

1116-VR-2696 **Ziyue Guo*** (zoeyguo@gmail.com), 2582 South Road, Marlboro, VT 05344. *Using 3D-Printing in Teaching Multi-variable Calculus*. Preliminary report.

In this talk, we present student activities in a multi-variable calculus course using a 3D-printer and Mathematica to create surfaces that demonstrate limits and differentiability. We start with classic examples of surfaces that are not differentiable at the origin, such as the graph for $f(x, y) = (xy^2)/(x^2 + y^4)$ and the graph for $f(x, y) = (xy^2)/(x^2 + y^2)$. By working together on the Mathematica code, students practice using polar coordinates and observe the difference between pathological limits, continuity, and differentiability. Later in the course, students are also assigned a project to design a surface that is smooth on its domain except at one point, and 3D-print the surface with its tangent plane at a differentiable point. (Received September 22, 2015)