SPRING, 2018
Math 450. Mathematical Modeling

When and Where: Mon., Wed., and Fr., 11:15 - 12:05 pm, 351 Willard
Course Web page: http://www.math.psu.edu/treluga/450
Instructor: Timothy Reluga, treluga@math.psu.edu
Office: 424 McAllister
Office hours: Mondays, 3:30-4:30 or by appointment.

Course Description: The purpose of the course is to introduce mathematical modeling, i.e., the construction of mathematical structures to describe parts of our world. The course will explore mathematical ideas and tools used to study the natural world. Particular emphasis will be placed on open-ended problems, the process of creating a mathematical model starting from a physical, biological, or social scenarios, and then developing the associated mathematical theory. While solution-techniques will be discussed, they are not the emphasis of the course.

Prerequisite: MATH 140 and 141 (calculus), and 220 (matrix algebra) or 250 (introductory differential equations). A little programming experience will help, as will a working knowledge complex numbers, but are not required.

Grading: Grades will be awarded based on regular homework assignments (50%), reading quizzes and class participation (5%), projects (15%), a midterm exam (10%), and a final exam (20%). Course grades will be assigned out of 100 points as follows:

A 100-95 A- 95-90 B+ 90-87 B 87-83
B- 83-80 C+ 80-77 C 77-70 D 70-60 F 60-0

Required Textbooks: Online course notes and *Signal+Noise* by Nate Silver.

Suggested Supplemental Textbooks: *A primer on scientific programming with python* by Hans Langtangen for reference.

Homework: Homework's will generally consist of problem sets, and programming assignments. Problem sets will be collected on Wednesday's in class, and will be graded by me. Programming assignments should be submitted through the appropriate drop-box on Canvas (https://psu.instructure.com/)

Projects: Students will be required to two projects during the course. The first project, done with an assigned partner, will be a research report on one of several current or historical conversations in applied mathematics. The second will be a modelling project of your choice (with instructor approval) and will require a written report and an oral presentation at the end of the course.

Software: No prior experience with programming is required -- we'll learn everything we need in-class as we go. This course will incorporate computer programming of models using the python computer language. I suggest installing Canopy (https://www.enthought.com/products/canopy/), which is free for academic use and encapsulates all the standard python modules for easy install. Download, install, and try it out, first chance you get. You could also use the Anaconda distribution (https://store.continuum.io/cshop/anaconda).

Academic Integrity:

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the Universitys Code of Conduct states that all students should act with personal integrity, respect other students dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

All Penn State and Eberly College of Science policies regarding academic integrity apply to this course. For details, see
http://www.science.psu.edu/academic/Integrity/index.html

Disability Accommodation:

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: See documentation guidelines (http://equity.psu.edu/sdr/guidelines). If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations. For further information, please visit http://equity.psu.edu/sdr/.

Counseling services:

Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

- Counseling and Psychological Services at University Park (CAPS) (http://studentaffairs.psu.edu/counseling/): 814-863-0395
- Counseling and Psychological Services at Commonwealth Campuses (http://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses/)
- Penn State Crisis Line (24 hours/7 days/week): 877-229-6400
- Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

Educational Equity and Bias Reporting:

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the Report Bias page (http://equity.psu.edu/reportbias/).