Upper-Level Mathematics and Operations Research Courses

Spring Semester AYE2026

SA234 Data Wrangling and Visualization
SA302 Analysis of Naval Tactics
SA305 Linear Optimization
SA325 Cost Estimation
SA403 Graph and Network Algorithms
SA410 Applications of Search and Detection Theory
SA435 Decision Analysis

SM208 Data Science for Decision Making
SM212(P) Differential Equations
SM222 Differential Equations with Matrices
SM233 Introduction to Computational Mathematics with MATLAB
SM239 Probability and Statistics I
SM244 Discrete Math for Operations Research
SM263 Applied Linear Algebra
SM279 Multivariable Calculus
SM291 Fundamentals of Mathematics
SM316 Engineering Mathematics with Probability & Statistics
SM317 Statistical Learning
SM332H Real Analysis II
SM342 Discrete Mathematics
SM350 Wargame Theory
SM361 Linear Algebra II
SM364 Introduction to Scientific Computing
SM411 Introduction to Complex Variables
SM450 Introduction to Differential Equations on Fractals

Course Descriptions

Course descriptions are available in the official course catalog:
https://www.usna.edu/MathDept/academics/Course_Catalog/index.php

(New) SM350 Wargame Theory

This course is centered around basic discrete mathematics, probability, and game theory. Students will encounter these topics three war games. Instead of covering a wide range of topics the focus here will be to study certain ideas from those mathematical areas in depth by applying them to these war games. Most of the course is theoretical. However, there are many components of the course and projects where mathematical coding skills will be very helpful.

Prerequisites: SM221 or SM223

(New) SM450 Introduction to Differential Equations on Fractals

Most mathematical models studied in a differential equations class and more assume that the underlying space is smooth. However, most objects in nature are rough, including trees, mountains, and coastlines. The area of fractal analysis deals with mathematical questions and models in which the underlying space is a fractal, which is at the polar extreme to smooth objects. However, the fractals that we study possess a very detailed structure called self-similarity that help define a self-similar energy and Laplacian on these objects. Thus, one can study diverse differential equations on fractals whose solutions might behave differently than the classical case. For example, if one could build a house in the shape of the Sierpinski gasket, then one would never hear her neighbors since the sound does not propagate in the Sierpinski gasket. While no real-life object is perfectly self-similar, the Army has been building fractal shaped antennas that help transmit signals safer at a longer distance. This course is a gentle introduction to this new and exciting new field of study.

Prerequisites: SM212 or SM222