

## SYLLABUS MATH 456 - FALL 2019

This course is an introduction to mathematical modeling. The main goal of the class is to learn how to translate real-world problems into quantitative terms for interpretation, suggestions of improvement and future predictions. Since this is too broad of a topic for one semester, this class will focus on linear and integer programming to study real world problems that affect real people. The course will culminate in a final modeling project that will involve optimizing the logistics of the Valley Bikeshare service.

**Class:**

MWF 12:20pm-1:10pm in LGRT 219

**Instructor:**

Dr. Annie Raymond  
raymond@math.umass.edu  
LGRT 1116

**TA:**

Daniel Gallagher  
gallagher@math.umass.edu  
LGRT 1323H

**Office hours:**

Monday 1:15pm-2:15pm in Annie's office  
Friday 11:00am-noon in Annie's office  
TBA in Dan's office If you can't make it then, email me for an appointment.

**Topics to be covered:**

linear programming, duality, sensitivity analysis, geometry of linear programming, integer programming, non-linear programming, real-world optimization with data from Valley BikeShare

**Textbook:**

There are no required textbooks. For additional information, I recommend the following textbooks:

*Introduction to Linear Optimization* by Bertsimas and Tsitsiklis  
*Linear Programming* by Chvátal

**Grading:**

There will be five problem sets every week for the first section of the course that will be posted on moodle. Problem sets will be due in class at the beginning of lecture. A midterm will end the first section of the course. For the second section of the course, you will work on a project with two other students. At that point, homework will be related to your project to help you stay on track. The grade will be divided as follows: 15% for the five problem sets, 20% for the midterm, 12% for the six project homework, 13% for the project presentation, 20% for the project report, and 20% class participation\* (which includes attending classes and engaging in group work in a positive way).

\*Should you miss a class for any unofficial reason, you can make up for half of the points by contacting Annie to figure out what work was done during that class, and sending her that work before the next class.

**Midterm:**

October 11 in class

**Project presentations:**

December 2, 4, 6, 9 and 11 in class

**Project report:**

Due by email on December 16 at noon