.0%*	*0.0%*	*0.0%*	*7.6%*	*0.0%*	*5.2*	*17.0*	*3.2*	*1.2*	*2.1*	*1.6*
Sections that meet as a class	37	71	69	24	11	11	17	17	12	15	0	0	8	0	8	33	31	27	5	8	11
SE	*13.9%*	*9.1%*	*8.1%*	*10.2%*	*5.7%*	*9.2%*	*8.8%*	*13.5%*	*5.8%*	*10.3%*	*0.0%*	*0.0%*	*7.5%*	*0.0%*	*6.4%*	*3.4*	*4.0*	*2.1*	*1.9*	*4.0*	*3.6*
Other sections	100	0	100	0	NA	0	0	NA	0	0	NA	0	0	NA	0	34	NA	30	0	0	0
SE	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*.*	*0.3*	*0.0*	*0.1*
Total Introductory Statistics (calculus)	43	74	63	24	10	8	15	14	22	13	0	0	6	1	6	37	40	27	7	13	14
SE	*11.3%*	*6.9%*	*7.6%*	*6.6%*	*4.6%*	*7.2%*	*6.1%*	*9.4%*	*9.3%*	*6.9%*	*0.0%*	*0.0%*	*5.5%*	*1.5%*	*5.0%*	*2.5*	*6.2*	*1.7*	*2.8*	*3.0*	*4.1*
Statistics for Pre-service Teachers (F3,F4)	23	76	29	27	0	0	12	27	0	38	0	71	0	0	0	25	23	3	1	1	0
SE	*14.8%*	*22.8%*	*58.8%*	*21.4%*	*0.0%*	*0.0%*	*10.7%*	*25.5%*	*0.0%*	*12.7%*	*0.0%*	*58.8%*	*0.0%*	*0.0%*	*0.0%*	*2.1*	*4.6*	*8.8*	*0.3*	*0.2*	*0.1*
Probability & Statistics (non-Calculus) (F5)	46	32	27	0	34	31	54	13	29	0	0	0	0	21	13	34	38	31	3	2	6
SE	*28.3%*	*7.9%*	*12.5%*	*0.0%*	*15.3%*	*15.8%*	*28.3%*	*19.0%*	*11.8%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*6.2%*	*11.6%*	*11.0*	*16.6*	*3.3*	*2.1*	*1.2*	*1.7*
Total, all introductory statistics courses for non-majors	20	52	44	30	31	16	18	14	30	19	0	1	13	2	9	40	39	27	53	58	123
SE	*3.8%*	*5.0%*	*3.1%*	*6.3%*	*5.1%*	*2.2%*	*3.9%*	*3.5%*	*2.8%*	*6.0%*	*0.0%*	*0.4%*	*6.9%*	*1.4%*	*2.1%*	*3.3*	*2.6*	*0.8*	*8.0*	*11.6*	*12.9*

TABLE FY.4

	Percentage of sections taught by															
	Tenured/ tenure-eligible %		Other full-time (with PhD) %		Other full-time (without PhD) %		Part-time %		Graduate teaching assistants %		Unknown %		Average Section Size		Enrollment (1000s)	
Course & Statistics Department Type	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA
Introductory Statistics (non-Calculus for non-majors/minors) (E1)																
Lecture with separate recitation	6	8	9	26	9	18	6	21	38	3	32	26	57	96	35	5
SE	*1.1%*	*2.4%*	*1.1%*	*11.2%*	*1.0%*	*3.4%*	*1.1%*	*4.6%*	*4.4%*	*1.6%*	*4.2%*	*11.0%*	*3.7*	*20.5*	*1.5*	*0.9*
Sections that meet as a class	17	40	16	4	9	35	11	15	41	1	6	5	66	53	18	7
SE	*2.4%*	*7.4%*	*2.4%*	*2.3%*	*1.2%*	*8.2%*	*1.9%*	*4.4%*	*4.3%*	*0.6%*	*0.8%*	*2.9%*	*3.0*	*6.9*	*1.4*	*1.4*
Other sections	0	NA	3	.	3	NA	42	NA	52	NA	0	NA	20	NA	1	0
SE	*0.0%*	*.*	*13.5%*	*.*	*12.1%*	*.*	*4.1%*	*.*	*21.4%*	*.*	*0.0%*	*.*	*2.1*	*.*	*0.4*	*0.0*
Total Introductory Statistics (non-Calculus)	9	31	11	10	9	30	9	16	40	1	23	11	58	65	54	12
SE	*1.0%*	*6.3%*	*1.0%*	*3.0%*	*0.8%*	*5.5%*	*1.2%*	*3.1%*	*2.9%*	*0.6%*	*2.9%*	*3.9%*	*2.6*	*7.6*	*1.6*	*1.4*
Introductory Statistics (calculus prerequisite for non-majors/minors) (E2)																
Lecture with separate recitation	14	17	24	17	7	8	12	0	16	0	27	58	73	57	10	1
SE	*2.7%*	*17.6%*	*3.9%*	*5.9%*	*0.9%*	*8.8%*	*3.4%*	*0.0%*	*2.3%*	*0.0%*	*6.2%*	*29.2%*	*8.5*	*2.2*	*1.0*	*0.3*
Sections that meet as a class	31	41	22	0	6	48	8	4	31	0	0	7	54	68	5	2
SE	*4.2%*	*11.9%*	*3.3%*	*0.0%*	*1.0%*	*10.5%*	*1.2%*	*1.9%*	*2.5%*	*0.0%*	*0.0%*	*4.4%*	*8.5*	*19.3*	*0.5*	*0.7*
Other sections	5	NA	33	NA	2	NA	0	NA	60	NA	0	NA	26	NA	1	0
SE	*9.9%*	*.*	*9.9%*	*.*	*5.0%*	*.*	*0.0%*	*.*	*24.8%*	*.*	*0.0%*	*.*	*11.8*	*.*	*0.4*	*0.0*
Total Introductory Statistics (Calculus)	18	33	25	5	6	36	9	3	29	0	14	23	59	65	16	3
SE	*2.4%*	*9.0%*	*2.2%*	*1.9%*	*0.9%*	*6.9%*	*1.8%*	*1.3%*	*3.3%*	*0.0%*	*3.7%*	*9.3%*	*4.5*	*11.9*	*1.2*	*0.7*
Statistics for Pre-service Teachers (E3,E4)	100	0	0	0	0	100	0	0	0	0	0	0	36	5	0	0
SE	*0.0%*	*.*	*0.0%*	*.*	*0.0%*	*.*	*0.0%*	*.*	*0.0%*	*.*	*0.0%*	*.*	*0.0*	*.*	*0.0*	*0.0*
Probability & Statistics (non-Calculus) (E5)	6	0	19	0	6	0	3	100	33	0	33	0	102	40	4	0
SE	*2.6%*	*.*	*2.6%*	*.*	*3.6%*	*.*	*1.6%*	*.*	*4.0%*	*.*	*4.3%*	*.*	*18.4*	*.*	*0.7*	*0.0*
Total, all introductory probability & statistics courses	11	31	14	9	8	32	9	14	37	1	21	13	59	65	74	15
SE	*1.0%*	*6.1%*	*1.1%*	*2.4%*	*0.7%*	*4.8%*	*1.1%*	*2.6%*	*2.4%*	*0.4%*	*2.8%*	*4.2%*	*2.7*	*6.7*	*2.3*	*1.8*

TABLE FY.5	Mathematics Departments							
	Univ (PhD)	SE	Univ (MA)	SE	College (BA)	SE	All Depts. Combined	SE
Percentage of departments that offer introductory statistics course with no calculus prerequisite	50	4.4	78	5.5	83	5.8	78	3.9
Number of different kinds of introductory statistics courses for non-majors with no calculus prerequisite								
1	61	11.9	69	10.0	74	6.6	72	5.4
2	35	11.9	23	8.5	23	6.5	24	5.2
3	4	3.1	4	1.8	2	1.1	3	0.9
More than 3	.	.	4	3.8	0	0.4	1	0.6
Of those that offer the course, the percentage of departments in which the majority of sections use real data for the following percentages of class sessions:								
0-20%	21	8.4	29	14.0	28	7.6	28	6.0
21-40%	13	12.0	31	7.0	23	5.5	23	4.3
41-60%	26	7.4	19	8.0	18	4.4	19	3.5
61-80%	12	4.5	2	1.6	14	4.4	12	3.4
81-100%	29	7.9	18	5.4	18	4.8	19	3.9
Percentage of departments where the majority of sections use in-class demonstrations in the following percentages of class sessions:								
0-20%	21	8.7	23	14.3	18	3.9	19	3.6
21-40%	26	12.3	17	7.2	22	5.9	22	4.8
41-60%	20	7.3	33	9.0	21	3.5	23	2.9
61-80%	16	4.9	17	5.4	17	5.1	17	4.0
81-100%	18	6.4	9	4.8	21	4.0	19	3.2
Percentage of departments using the following kinds of technology in the majority of sections:								
Graphing calculators	57	9.3	77	9.0	66	5.7	67	4.7
Statistical packages	48	12.8	64	10.4	45	6.6	48	5.5
Educational software	29	6.6	55	6.7	52	5.9	50	4.8
Applets	16	8.8	30	12.9	24	4.8	24	4.2
Spreadsheets	66	10.8	72	9.6	67	5.9	68	4.6
Web-based resources	42	8.9	65	8.7	49	6.5	50	5.2
Classroom response systems	4	3.3	12	5.6	6	3.0	6	2.4
Online textbooks	41	7.9	48	9.9	39	6.3	41	5.1
Online videos	26	7.7	32	10.0	32	5.4	31	4.5
Percentage of departments where the majority of sections require assessments beyond homework, exams, and quizzes	19	5.4	22	8.1	45	5.8	39	4.9

TABLE FY.6	Statistics Departments					
	Univ (PhD)	*SE*	Univ (MA)	*SE*	All Depts. Combined	*SE*
Percentage of departments that offer Introductory Statistics for non-majors/minors with no calculus prerequisite	97	*1.6*	85	*5.1*	94	*1.7*
Number of different kinds of introductory statistics courses for non-majors with no calculus prerequisite						
1	17	*2.9*	38	*6.9*	23	*2.8*
2	26	*3.1*	23	*6.0*	26	*2.8*
3	21	*2.8*	23	*6.0*	22	*2.6*
More than 3	35	*3.1*	15	*5.1*	30	*2.6*
Of those that offer the course, the percentage of departments in which the majority of sections use real data the following percentages of the time:						
0-20%	14	*2.9*	20	*6.6*	15	*2.7*
21-40%	12	*2.2*	20	*6.6*	14	*2.2*
41-60%	16	*1.8*	10	*5.0*	15	*1.7*
61-80%	16	*2.9*	40	*8.1*	21	*2.9*
81-100%	42	*3.4*	10	*5.0*	35	*2.9*
Percentage of departments where the majority of sections use in-class demonstrations in the following percentages of class sessions:						
0-20%	8	*2.1*	30	*7.6*	13	*2.3*
21-40%	18	*2.9*	40	*8.1*	23	*2.9*
41-60%	24	*3.0*	10	*5.0*	21	*2.6*
61-80%	7	*0.9*	.	.	5	*0.7*
81-100%	44	*3.2*	20	*6.6*	39	*2.9*
Percentage of departments using following kinds of technology in the majority of sections						
Graphing calculators	46	*3.5*	50	*7.4*	47	*3.2*
Statistical packages	65	*3.1*	75	*6.4*	68	*2.8*
Educational software	53	*3.5*	55	*7.8*	53	*3.2*
Applets	45	*3.6*	27	*7.0*	41	*3.2*
Spreadsheets	52	*3.5*	64	*7.5*	55	*3.2*
Web-based resources	74	*2.7*	45	*7.8*	68	*2.7*
Classroom response systems	55	*3.6*	33	*7.0*	50	*3.2*
Online textbooks	51	*3.5*	45	*7.8*	50	*3.2*
Online videos	38	*3.5*	27	*7.0*	35	*3.1*
Percentage of departments where the majority of sections require assessments beyond homework, exams, and quizzes	35	*3.5*	25	*6.4*	32	*3.1*

TABLE FY.7	Mathematics Depts				Statistics Depts		
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total
Conditional probability	92	90	72	76	85	75	83
SE	*5.5*	*5.2*	*4.7*	*3.7*	*2.5*	*6.4*	*2.5*
Simulation to explore randomness	50	84	45	51	76	67	73
SE	*12.5*	*6.3*	*5.0*	*4.3*	*2.6*	*7.0*	*2.6*
Resampling techniques	9	34	21	22	50	8	39
SE	*5.0*	*5.2*	*6.4*	*5.1*	*3.6*	*4.1*	*2.9*

TABLE FY.8	No graduate degree in statistics	Masters degree in statistics	PhD degree in statistics
Mathematics Departments			
Univ (PhD)	52	29	18
SE	*10.3*	*9.9*	*7.8*
Univ (MA)	48	35	17
SE	*8.3*	*7.2*	*5.1*
Coll (BA)	68	18	14
SE	*5.6*	*5.6*	*4.3*
Total Math Depts	64	21	15
SE	*4.5*	*4.4*	*3.5*

TABLE FY.9	Mathematics Depts				Statistics Depts		
	Univ (PhD)	Univ (MA)	College (BA)	Total	Univ (PhD)	Univ (MA)	Total
Average estimated outside enrollment	710	196	68	134	306	496	328
SE	*114.6*	*35.4*	*6.8*	*17.2*	*34.4*	*124.0*	*32.6*
Estimated outside national enrollment	34369	20217	34988	89574	6038	1296	7334
SE	*8830.9*	*4938.4*	*4723.2*	*11166.1*	*724.3*	*465.7*	*861.1*

TABLE TYE.2	2015	SE
Mathematics & Statistics enrollments in TYCs	2,012,000	118,000.0

TABLE TYE.3

Course Number	Type of course	2015	SE
	Precollege level		
1	Arithmetic & Basic Mathematics	71	14.1
2	Pre-algebra	127	16.3
3	Elementary Algebra (High School level)	277	26.9
4	Intermediate Algebra (High School level)	299	29.8
5	Geometry (High School level)	8	3.0
	Precalculus level		
6	College Algebra (above Intermediate Algebra)	292	29.0
7	Trigonometry	51	6.7
8	College Algebra & Trigonometry (combined)	13	2.7
9	Introduction to Mathematical Modeling	2	1.3
10	Precalculus/Elem Functions/Analytic Geometry	87	13.3
	Calculus level		
11	Mainstream Calculus I	66	6.5
12	Mainstream Calculus II	34	3.8
13	Mainstream Calculus III	19	2.2
14	Non-mainstream Calculus I	26	7.1
15	Non-mainstream Calculus II	0	0.1
16	Differential Equations	7	1.3
	Other mathematics courses		
17	Linear Algebra	7	1.1
18	Discrete Mathematics	5	2.1
19	Elementary Statistics (with or w/o Probability)	251	54.9
20	Probability (with or w/o Statistics)	28	15.3
21	Finite Mathematics	40	19.4
22	Mathematics for Liberal Arts	97	14.0
23	Mathematics for Elementary School Teachers I	12	1.8
24	Mathematics for Elementary School Teachers II	3	0.9
25	Other Mathematics Courses for Teacher Preparation	1	0.5
26	Business Mathematics (not transferable)	16	3.8
27	Business Mathematics (transferable)	10	2.8
28	Technical Math (non-calculus-based)	21	4.7
29	Technical Math (calculus-based)	3	1.7
30	Other Mathematics Courses (not transferable)	31	8.8
31	Other Mathematics Courses (transferable)	12	4.6
	Total all Two-year College math courses	1918	114.6

TABLE TYE.4			
Course numbers	Type of course	2015	SE
1-5	Precollege Level	782 (41%)	64.7
6-10	Precalculus Level	445 (23%)	39.4
11-16	Calculus Level	152 (8%)	15.2
19-20	Statistics, Probability	280 (15%)	59.6
17-18 & 21-31	Remaining Courses	259 (13%)	31.2
1-31	Total, all courses	1918 (100%)	114.6

TABLE TYE.5			
Course number	Type of course	Fall 2010	SE
1	Arithmetic & Basic Mathematics	36	4.8
2	Pre-algebra	44%	4.8
3	Elementary Algebra (High School level)	75%	5.3
4	Intermediate Algebra (High School level)	72%	4.6
5	Geometry (High School level)	8%	1.5
6	College Algebra (above Intermediate Algebra)	79%	4.1
7	Trigonometry	57%	4.9
8	College Algebra & Trigonometry (combined)	20%	4.4
9	Introduction to Mathematical Modeling	5%	2.7
10	Precalculus/ Elementary Functions/ Analytic Geometry	54%	6.3
11	Mainstream Calculus I	80%	6.3
12	Mainstream Calculus II	65%	3.8
13	Mainstream Calculus III	54%	4.3
14	Non-mainstream Calculus I	26%	4.4
15	Non-mainstream Calculus II	0%	0.2
16	Differential Equations	25%	3.7
17	Linear Algebra	24%	3.9
18	Discrete Mathematics	12%	2.4
19	Elementary Statistics (with or w/o Probability)	83%	5.8
20	Probability (with or w/o Statistics)	5%	2.8
21	Finite Mathematics	23%	4.6
22	Mathematics for Liberal Arts	62%	5.1
23	Mathematics for Elementary School Teachers I	41%	5.4
24	Mathematics for Elementary School Teachers II	17%	3.7
25	Other Mathematics Courses for Teacher Preparation	4%	2.0
26	Business Mathematics (not transferable)	25%	5.4
27	Business Mathematics (transferable)	12%	3.0
28	Technical Mathematics (non-calculus-based)	38%	4.5
29	Technical Mathematics (calculus-based)	9%	3.3
30	Other Mathematics Courses (not transferable)	23%	4.8
31	Other Mathematics Courses (transferable)	10%	3.0

TABLE TYE.6		Percentage of two-year colleges teaching course	
Course number	Type of course	2015	*SE*
11	Mainstream Calculus I	80	*6.3*
16	Differential Equations	25	*3.7*
17	Linear Algebra	24	*3.9*
18	Discrete Mathematics	12	*2.4*
19	Elementary Statistics (with or w/o Probability)	83	*5.8*
21	Finite Mathematics	23	*4.6*
22	Mathematics for Liberal Arts	62	*5.1*
23	Mathematics for Elementary School Teachers I	41	*5.4*
28	Technical Mathematics (non-calculus-based)	38	*4.5*
29	Technical Mathematics (calculus-based)	9	*3.3*

TABLE TYE.7		2015			
Course numbers	Type of course	Average section size	SE	Percentage of sections with size > 30	*SE*
1-5	Precollege Level	19.2	*4.2*	19%	*4.6*
6-10	Precalculus Level	24.7	*0.8*	31%	*3.7*
11-16	Calculus Level	25.4	*0.9*	34%	*4.1*
19-20	Elem. Statistics, Probability	25.5	*4.8*	33%	*8.7*
1-31	Total, all courses	21.7	*2.1*	25%	*3.1*

TABLE TYE.7.1					
Course number	Type of course	2015 average section size	*SE*	Percentage of 2015 departments with average size > 30	*SE*
1-5	Precollege Level	22.6	*1.3*	18%	*3.9*
6-10	Precalculus Level	20.1	*0.9*	9%	*2.8*
11-16	Calculus Level	18.7	*3.5*	18%	*10.3*
19-20	Statistics, Probability	22.5	*1.3*	21%	*4.8*
1-31	Total, all courses	20.7	*0.7*	17%	*3.5*

TABLE TYE.8

Course number	Type of course	Average section size	*SE*	Course number	Type of course	Average section size	*SE*
1	Arithmetic & Basic Mathematics	20	*1.4*	17	Linear Algebra	23	*1.6*
2	Pre-algebra	24	*1.4*	18	Discrete Mathematics	27	*1.7*
3	Elementary Algebra (High School level)	23	*0.9*	19	Elementary Statistics (with or w/o Probability)	25	*5.1*
4	Intermediate Algebra (High School level)	15	*8.9*	20	Probability (with or w/o Statistics)	35	*11.2*
5	Geometry (High School level)	30	*3.5*	21	Finite Mathematics	28	*1.8*
6	College Algebra (above Intermediate Algebra)	25	*0.9*	22	Mathematics for Liberal Arts	20	*4.5*
7	Trigonometry	24	*1.3*	23	Mathematics for Elementary School Teachers I	19	*1.1*
8	College Algebra & Trigonometry (combined)	25	*2.5*	24	Mathematics for Elementary School Teachers II	19	*1.6*
9	Introduction to Mathematical Modeling	10	*3.2*	25	Other Mathematics Courses for Teacher Preparation	16	*3.2*
10	Precalculus/Elem Functions/Analytic Geometry	26	*1.3*	26	Business Math (not transferable)	19	*2.0*
11	Mainstream Calculus I	26	*1.1*	27	Business Math (transferable)	24	*2.0*
12	Mainstream Calculus II	26	*1.1*	28	Technical Math (non-calculus-based)	15	*1.8*
13	Mainstream Calculus III	24	*1.5*	29	Technical Math (calculus-based)	20	*6.3*
14	Non-mainstream Calculus I	26	*1.4*	30	Other Mathematics Courses (not transferable)	22	*2.8*
15	Non-mainstream Calculus II	26	.	31	Other Mathematics Courses (transferable)	21	*3.2*
16	Differential Equations	22	*1.5*				

TABLE TYE.8.1

Course number	Type of course	Average section size	*SE*	Course number	Type of course	Average section size	*SE*
1	Arithmetic & Basic Mathematics	18	*2.1*	17	Linear Algebra	17	*10.9*
2	Pre-algebra	20	*3.1*	18	Discrete Mathematics	24	*0.9*
3	Elementary Algebra (High School level)	23	*1.3*	19	Elementary Statistics (with or w/o Probability)	19	*3.0*
4	Intermediate Algebra (High School level)	22	*1.4*	20	Probability (with or w/o Statistics)	26	*14.1*
5	Geometry (High School level)	NA	*.*	21	Finite Mathematics	23	*1.6*
6	College Algebra (above Intermed. Alg.)	20	*1.4*	22	Mathematics for Liberal Arts	20	*3.4*
7	Trigonometry	15	*2.5*	23	Mathematics for Elementary School Teachers I	14	*2.4*
8	College Algebra & Trigonometry (combined)	13	*3.0*	24	Mathematics for Elementary School Teachers II	13	*2.5*
9	Introduction to Mathematical Modeling	23	*7.0*	25	Other Mathematics Courses for Teacher Preparation	NA	*.*
10	Precalculus/Elem Functions/Analytic Geometry	20	*1.5*	26	Business Math (not transferable)	19	*2.3*
11	Mainstream Calculus I	17	*2.4*	27	Business Math (transferable)	18	*3.2*
12	Mainstream Calculus II	14	*3.0*	28	Technical Math (non-calculus-based)	16	*1.9*
13	Mainstream Calculus III	11	*5.1*	29	Technical Math (calculus-based)	27	*.*
14	Non-mainstream Calculus I	24	*2.7*	30	Other Mathematics Courses (not transferable)	17	*2.1*
15	Non-mainstream Calculus II	NA	*.*	31	Other Mathematics Courses (transferable)	21	*2.1*
16	Differential Equations	17	*.*				

TABLE TYE.9		2015					
Course number	Type of course	Number of sections	*SE*	Number of sections taught by part-time faculty	*SE*	Percentage of sections taught by part-time faculty	*SE*
1-5	Precollege level	36108	*6792.6*	16515	*1716.5*	46%	*9.6*
6-10	Precalculus level	15793	*1369.8*	5173	*744.1*	33%	*2.9*
11-13	Mainstream Calculus	4396	*351.3*	666	*111.3*	15%	*2.2*
14-15	Non-mainstream Calculus	882	*223.5*	254	*61.7*	29%	*10.2*
16-18	Advanced level	761	*98.6*	62	*24.0*	8%	*2.9*
19-20	Statistics, Probability	9661	*1838.1*	1977	*217.5*	21%	*4.8*
21-27	Service courses	7014	*1325.3*	2053	*295.8*	29%	*5.0*
28-29	Technical mathematics	1433	*287.5*	501	*170.4*	35%	*9.9*
30-31	Other mathematics courses	1845	*647.9*	813	*294.8*	44%	*8.0*
1-31	Total, all courses	77893	*7814.8*	28014	*2771.6*	36%	*3.9*

TABLE TYE.10		Percentage of sections taught that					
Course Number	Type of course	Have common Department exams %	SE	Use a Homework Management system %	SE	Total number of on-campus sections in fall 2015	SE
1	Arithmetic & Basic Mathematics	67	*9.7*	72	*8.7*	3070	*638.0*
2	Pre-algebra	64	*6.8*	80%	*4.8*	4986	*704.9*
3	Elementary Algebra (High School level)	61	*5.1*	68%	*5.5*	10198	*963.3*
4	Intermediate Algebra (High School level)	38	*20.4*	43%	*23.2*	17580	*6488.9*
5	Geometry (High School level)	45	*21.5*	32%	*16.6*	274	*96.5*
6	College Algebra (above Intermed. Algebra)	49	*5.7*	68%	*4.3*	10333	*1077.8*
7	Trigonometry	19	*4.0*	53%	*5.2*	1900	*209.6*
8	College Algebra & Trigonometry (combined)	15	*9.3*	50%	*10.3*	499	*120.6*
9	Introduction to Mathematical Modeling	5	*5.8*	47%	*48.7*	116	*65.1*
10	Precalculus/Elem Functions/Analytic Geometry	31	*9.4*	61%	*7.7*	2947	*427.9*
11	Mainstream Calculus I	12	*2.8*	36%	*4.1*	2405	*206.0*
12	Mainstream Calculus II	14	*3.7*	32%	*5.1*	1241	*112.5*
13	Mainstream Calculus III	14	*5.0*	33%	*6.0*	749	*79.9*
14	Non-mainstream Calculus I	9	*4.0*	66%	*13.1*	880	*223.5*
15	Non-mainstream Calculus II	0	.	0%	.	2	*2.2*
16	Differential Equations	5	*3.1*	25%	*6.7*	311	*49.0*
17	Linear Algebra	4	*2.2*	22%	*7.0*	280	*38.9*
18	Discrete Mathematics	6	*4.8*	13%	*8.2*	169	*62.2*
19	Elementary Statistics (with or w/o Probability)	39	*14.1*	55%	*12.0*	8915	*1671.8*
20	Probability (with or w/o Statistics)	65	*58.6*	65%	*58.6*	745	*462.7*
21	Finite Mathematics	10	*3.7*	77%	*17.7*	1291	*612.5*
22	Mathematics for Liberal Arts	43	*16.1*	57%	*12.3*	3996	*1015.3*
23	Mathematics for Elementary School Teachers I	27	*7.5*	30%	*6.1*	514	*88.8*
24	Mathematics for Elementary School Teachers II	32	*13.5*	48%	*12.1*	118	*28.3*
25	Other Mathematics Courses for Teacher Preparation	42	*42.2*	79%	*23.3*	51	*26.5*
26	Business Math (not transferable)	24	*9.8*	38%	*10.5*	670	*146.7*
27	Business Math (transferable)	14	*12.3*	23%	*8.9*	373	*101.6*
28	Technical Math (non-calculus-based)	41	*10.9*	48%	*9.5*	1265	*283.1*
29	Technical Math (calculus-based)	13	*11.6*	47%	*17.2*	168	*57.8*
30	Other Mathematics Courses (not transferable)	58	*16.0*	75%	*10.7*	1348	*431.6*
31	Other Mathematics Courses (transferable)	21	*13.8*	79%	*16.5*	497	*249.9*

TABLE TYE.11	Percentage					
Pathways course	Yes	*SE*	No	*SE*	Fall 2015 Enrollment	*SE*
Implememted a Pathways course sequence	58	*5.1*	42	*5.1*		
Implemented Pathways course in:						
a. Foundations	51	*7.2*	49	*7.2*	76338	*18490.4*
b. Quantative Reasoning/Literacy	59	*8.2*	41	*8.2*	45203	*12093.0*
c. Statistics	63	*6.2*	37	*6.2*	56342	*11787.2*
d. Other	32	*9.2*	68	*9.2*	14631	*5345.3*

TABLE TYE.11.1

	Area of change and activity	Pre-College: Arithmetic, Pre-Algebra, Beginning Algebra, Intermediate Algebra	*SE*	Statistics	*SE*	College-Level Non-STEM: College Algebra, Math for Liberal Arts, Finite Math, Quantitative Reasoning	*SE*	College-Level STEM: College Algebra/ Trigonometry, Precalculus, Calculus and above	*SE*
Content									
i)	Students collect, organize, and analyze real data	12	*4.1*	36%	*4.8*	20	*5.3*	13	*3.3*
ii)	Student solves contextually-based problems/applications	26	*5.2*	31%	*4.7*	34	*6.3*	38	*5.1*
iii)	Course includes modeling	15	*4.6*	21%	*4.2*	23	*3.9*	29	*6.3*
iv)	Course focuses on quantitative reasoning	27	*5.1*	23%	*4.3*	36	*6.1*	16	*4.0*
v)	Course has less symbol manipulation and more emphasis on conceptual understanding	19	*4.4*	23%	*4.6*	28	*4.4*	8	*2.9*
Delivery Methods									
i)	Emporium model	33	*4.7*	2%	*1.0*	5	*1.7*	6	*2.6*
ii)	Students complete prescribed modules	36	*5.3*	4%	*2.2*	3	*1.1*	7	*2.7*
iii)	Flipped Classroom	16	*3.2*	9%	*2.9*	16	*4.5*	15	*3.8*
iv)	Accelerated pace	43	*6.5*	6%	*2.4*	6	*1.6*	6	*1.8*
v)	Slower pace	11	*3.3*	1%	*0.5*	5	*2.0*	2	*1.9*
Instructional Strategies routinely include:									
i)	Group work	35	*5.9*	30%	*4.1*	35	*5.2*	24	*3.7*
ii)	Use of handheld devices	15	*4.0*	26%	*4.7*	25	*4.1*	26	*5.3*
iii)	Use of computer programs or internet	46	*6.6*	31%	*4.6*	36	*5.7*	34	*5.4*
iv)	Use of Excel spreadsheets	9	*2.9*	31%	*3.5*	18	*4.3*	5	*1.6*
v)	Guided questioning and less lecturing	27	*5.0*	17%	*4.0*	26	*5.5*	19	*3.3*
vi)	Active learning strategies	38	*4.0*	33%	*4.1*	42	*5.1*	33	*4.3*

TABLE TYE.12		2015		2015		2015	
Course Number	Type of course	Total Enrollments (1000s)	*SE*	Distance Enrollments (1000s)	*SE*	Percentage Distance Enrollments	*SE*
1	Arithmetic & Basic Mathematics	71	*14.1*	9	*4.1*	13%	*5.3*
2	Pre-algebra	127	*16.3*	9	*2.4*	7%	*1.7*
3	Elementary Algebra (High School level)	277	*26.9*	38	*9.9*	14%	*2.7*
4	Intermediate Algebra (High School level)	299	*29.8*	33	*4.6*	11%	*1.0*
5	Geometry (High School level)	8	*3.0*	0	*0.0*	0%	*0.0*
6	College Algebra (above Intermed. Algebra)	292	*29.0*	38	*5.5*	13%	*1.4*
7	Trigonometry	51	*6.7*	4	*0.9*	9%	*1.6*
8	College Algebra & Trigonometry (combined)	13	*2.7*	1	*0.3*	7%	*2.5*
9	Introduction to Mathematical Modeling	2	*1.3*	1	*0.7*	46%	*8.1*
10	Precalculus/ Elementary Functions/ Analytic Geometry	87	*13.3*	10	*2.8*	12%	*2.3*
11	Mainstream Calculus I	66	*6.5*	4	*0.9*	6%	*1.3*
12	Mainstream Calculus II	34	*3.8*	2	*0.5*	5%	*1.2*
13	Mainstream Calculus III	19	*2.2*	1	*0.4*	4%	*1.9*
14	Non-mainstream Calculus I	26	*7.1*	3	*1.1*	13%	*3.6*
15	Non-mainstream Calculus II	0	*0.1*	0	*0.0*	0%	.
16	Differential Equations	7	*1.3*	0	*0.1*	1%	*1.1*
17	Linear Algebra	7	*1.1*	0	*0.3*	6%	*4.9*
18	Discrete Mathematics	5	*2.1*	1	*0.4*	13%	*6.0*

TABLE TYE.12		2015		2015		2015	
Course Number	Type of course	Total Enrollments (1000s)	*SE*	Distance Enrollments (1000s)	*SE*	Percentage Distance Enrollments	*SE*
19	Elementary Statistics (with or w/o Probability)	251	*54.9*	31	*4.2*	12%	*3.8*
20	Probability (with or w/o Statistics)	28	*15.3*	2	*1.5*	9%	*3.4*
21	Finite Mathematics	40	*19.4*	4	*1.5*	11%	*3.8*
22	Math for Liberal Arts	97	*14.0*	19	*4.0*	19%	*2.5*
23	Mathematics for Elementary School Teachers I	12	*1.8*	2	*0.5*	17%	*4.1*
24	Mathematics for Elementary School Teachers II	3	*0.9*	1	*0.4*	32%	*6.6*
25	Other Mathematics Courses for Teacher Preparation	1	*0.5*	0	*0.0*	0%	*0.0*
26	Business Math (not transferable)	16	*3.8*	3	*1.5*	21%	*7.4*
27	Business Math (transferable)	10	*2.8*	1	*0.4*	11%	*2.9*
28	Technical Math (non-calculus)	21	*4.7*	3	*0.8*	12%	*3.5*
29	Technical Math (calculus)	3	*1.7*	0	*0.2*	6%	*4.5*
30	Other Math Courses (not transferable)	31	*8.8*	2	*0.9*	7%	*3.1*
31	Other Math Courses (transferable)	12	*4.6*	1	*0.5*	13%	*6.2*
	Total Enrollments	1918	*114.6*	225	*24.7*	12%	*1.0*

TABLE TYE.12.1		Percent	SE
A. Award transfer credit for distance learning not taught by faculty at your instituion			
	a. Yes	58	*5.1*
	b. No	42	*5.1*
B. Limit distance learning credits that can be counted toward graduation			
	a. Yes	1	*0.5*
	b. No	99	*0.5*
C. Department taught distance learning courses in 2013-2015			
	a. Yes	87	*4.1*
	b. No	13	*4.1*
D. Instructional materials created by:			
	a. Faculty	14	*4.4*
	b. Commercially produced materials	19	*3.9*
	c. Combination of both	67	*5.2*
E. Format of majority of distance learning			
	a. Complete online	69	*5.7*
	b. Hybrid	22	*5.0*
	c. Other	8	*4.0*
F. Requirements of distance learning faculty to meet with students			
	a. Never	5	*2.0*
	b. For scheduled meetings	12	*3.2*
	c. Specified office hours per week	32	*6.6*
	d. Not applicable	51	*8.1*
G. How distance learning students take majority of tests			
	a. Not monitored	11	*3.7*
	b. Online, but using monitoring technology	10	*3.5*
	c. At monitored testing site	47	*5.1*
	d. Combination of above	32	*6.0*
H. Distance learning practices			
	a. Same exams as in face-to-face	67	*5.0*
	b. Same outlines as in face-to-face	97	*2.6*
	c. Same course projects	77	*4.5*
	d. More course projects than in non-distance learning course	12	*3.6*
I. Distance learning instructors evaluated in same way			
	a. Yes	93	*3.1*
	b. No	7	*3.1*

TABLE TYE.12.2

Type of course	No challenge	*SE*	Somewhat of a challenge	*SE*	Somewhat of a challenge	*SE*
A. Maintaining a standard and reliable network/user platform.	54	*6.3*	38	*6.2*	8	*2.4*
B. Maintaining a level of rigor in distance learning mathematics courses equivalent to courses offered face-to-face.	42	*4.3*	41	*4.7*	17%	*4.7*
C. Faculty knowledge about technology.	56	*6.3*	35	*6.0*	8%	*5.1*
D. Student success rates in online distance mathematics courses are lower than face-to-face courses with similar content.	22	*5.7*	38	*5.7*	40%	*5.5*
E. Student success rates in online distance mathematics courses are higher than face-to-face courses with similar content.	62	*6.0*	33	*6.3*	4%	*2.2*

TABLE TYE.13

Opportunity/Service	2015	*SE*
A. Diagnostic or placement testing	94%	*2.7*
a. Colleges that usually require placement tests of first-time enrollees	78%	*4.3*
b. Colleges that periodically assess the effectiveness of their placement tests	79%	*3.8*
B. Advising by a member of the mathematics faculty	49%	*5.7*
C. Opportunities to compete in mathematics contests	40%	*4.7*
D. Honors sections	28%	*4.2*
E. Mathematics club	32%	*4.7*
F. Special mathematics programs to encourage minorities	15%	*3.1*
G. Lectures/colloquia for students, not part of math club	21%	*4.1*
H. Special mathematics programs to encourage women	15%	*3.2*
I. K-12 outreach opportunities	46%	*4.4*
J. Undergraduate research opportunities	17%	*3.3*
K. Independent mathematics studies	41%	*5.6*
L. Other	5%	*3.5*

TABLE TYE.14		Enrollment (in 1000s)	
Course Number	Type of course	2015	*SE*
1-2	Arithmetic & Basic Math, Pre-algebra	38	*10.7*
3	Elementary Algebra (High School level)	36	*9.7*
4	Intermediate Algebra (High School level)	27	*9.6*
19-20	Elementary Statistics, Probability	13	*2.2*
26-27	Business Mathematics	7	*4.0*
28-29	Technical Mathematics	8	*2.3*
	Total	129	*23.9*

TABLE TYE.15		Mathematics Enrollment (in 1000s) in Other Programs							
Course Number	Type of course	Developmental Education Dept/Division	*SE*	Occupational Programs	*SE*	Business	*SE*	Other Depts/ Divisions	*SE*
1-2	Arithmetic & Basic Math, Pre-algebra	36	*10.6*	2	*1.4*	0	*0.1*	1	*0.4*
3	Elementary Algebra (High School level)	34	*9.6*	2	*1.6*	0	*0.0*	1	*0.4*
4	Intermediate Algebra (High School level)	27	*9.6*	0	*0.0*	0	*0.0*	1	*0.4*
19-20	Elementary Statistics, Probability	2	*1.0*	0	*0.1*	3	*0.9*	7	*3.4*
26-27	Business Mathematics	0	*0.3*	0	*0.0*	6	*2.0*	0	*0.0*
28-29	Technical Mathematics	4	*2.0*	3	*1.2*	0	*0.0*	1	*0.6*
	Total	103	*0.0*	6	*0.0*	10	*0.0*	10	*0.0*

TABLE TYE.16

Mathematics Outside of the Mathematics Department		2015	*SE*
Percentage of Two-year Colleges with some precollege mathematics courses outside of mathematics department control		32	*5.3*
Course number	Type of Course		
1-2	Arithmetic & Basic Math, Pre-algebra	23	*4.9*
3	Elementary Algebra (High School level)	22	*5.2*
4	Intermediate Algebra (High School level)	16	*4.5*

TABLE TYF.1

Two-Year Colleges	2015
Full-time permanent faculty	8314
SE	*839.5*
Full-time continuing faculty	1221
SE	*267.9*
Other full-time faculty	266
SE	*73.3*
Part-time faculty paid by TYC	17888
SE	*1908.8*
Part-time, paid by third party	2359
SE	*528.2*

TABLE TYF.2

	Teaching assignment in weekly contact hours					
	<10	10 to 12	13 to 15	16 to 18	19 to 21	>21
Percentage of two-year colleges	3	10	68	8	6	5
SE	*2.2*	*5.0*	*5.1*	*2.7*	*2.4*	*1.5*

Full-time Permanent Faculty	Estimate	*SE*
A. Average weekly contact hours:	18	*1.8*
B. Percentage who teach extra hours for extra pay at their own two-year college:	74	*3.0*
C. Percentage teaching 1-3 extra hours for extra pay:	38	*2.7*
D. Percentage teaching 4-6 extra hours for extra pay:	39	*2.3*
E. Percentage teaching 7 or more extra hours for extra pay:	23	*2.1*
Part-time Faculty		
F. Percentage who teach 6 or more hours weekly:	64	*2.1*
G. Percentage of two-year colleges requiring part-time faculty to hold office hours:	29	*6.1*

TABLE TYF.3	
Number no longer part of 2015-2016 faculty	612
SE	*131.5*
Total full-time permanent faculty, fall 2015	8314
SE	*839.5*

TABLE TYF.4	Percentage of full-time permanent faculty
Highest degree	2015
Doctorate	15
SE	*1.5*
Master's	80
SE	*2.9*
Bachelor's	5
SE	*2.5*
Number of full-time permanent faculty	8314
SE	*839.5*

TABLE TYF.5	Percentage having as highest degree			
Field of degree	Doctorate	Master's	Bachelors	Total Percent in Field
Mathematics	9	60	4	73
SE	*1.2*	*2.7*	*2.2*	*2.3*
Statistics	2	3	0	5
SE	*1.2*	*0.5*	*0.1*	*1.4*
Mathematics Education	2	11	0	13
SE	*0.5*	*1.5*	*0.1*	*1.7*
Other fields	2	6	0	9
SE	*0.5*	*1.0*	*0.3*	*1.1*
Total Percentage by highest degree	15	80	5	100
SE	*1.5*	*2.9*	*2.5*	0.0

TABLE TYF.6	Percentage of part-time faculty
Highest degree	2015
Doctorate	7
SE	*0.8*
Master's	76.0
SE	*2.8*
Bachelor's	17.0
SE	*2.9*
Total	100%
SE	
Number of part-time faculty	20247
SE	*2182.9*

TABLE TYF.7	Percentage having as highest degree			
Field of degree	Doctorate	Master's	Bachelors	Total Percent in Field
Mathematics	4	45	8	58
SE	*0.7*	*3.6*	*1.6*	*3.9*
Mathematics Education	1	16	3	19
SE	*0.3*	*2.0*	*1.1*	*2.2*
Statistics	0	3	0	3
SE	*0.1*	*0.7*	*0.1*	*0.7*
Other fields	2	12	6	19
SE	*0.4*	*2.1*	*1.3*	*2.7*
Total Percentage by highest degree	7	76	17	100%
SE	*0.8*	*2.8*	*2.9*	*0.0*

TABLE TYF.8	Estimate	*SE*
Men	3969	*402.70*
	48%	*2.0%*
Women	4345	*475.50*
	52%	*2.0%*
Total	8314	*839.50*
	100%	

TABLE TYF.9	Percentage of	
	Full-time permanent faculty	Part-time faculty
Men	48	47%
SE	*2.0%*	*1.7%*
Women	52	53%
SE	*2.0%*	*1.7%*
Total	100%	100%
SE		
Total Number	8314	17888
SE	*839.5*	*1908.8*

TABLE TYF.10	2015
Percentage of ethnic minorities among full-time permanent faculty	23%
SE	*2.2%*
Number of full-time permanent ethnic minority faculty	1876
SE	*289.3*
Number of full-time permanent faculty	8314
SE	*984.8*

TABLE TYF.11	Percentage of full-time permanent faculty	
Ethnic Group	2015	*SE*
American Indian/Eskimo/Aleut	0	*0.1*
Asian/Pacific Islander	9	*1.1*
Black (non-Hispanic)	6	*0.9*
Mexican American/Puerto Rican/ other Hispanic	6	*1.4*
White (non-Hispanic)	75	*4.1*
Status unknown	3	*1.0*
Number of full-time permanent faculty	*8314*	*840*

TABLE TYF.12			
Ethnic Group	Number of full-time permanent faculty	Percentage of ethnic group in full-time permanent faculty	Percentage of women in ethnic group
American Indian, Alaskan Native	27	0	18
SE	*10.2*	*0.1*	*26.2*
Asian/Pacific Islander	754	9	27
SE	*110.8*	*1.1*	*7.2*
Black or African American (non-Hispanic)	525	6	41
SE	*80.4*	*0.9*	*7.6*
Mexican American,Puerto Rican or other Hispanic	515	6	33
SE	*124.9*	*1.4*	*9.7*
White (non-Hispanic)	6202	75	42
SE	*597.6*	*4.1*	*2.7*
Status not known or other	291	3	35
SE	*80.8*	*1.0*	*13.7*
Total	8314	100%	52
SE	*839.5*	*0.0*	*1.6*

TABLE TYF.13	Percentage among	
Ethnic Group	All full-time permanent faculty	Full-time permanent faculty under age 40
Ethnic Minorities	23%	26%
SE	*0.0*	*0.0*
White (non-Hispanic)	74%	72%
SE	*0.0*	*0.0*
Unknown	4%	2%
SE	*0.0*	*0.0*
Total	100%	100%
SE		
Number	8314	2045
SE	*839.5*	*292.1*

TABLE TYF.14	2015
Percentage of ethnic minorities among part-time faculty	20
SE	*1.4*
Number of part-time faculty	17888
SE	*1908.8*

TABLE TYF.15		Percentage of	
Ethnic Group	Number of part-time faculty	Ethnic group among all part-time faculty	Women within ethnic group
American Indian, Alaskan Native	46	0	80
SE	*29.4*	*0.2*	*34.3*
Asian/Pacific Islander	1341	7	49
SE	*284.1*	*1.3*	*4.4*
Black or African American (non-Hispanic)	1009	6	41
SE	*187.8*	*1.0*	*6.1*
Mexican American,Puerto Rican or other Hispanic	1073	6	42
SE	*258.1*	*1.2*	*2.8*
White (non-Hispanic)	12531	70	55
SE	*1413.9*	*2.8*	*1.9*
Status not known or other	1888	11	59
SE	*502.7*	*2.6*	*7.0*
Total	17888	100%	53
SE	*1908.8*	*0.0*	*1.7*

TABLE TYF.16				
	Percentage of full-time permanent faculty		Number of full-time permanent faculty	
Age	2015	*SE*	2015	*SE*
<30	4	*1.2*	363	*104.6*
30-34	6	*1.1*	529	*100.8*
35-39	14	*1.6*	1153	*177.6*
40-44	14	*1.7*	1159	*182.9*
45-49	18	*1.9*	1479	*229.5*
50-54	16	*1.8*	1357	*219.6*
55-59	13	*1.7*	1055	*157.0*
>59	15	*1.3*	1219	*152.9*
Total	100%		8314	*839.5*

TABLE TYF.17						
	Percentage of full-time permanent faculty				Percentage of women in age group	*SE*
Age	Women	*SE*	Men	*SE*		
<35	6	*0.2*	5	*0.2*	56	*1.6*
35-44	14	*0.4*	14	*0.5*	50	*1.6*
45-54	19	*0.6*	14	*0.5*	58	*1.5*
>54	13	*0.4*	15	*0.5*	46	*1.6*
Total	52	*1.6*	48	*1.6*		

TABLE TYF.18		
Percentage of new faculty from:	2015	*SE*
A. Graduate School	37	*7.4*
B. Teaching in a four-year college or university	4	*1.9*
C. Teaching in another two-year college	19	*5.4*
D. Teaching in a secondary school	1	*1.0*
E. Part-time or full-time temporary employment at the same college	26	*5.5*
F. Nonacademic employment	1	*0.8*
G. Unemployed	4	*4.0*
F. Unknown	9	*4.7*
Total	100%	*100.0%*
Total Number Hired	451	*82.7*

TABLE TYF.19	Percentage of New Hires	
Highest Degree	2015-2016	*SE*
Doctorate	9	*3.2*
Master's	87	*4.2*
Bachelor's	0	*0.0*
Unknown	4	*2.6*
Total	100%	*0.0*

TABLE TYF.20	Percentage of new hires		Percentage of women in ethnic group for 2015-2016 new hires	
Ethnic Group	2015-2016	*SE*	2015-2016	*SE*
American Indian	0	*0.0*	na	*na*
Asian/Pacific Islander	4	*1.8*	11	*12.1*
Black or Arican American (non-Hispanic)	2	*1.5*	54	*59.0*
Mexican Americank, Puerto Rican, or other Hispanic	3	*2.2*	33	*64.0*
White (non-Hispanic)	82	*4.9*	63	*7.3*
Other	3	*2.0*	33	*29.1*
Unknown	5	*2.5*	0	*0.0*
Percentage of women among all new hires	55	*6.9*		

TABLE TYF.21	Percentage of two-year colleges in fall 2015	*SE*
Colleges that require teaching evaluations for all full-time faculty	100	*0.0*
Colleges that require teaching evaluations for all part-time faculty	98	*1.1*

TABLE TYF.22	Percentage of programs using evaluation method for			
Method of evaluating teaching	Part-time faculty	*SE*	Full-time faculty	*SE*
A. Observation of classes by other faculty	64	*4.6*	75	*5.0*
B. Observation of classes by division head (if different from chair) or other administrator	62	*5.5*	45	*5.3*
C. Evaluation forms completed by students	94	*2.7*	95	*2.7*
D. Evaluation of written course material such as lesson plans, syllabus, or exams	57	*6.2*	53	*6.9*
E. Self-evaluation such as teaching portfolios	62	*5.5*	23	*4.2*
F. Written Peer Evaluations	34	*5.2*	21	*4.8*
G. Other methods	18	*5.7*	9	*4.1*

TABLE TYF.23		
Faculty Development	Fall 2015	*SE*
Percentage of institutions requiring continuing education or professional development for full-time permanent faculty	82	*3.6*
How Faculty Meet Professional Development Requirements	Percentage of permanent faculty in fall 2015	*SE*
A. Activities provided by employer	62	*1.6*
B. Activities provided by professional associations	33	*1.6*
C. Publishing books or research or expository papers	3	*0.7*
D. Continuing graduate education	3	*0.4*

TABLE TYF.24	Percentage of program heads classifying problem as major	
Problem	2015	*SE*
A. Maintaining vitality of faculty	7	*3.7*
B. Dual-enrollment courses	7	*3.1*
C. Staffing statistics courses	5	*2.3*
D. Students don't understand demands of college work	62	*4.9*
E. Need to use part-time faculty for too many courses	15	*3.4*
F. Faculty salaries too low	39	*6.8*
G. Class sizes too large	5	*2.3*
H. Low student motivation	57	*8.1*
I. Too many students needing remediation	64	*5.3*
J. Lack of student progress from developmental to advanced courses	36	*5.5*
K. Low success rate in transfer-level courses	14	*3.5*
L. Too few students who intend to transfer actually do	8	*2.0*
M. Inadequate travel funds for faculty	25	*4.3*
N. Inadequate classroom facilities for use of technology	4	*1.6*
O. Inadequate computer facilities for part-time faculty use	7	*1.8*
P. Inadequate computer facilities for student services	6	*1.7*
Q. Heavy classroom duties prevent personal & teaching enrichment by faculty	13	*3.5*
R. Coordinating mathematics courses with high schools	21	*5.1*
S. Lack of curricular flexibility because of transfer rules	2	*0.8*
T. Other barriers than inhibit curricular changes	7	*3.0*
U. Maintaining high and consistent expectations across sections	8	*3.0*
V. High cost of textbooks	54	*5.3*
W. Lack of flexibility in curricular redesign	4	*2.1*
X. Maintaining common standards between distance learning and related courses	2	*0.9*
Y. Use of distance education	4	*2.9*

TABLE TYF.25	Percentage of program heads classifying problems as					
Problem	minor or no problem	*SE*	somewhat of a problem	*SE*	major problem	*SE*
A. Maintaining vitality of faculty	60	*6.7*	33	*5.3*	7	*3.7*
B. Dual-enrollment courses	57	*4.1*	36	*4.7*	7	*3.1*
C. Staffing statistics courses	63	*4.0*	31	*4.1*	5	*2.3*
D. Students don't understand demands of college work	7	*3.2*	31	*4.7*	62	*4.9*
E. Need to use part-time faculty for too many courses	47	*5.5*	38	*3.7*	15	*3.4*
F. Faculty salaries too low	22	*4.8*	39	*6.1*	39	*6.8*
G. Class sizes too large	70	*3.4*	24	*3.1*	5	*2.3*
H. Low student motivation	9	*3.6*	34	*5.9*	57	*8.1*
I. Too many students needing remediation	2	*0.8*	33	*5.3*	64	*5.3*
J. Lack of student progress from developmental to advanced courses	15	*4.2*	48	*4.2*	36	*5.5*
K. Low success rate in transfer-level courses	32	*5.0*	54	*5.3*	14	*3.5*
L. Too few students who intend to transfer actually do	47	*5.9*	45	*5.8*	8	*2.0*
M. Inadequate travel funds for faculty	44	*4.8*	31	*3.1*	25	*4.3*
N. Inadequate classroom facilities for use of technology	70	*4.9*	26	*5.0*	4	*1.6*
O. Inadequate computer facilities for part-time faculty use	63	*4.4*	31	*4.4*	7	*1.8*
P. Inadequate computer facilities for student services	70	*4.9*	24	*4.9*	6	*1.7*
Q. Heavy classroom duties prevent personal & teaching enrichment by faculty	43	*4.6*	43	*4.9*	13	*3.5*
R. Coordinating mathematics courses with high schools	28	*4.2*	52	*4.0*	21	*5.1*
S. Lack of curricular flexibility because of transfer rules	52	*4.8*	46	*4.7*	2	*0.8*
T. Other barriers than inhibit curricul changes	61	*4.1*	32	*4.2*	7	*3.0*
U. Maintaining high and consistent expectations across sections	48	*5.2*	44	*5.9*	8	*3.0*
V. High cost of textbooks	11	*3.2*	35	*4.9*	54	*5.3*
W. Lack of flexibility in curricular redesign	55	*6.2*	41	*6.4*	4	*2.1*
X. Maintaining common standards between distance learning and related courses	57	*6.4*	41	*6.4*	2	*0.9*
Y. Use of distance education	53	*6.4*	43	*7.6*	4	*2.9*

TABLE TYF.26	Percentage of Mathematics Programs	
Administrative structure	2015	*SE*
Mathematics Department	52	*5.4*
Mathematics and computer science	10	*2.7*
Mathematics and science	28	*5.0*
Other department or division structure	6	*2.4*
None of the above or unknown	4	*1.4*