MATH 105: APPLIED MODELING WITH CALCULUS
SPRING 2018 COURSE INFORMATION

Instructor
Heidi Goodson

Email hgoodson@haverford.edu (I don’t often check my email between the hours of 8pm-8am or on weekends, so please don’t expect a response until the next day.)

Class Times
MWF 10:30 – 11:30 in Sharpless Auditorium

Office Hours
My office is Hilles 209D. Please see Moodle for up-to-date office hours.

Textbook
Applied Calculus, 5th ed by Hughes-Hallett, et. al. (Wiley 2014). (Be sure that you have the latest, or 5th edition!) There is a copy of the book on reserve in the Science Library.

Calculators
Every student should have a scientific calculator available during class, quizzes, and exams (one that calculates exponents, logarithms, sines and cosines). Graphing calculators are NOT allowed on exams.

Course Content and Goals

This course is an introduction to the basic techniques of calculus, with a strong emphasis on applications. The first step in being able to apply mathematical techniques to real-world problems is the development of a mathematical representation of the problem, or “mathematical modeling,” and the concepts and techniques of mathematical modeling will play a central role in the course. Since most applications involve relationships among many variables, this course also introduces multivariable calculus techniques.

If you were placed in Math 118 (or Calculus II) or higher, you must confer with the instructor to see if this course is appropriate for you. In particular, you CANNOT enroll in this course if you have previous credit for any calculus course, or AP credit, on your college transcript. If you are undecided about whether to take the course, please talk to me about it!

Course Outline:

Functions (about 3 weeks), Derivatives (about 3 weeks), Optimization (about 1 week), Accumulation and Integration (about 1 week), Differential equations (about 2 weeks), Multivariable Functions and Optimization (about 2 weeks).

Coursework

You have to spend some energy and effort to see the beauty of math.

– Maryam Mirzakhani, 2014 Fields Medalist

Online Homework. There are online WebWork exercises due by 11:59pm on Mondays, starting on January 29 (the second week of class). The goal of the online assignments is to help you to test your understanding of
the basic ideas and procedures that form the foundation for the deeper ideas of the course. You can attempt the online homework as many times as you like until the due date, so you should (a) use it as a diagnostic tool and (b) keep trying until you get every question right!

You are allowed to ask me or your peers about the concepts of the online exercises, but you should answer the questions yourself. Each student may miss ONE WebWork assignment without penalty – or the lowest WebWork score will be dropped, if none are missed.

**Written Homework.** Written assignments, based on problems in the textbook, will be posted on Moodle and are due **Wednesdays at 5pm** outside my office (Hilles 209D). The written homework consists of problems that enable you to gain a deeper understanding of the class material and to improve your problem-solving skills.

In general, late homework will not be accepted; in exceptional circumstances, extensions may be granted, but only if they are requested **before** the day the assignment is due. Please talk to me as soon as possible if you are having a difficult time meeting a particular deadline. However, each student may miss ONE written assignment without penalty – or the lowest homework score will be dropped, if none are missed. You may collaborate on all of the homework problems. Please see the policy on collaboration below.

**Quizzes:** There will be short (10 minutes) weekly quizzes on Fridays (unless otherwise announced) to help you practice memory retrieval. Quiz problems will be similar to homework problems. I will drop your lowest quiz grade (which will include any missed quizzes).

**Participation.** Math is not a spectator sport! There are many ways to participate in this course, including: asking and answering questions in class, working with others both inside and outside of the classroom, and attending office hours. You must be up to date and prepared for class to participate effectively.

**Exams.** There will be two in-class exams and a three-hour, self-scheduled final exam. The in-class exams will be **Friday, February 16** and **Monday, March 26**

**Grading**

Your grade for the course is determined by:

- **Written Homework** 15%
- **Online Homework** 10%
- **Weekly Quizzes** 10%
- **Participation** 5%
- **Exams** 20% each

**Classroom Etiquette**

While in class, I ask that you not use phones, laptops, or other electronic devices for things unrelated to your learning in this course. In particular, please do not send or read text messages or email, browse Facebook, Tweet, etc. Doing so is distracting to you, to me, and to your fellow students. I will appreciate you respecting this request.

In order to support a flourishing mathematical community, our in-class discussions will focus on dialogue rather than monologue. You will each share your own ideas and ask questions of others. You will listen to each other and carefully consider each other’s ideas. In each class discussion, make sure you have heard from everyone in your group! That includes you!
Collaboration

Collaboration on homework is encouraged! However, you need to carefully balance learning with your fellow students and finding your own path through the material. For the written homework, you must follow the collaboration guidelines below. (Instructions in *italics* are not strictly required, but will help you in following the guidelines.)

1. When solving homework problems, you are not allowed to use outside materials (e.g. from the web) unless I give express permission.
2. You must indicate on your written homework who your collaborators are. (If you collaborate with different people on different problems, say so!)
3. Work on a problem by yourself until you have your own “idea” about the problem; after that, you may start collaborating. (A valuable idea can be as simple as a sense of why you are stuck!) *Use white paper for individual work.*
4. Keep your written collaborative work separate from your written individual work. The same applies when you discuss problems with us. *Use colored paper or a chalk board for collaborative work.*
5. Do the actual write-up of your homework assignment without your collaboration notes so as to reflect your own understanding of the problem. *Put colored paper away, be out of sight of any blackboard notes, and do your individual write-up on white paper.* If you cannot write the solution without referring to your collaboration notes, then you have not yet understood the solution. In that case, go back to step (3).

Note that the last guideline above means that while you are collaborating, you cannot be simultaneously working on the final draft of your problem set!

So as to ensure productive collaborations, you should not be working in groups larger than four people on any given problem at any given time. Two- or three-person groups are better than four. Large groups of people “working together” are not really working together.

Resources

**Office Hours.** My office hours are posted on Moodle. Please stop by office hours to ask questions! I have set aside this time specifically to help you learn and be successful in the course. If you are unable to make any of my office hours, please email me to set up an appointment.

**Math Question Center.** The Math Question Center is a place where you can go to discuss homework with your classmates and ask questions of student helpers. The MQC is in KINS H011 and is open Sunday–Thursday, 7–9 pm.

**Calculus Resource Center.** The Calculus Resource Center is open for drop-in tutoring for Math 105 on Monday and Tuesday nights, 9–11 pm, starting in the second week of classes. The CRC is located in the Office of Academic Resources, Stokes 118K.

**Support and Accommodations.** Haverford College is committed to supporting the learning process for all students. Please contact me as soon as possible if you are having difficulties in the course. There are also many resources on campus available to you as a student, including

- Office of Academic Resources [https://www.haverford.edu/oar](https://www.haverford.edu/oar)
- Office of Access and Disability Services [https://www.haverford.edu/ads](https://www.haverford.edu/ads)
- Counseling & Psychological Services [https://www.haverford.edu/caps](https://www.haverford.edu/caps)

If you think you may need accommodations in this course because of a disability, you should contact the Office of Access and Disability Services at [hc-ads@haverford.edu](mailto:hc-ads@haverford.edu). If you have already been approved to receive academic accommodations and would like to request accommodations in this course, please meet with me privately at the beginning of the semester (ideally within the first two weeks) with your verification letter.