Syllabus

Course coordinator: Asst. Prof. Robert M. Curry (rcurry@usna.edu)

Textbook: *Deterministic Operations Research*, by David Rader.

Course description: This course covers a range of advanced topics in mathematical programming. Topics include integer programming modeling, branch-and-bound methods, integer programming theory, and algorithms. Students will also learn to use a set-based modeling language for an advanced integer programming solver. Topics may vary with instructor.

Course objectives: By the end of this course, students will be able to

(i) creatively and critically problem solve;

(ii) successfully collaborate in groups;

(iii) identify, model, and solve (using software) a variety of real-world problems that can be formulated as integer linear programs;

(iv) use Microsoft Excel and Python to develop a spreadsheet interface for a linked optimization model;

(v) understand the theoretical and computational difficulty of integer linear optimization, along with associated theoretical and algorithmic considerations and algorithms.

Approximate weekly course schedule:

Week	Topic
1	Mathematical optimization modeling and software review.
2	Network Models
3	Shortest Path Models
4	Maximum Flow Models
5	Fixed-charge Models, Set-covering, & Logical Constraints
6	Review & *Exam #1*
7	Python/Pyomo Resources
8	Minimum Spanning Tree Problem
9	Traveling Salesperson Problem (TSP)
10	Vehicle Routing Problems & Subtour-elimination Constraints.
11	Facility Location Models