

Academic Recruitment, Hiring, and Attrition during 2018–2019

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Each year in academic mathematical sciences departments around the United States, new full-time faculty are recruited, and a subset of those positions are filled. The hiring infuses into the faculty a new cohort of mathematical scientists actively engaged in research and teaching. At the same time, a segment is removed from the population of mathematical scientists by way of faculty changing jobs, retirement, and death. This report provides a snapshot of that process to aid in understanding the status of such variables as: hiring rates, gender distribution, position type, and prior experience. Also, the report provides historical context to aid the reader in discerning trends and patterns. For further details, including all tables generated to prepare this report, please see www.ams.org/annual-survey.

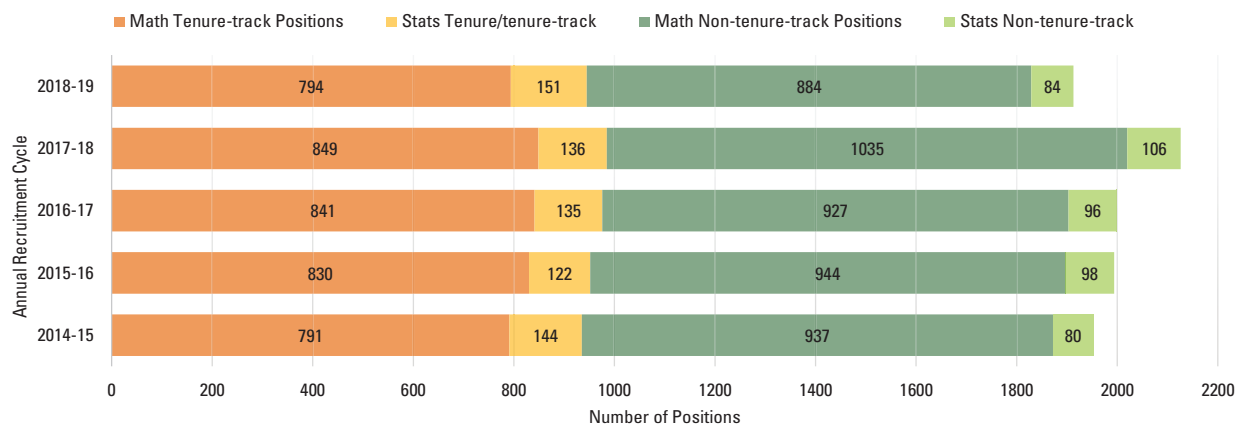
A total of 634 mathematical sciences departments were in the frame for this Recruitment, Hiring, and Attrition survey. This report is based on the completed questionnaires

received from the 310 departments that reported recruiting to fill doctoral tenure-track and non-tenure-track positions during the academic year 2018–19 for employment beginning in the fall of 2018.

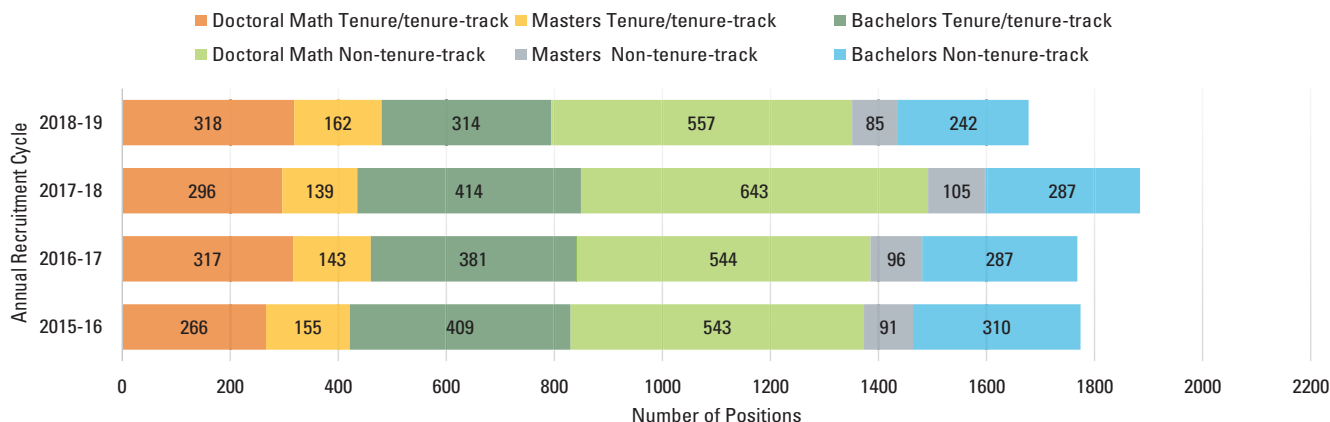
Overview of Recruitment

During the 2018–19 academic year, the estimated number of full-time positions under recruitment in mathematical and statistical sciences departments was 1,913 (SE = 69). This figure breaks down as follows: 794 tenure-track math positions, 884 non-tenure-track math positions, 151 tenure-track stats positions, and 84 non-tenure-track stats positions. See Figure R.1 for comparisons with earlier years. In the period from 2014 to 2019, the overall percentage of positions under recruitment that were tenure-track ranged from 46% to 49%, with the highest percentages in 2014–15 and 2018–19 of this range of time.

Figure R.1. Positions Under Recruitment in Mathematical Sciences



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Figure R.2. Positions Under Recruitment in Mathematics Departments by Highest Mathematical Sciences Degree Offered


- Overall features in the 2018–19 cycle:
 - The estimated number of positions under recruitment was 1,913; this figure represents a 10% decrease from the 2017–18 estimate of 2,126 positions.
 - Women accounted for 34% of those hired, up from 31% in 2017–18.
 - Since 2009–2010 recruitment has increased 65% in all Mathematical Sciences, 62% in Math, and 82% in Stats.
- Tenure-track positions under recruitment:
 - The estimated number of open tenure-track positions was 945 down 4% from the 2017–18 estimate of 985.
 - 49% (945) of all positions under recruitment were tenure-track. Of these 945 positions, all were open to new PhDs, and 26% (246) were potentially at the rank of associate/full professor.
- Non-tenure-track positions under recruitment:
 - Non-tenure-track positions decreased 15% overall, to 968 from 1,141 in 2017–18.
 - 51% (968) of all positions under recruitment were non-tenure-track.

In Math the number of positions under recruitment (1,678) in 2018–19 was down 11% from the previous year (1,884). See Figure R.2 for a longer-term comparison. Over the period since 2008–09 recruitment has increased in both Doctoral departments and Masters departments by 64% and 43%, respectively, and decreased in Bachelors departments by 26%. In the same ten-year period, the net number of mathematics positions under recruitment has decreased by 11%.

In Stats, the number of positions under recruitment in 2018–19 was 235, essentially the same as in 2017–18.

Positions Filled

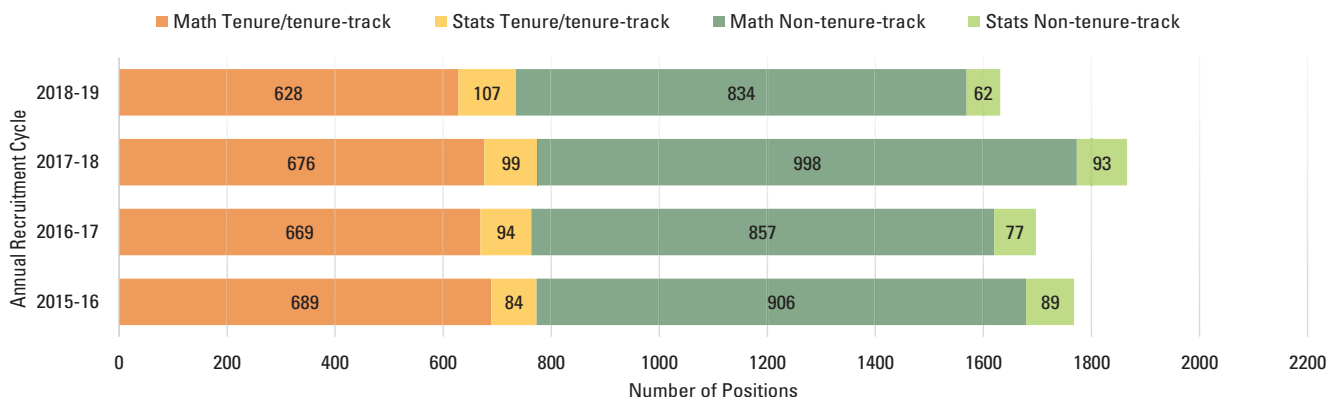
A total of 1,631 full-time positions in Mathematical and Statistical Sciences were filled during the 2018–19 academic

cycle, 1,462 in Mathematics Departments and 169 in Statistics or Biostatistics. Figure F.1 gives a breakdown for the most recent four years. The total for Math is down 10% from the 12-year high in 2007–08 cycle of 1,816 filled. For Stats, the number of filled positions is up 37% from the 2007–08 estimate of 123. One interesting feature implicit in these data is that the success rate for filling mathematical sciences tenure-track positions over the period 2013–19 is about 80%, whereas the success rate for non-tenure-track is about 95%.

Figure F.2 gives a breakdown on hiring by gender and department grouping. Percentages generally are obtained by comparison with Figure R.1. Here are further highlights and comparisons:

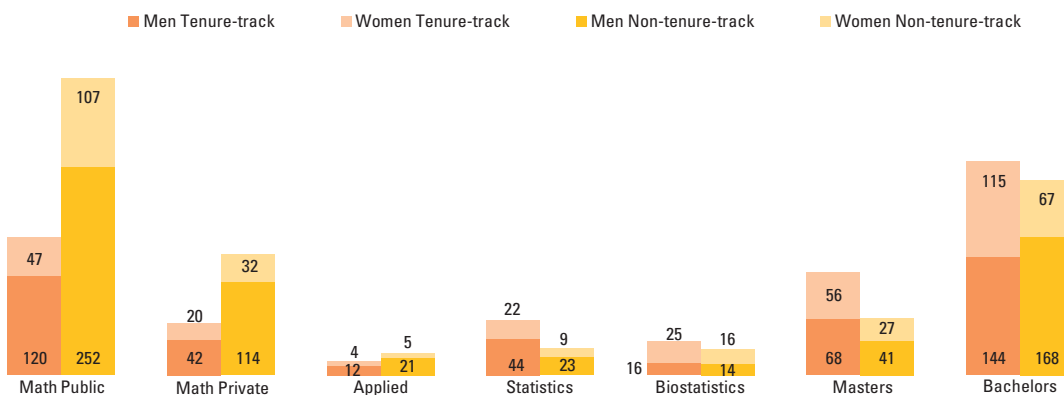
- Overall features of hires in mathematical sciences:
 - Women hold 34% (552) of positions filled.
 - Of all hires, 45% (735) were tenure-track; women constitute 39% (289) of these.
 - Of all hires, 55% (896) were non-tenure-track; women constitute 29% (263) of these.
- Math and Stats breakdown:
 - In Math overall, 1,397 of 1,678 positions (83%) were filled; 32% of Math positions filled were by women.
 - In Stats, 163 of 235 positions (69%) were filled; 42% of Stats positions filled were by women.
- Tenure-track hires in mathematical sciences:
 - Of the 945 tenure-track positions under recruitment, 78% (735) were filled.
 - Of tenure-track positions filled, 72% (526) were filled by doctoral faculty who are not new PhDs. In comparison with 2017–18, all groups reported increases in tenure-track hires of doctoral faculty except Math Public Large (↓22%), Math Public Small (↓21%), Applied Math (↓6%), and Bachelors (↓20%).
 - Of the 209 (28%) of tenure-track hires who were new PhDs, 50% were women.

Figure F.1. Positions Filled in Mathematical Sciences



- Of tenure-track hires, 18% (123) had a non-tenure-track position in 2017–18; of these individuals, 30% were women.
- Of tenure-track hires, 32% (236) held a postdoc in 2017–18, and 32% of these postdocs were women.
- Non-tenure-track hires:
 - Of the 968 non-tenure-track positions under recruitment, 93% were filled. In comparison to 2017–18, all groups reported decreased hiring of non-tenure-track faculty except Math Public Large (↑2%) and Applied Math (↑24%).
 - Of non-tenure-track hires, 38% (341) were filled by PhD faculty who were not new PhDs; 25% of these doctoral faculty hires were women.
 - Of non-tenure-track hires, 92% (825) were PhDs; 59% of these PhDs were new PhDs and 29% of these were women.
 - Of non-tenure-track hires, 8% (71) were filled by non-doctoral faculty; 51% of these non-doctoral hires were women. Thirty-four percent of these non-doctoral, non-tenure-track hires were in Bachelors departments.
- Of non-tenure-track hires, 19% (168) were temporary (one-year); 22% of these temporary hires were women. Sixty-two percent of all temporary hires were in Bachelors departments.
- Of non-tenure-track hires, 43% (389) were in postdoctoral positions; 30% of these postdocs were women.
- Women hires (see Figure F.2):
 - Of all hires, 34% (552) were women; of these women, Bachelors departments hired 37%, and Doctoral Math departments hired 28%.
 - In the Doctoral Math Group, women hires decreased by 9% to 215.
 - All groups reported increases in the number of women hires over 2017–18 except Math Public Medium (↓5%), Math Private Small (↓47%), Applied Math (↓47%), Statistics (↓3%), and Bachelors (↓19%).
 - The number of women hired into tenure-track positions increased 25% to 289 from 232; the number hired into non-tenure-track positions increased by 22% to 353.
 - Women accounted for 39% of all tenure-track and 29% of all non-tenure track hires; in 2017–18 these percentages were, respectively, 30% and 32%.

Figure F.2. Gender of Tenure-track and Non-tenure-track Hires by Department Grouping, Fall 2018–19 Employment



ANNUAL SURVEY

Faculty Retirements and Deaths

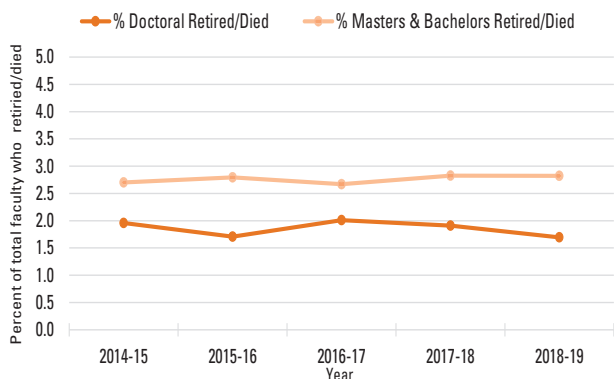
Figure A.1 shows the attrition from deaths and retirements among full-time faculty for the academic years 2014–15 through 2018–19. On average over the period shown, in doctoral departments the yearly percentage of retired or deceased faculty is about 1.7%, and in Masters and Bachelors departments that percentage is about 2.8%.

During the same period, in the respective groups, the percentages of tenured faculty who retired averaged 3.4% for Doctoral Math departments, 4.9% for Bachelors and Masters, and 3.9% for Stats. As reported in previous years, departments continue to report the majority of those retiring as members of the tenured faculty.

Here are a few other highlights from the attrition data from the 2018–19 cycle:

- Overall retirements by tenured faculty decreased to 450 from 531 in 2017–18.
- Deaths and retirements decreased to 592 from 614 in 2017–18.
- Overall deaths and retirements break down by departmental grouping as follows:
 - 42% (246) were from Bachelors
 - 26% (156) were from Doctoral Math
 - 23% (138) were from Masters
 - 9% (52) were from Stat

Figure A.1. Full-time Faculty Retired/Deceased Percentage*



* The percentage of full-time faculty who died or retired is the number of faculty who died or retired at some point during the academic year (September 1 through August 31) divided by the number of full-time faculty at the start of the academic year.

Faculty Departures

Departments also reported an estimated 378 full-time faculty left their department for employment elsewhere. Seventy-eight percent of these individuals took another academic position with a different department or institution, 16% took employment in Business, Industry, and Government (BIG), and 6% took positions in secondary education or a different sector. Of the positions vacated, 37% were postdocs, 22% were tenured, and 41% were tenure-eligible.

Department Groupings

In this report, *Mathematical and Statistical Sciences* departments are those in four-year institutions in the US that refer to themselves with a name that incorporates (with a few exceptions) “Mathematics” or “Statistics” in some form. For instance, the term includes, but is not limited to, departments of “Mathematics,” “Mathematical Sciences,” “Mathematics and Statistics,” “Mathematics and Computer Science,” “Applied Mathematics,” “Statistics,” and “Biostatistics.” Also, *Mathematics (Math)* refers to departments that (with exceptions) have “mathematics” in the name; *Stat/Biostat* refers to departments that incorporate (again, with exceptions) “statistics” or “biostatistics” in the name but do not use “mathematics.”

Listings of the actual departments that comprise these groups are available on the AMS website at www.ams.org/annual-survey/groupings.

| A department is in Group... | ...when its subject area, highest degree offered, and PhD production rate* p |
|-----------------------------|--|
| Math Public Large | Math PhD, $7.0 \leq p$ |
| Math Public Medium | Math PhD, $3.9 \leq p < 7.0$ |
| Math Public Small | Math PhD, $p < 3.9$ |
| Math Private Large | Math PhD, $3.9 \leq p$ |
| Math Private Small | Math PhD, $p < 3.9$ |
| Applied Math | Applied mathematics, PhD |
| Statistics | Statistics, PhD |
| Biostatistics | Biostatistics, PhD |
| Masters | Math, master's |
| Bachelors | Math, bachelor's |
| Doctoral Math | Math Public, Math Private, & Applied Math |
| Stat/Biostat or Stats | Statistics & Biostatistics |
| Math | All groups except Statistics & Biostatistics |

* The doctorate-granting departments of mathematics PhD production rates are based on the size of the PhD program as reflected in the number of PhDs awarded (as reported by departments to the Annual Survey) during the ten years from July 1, 2000, through June 30, 2010. Since there are some departments that have not reported their PhDs for every Annual Survey during this time, the average annual number of PhDs awarded was used to compare the departments.

Survey Response Rates by Grouping

Recruitment, Hiring, and Attrition Response Rates

| Group | Number | Percent |
|--------------------|--------------|---------|
| Math Public Large | 20 of 26 | 76% |
| Math Public Medium | 26 of 40 | 65% |
| Math Public Small | 50 of 73 | 68% |
| Math Private Large | 12 of 24 | 50% |
| Math Private Small | 14 of 28 | 50% |
| Applied Math | 14 of 23* | 61% |
| Statistics | 33 of 61 | 54% |
| Biostatistics | 20 of 45* | 44% |
| Masters | 78 of 178 | 45% |
| Bachelors | 367 of 1,007 | 36% |
| Total | 634 of 1,505 | 42% |

*The populations for Applied Math and Biostatistics are slightly less than for the Doctorates Granted Survey because some programs do not formally "house" faculty, teach undergraduate courses, or award undergraduate degrees.

Acknowledgments

The Annual Survey attempts to provide an accurate appraisal and analysis of various aspects of the academic mathematical sciences scene for the use and benefit of the community and for filling the information needs of the professional organizations. Every year, college and university departments in the United States are invited to respond. The Annual Survey relies heavily on the conscientious efforts of the dedicated staff members of these departments for the quality of its information. On behalf of the Joint Data Committee and the Annual Survey Staff, we thank the many secretarial and administrative staff members in the mathematical sciences departments for their cooperation and assistance in responding to the survey questionnaires.

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