MAE 289A: Mathematical Analysis for Applications
Time and Location: M/W 5:00–6:20, WLH 2113

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Description: This course will involve an exploration of the area generally referred to as Mathematical Analysis (or Advanced Calculus). We will begin by looking at functions of a single variable, and later revisit some of the same topics in the more general settings of $I\!R^n$ and other metric spaces. In addition to becoming familiar with some of the topics of Mathematical Analysis, you will also develop the skill of proving results in a mathematically rigorous manner. This will prove invaluable to any career requiring deep thinking on difficult problems. It will also be essential for anyone considering an academic-grade research career in a mathematically intensive field, such as many within Mechanical and Aerospace Engineering.

This will be a stand-alone course. Nonetheless, it is also envisioned as the first third of a sequence in analysis for MAE graduate students. Currently, the level of mathematics necessary for a successful path through much of the MAE graduate curriculum is above that with which students typically arrive. The goal of the sequence is to help bring you to the point where you can more easily handle the material in advanced courses within the program. In this first course, you will become familiar with mathematical tools that are ubiquitous in research. This will include deeper understanding of some concepts which you may have already encountered, including for example, open and closed sets, compactness, continuity, differentiability, convex sets and functions, transforms, Stokes Theorem, etc. As a side benefit, you will improve your ability to write a solid mathematical proof. These concepts and capabilities will also be essential for the next courses, Real and Functional Analysis, of the sequence.

Grading: The final course grade will be calculated as follows:
Homework: 75%
Take-home final: 25%

Textbook: Protter and Morrey, *A First Course in Real Analysis,* Second Edition.