

# Mathematical Modeling Syllabus, Fall 2018

- INSTRUCTOR: Dr. Hundley

OFFICE: Olin 222

OFFICE HOURS: Mondays and Fridays by appointment (drop me an email). Tuesday I'll have office hours at 9AM, then Wednesdays at 3 and Thursdays at 1. My office hours are also posted online and on my office door.

If you can't meet during office hours, you may drop by any time my office door is open, or we can always arrange other times to meet (email is probably fastest way to get in touch with me).

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Class Webpage: <http://people.whitman.edu/~hundledr/courses/M350.html>

- **Text:** "Introduction to Empirical Modeling", in progress. The course notes will be distributed as we go, and are available on our class website (as they are distributed) or on CLEo.
- **Technology:** We'll be using Matlab extensively. We'll have some sporadic "Lab Days" where we'll meet in the computer lab to talk about Matlab specifics.
- **Grading Criteria.**

- HOMEWORK/LAB WORK:

Homework and lab work is extremely important for the class, and will be assigned daily and collected weekly. You are expected to produce your own solutions to all homework problems! There may be occasions when we do "group work", and even in those cases, each student should turn in their own copy of the work.

We'll discuss turning in solutions later (sometimes this can be done electronically). Collectively, homework will account for 25% of the overall grade.

- EXAMS:

We will have two midterms, one during week 5 (Friday, Sep 28), one at week 11 (Friday, Nov 9) and a final exam. They will all be weighted equally, and will take 75% of the overall grade. Some of these may have a take home (Matlab) component.

GRADING: Grading is done on a standard scale:

90-100%=A, 80-89%=B, 70-79%=C, 60-69%=D, 59 and below=F

I will use the plus/minus grading only sparingly in borderline cases.

- Help! I encourage you to come see me. If you can't make it during office hours, either email me if you have short questions, or make an appointment.

- Academic Honesty. Academic standards will be *strictly* adhered to as outlined in the College's policies. This means that cheating will not be tolerated. Looking at another student's exam or quiz (whether or not you mean to copy answers) while taking it will be considered cheating. *Please don't test this policy!* Students caught cheating for the first time will fail the exam or quiz during which the cheating took place, and the Dean of Students will be notified. Continuation of this behavior will lead to an automatic failing grade for the course, and may include other administrative action.
- If you have a learning disability, please let me know as soon as possible so that we can make alternative assessment methods. Please do not wait until the day of the exam!
- **General Discussion of Topics**

Mathematical modeling is the process by which we translate some physical process into mathematical statements. There are several ways of doing this- Some modeling classes are mostly statistics, some are mostly differential equations (or partial differential equations), and still others are physics-based. Most of this class will look at empirically driven models, or models that come from analyzing data.

The main methods of analysis come from Calculus, linear algebra and statistics. It will also be important for us to implement algorithms on the computer, so we'll use Matlab fairly extensively. Initially, we won't do a lot of programming, but you will need to be able to read and change some basic code.

First, we go to some simple statistical models, where we look at the  $n$  armed bandit, learn Matlab, then we'll look at "genetic algorithms".

We then go back into linear algebra, discuss some topics from statistics, and we'll look at some basic face recognition algorithms.

Once we've looked at building linear functions, we move to general nonlinear functions. We'll select from topics in Data Clustering, and Neural Networks.