

Math 351 Mathematical Modeling (2010 Spring)

Syllabus

Goals. The successful student will be able to apply mathematical methods to study phenomena and solve problems, synthesize mathematical techniques studied in other courses, and use the computer as a powerful computational aid. The course will focus on models involving functional relationships, optimization, and simulation.

Structure. Unlike most mathematics courses that present specific concepts and techniques in a logical progression, this course will be driven by complex and open-ended problems. Class time will be devoted to discussions of specific problems and models, the modeling process, and the necessary mathematics. Exercises will be assigned to ensure individual understanding of basic concepts and techniques. A significant proportion of your time will be devoted to three major projects, which will be completed by groups of one to three students.

Instructor. David Housman is an applied mathematician who has done research in game theory and mathematics education. He is often in his office. Feel free to stop by any time his office door is open, or contact him for an appointment. His office is SC 117, email address is dhousman@goshen.edu, web page is www.goshen.edu/~dhousman, office telephone is 574-535-7405, and home telephone is 574-875-0339.

Class. TR 2:00 – 3:15pm in SC 107. Sometimes, with advanced notice, we will meet in a computer lab. Class activities are an extremely important and integral part of the pedagogy for this course. Attendance and participation are expected.

Books. There is no textbook for this course. The Mathematics and Computer Science Reading Room (SC 105) and Moodle will contain relevant materials. The Good Library and my office shelves have a number of excellent books about mathematical modeling.

Software. *Maple* will be used extensively as a mathematical and computational tool. Although *Maple* is available on campus computers, you may wish to purchase a copy for use on your own personal computer. To do so, visit Maplesoft's webstore at <https://webstore.maplesoft.com>. To obtain a significant discount, use this promotion code: AP58384. The web site <http://www.maplesoft.com/academic/adoption/studentcenter> is a resource for answering questions you have about Maple.

Grade. Your grade will be based upon three group projects (60%), assignments (30%), and class participation (10%). An excellent, very good, good, or adequate display of ability will earn grades of A, B, C, and D, respectively.

Project Schedule. Project reports will be due and oral presentations will be made on February 9, March 23, and April 21 (during the scheduled final exam period 1:00-3:00pm).

Collaboration and Integrity. I encourage you to use all available resources in order to solve problems and come to an understanding of the underlying concepts. In particular, conversations with others and me can be an effective learning method. Since learning is the goal, please destroy any written materials produced during a conversation related to assignments. You will know your learning is complete when you are able to reproduce the arguments developed during a conversation. As a matter of personal and academic integrity, please acknowledge resources used. For example, you might write, "I discussed problem 2 with Sally, David provided some hints for problem 4, Joan read and critiqued my solution to problem 5, I read a solution to problem 6 in *Linear Algebra* by Johnson *et. al.*, and a group of us (Sally, Joan, Mark, and me) solved problems 7-9." For the purposes of this course, you do not need to acknowledge class as a resource used.

Roles. You and I share the responsibility to ensure that tasks and feedback actually facilitate learning and that evaluations are accurate and fair. Based upon my experience and training, I should establish course goals that are important and realistic, assign tasks that should facilitate learning, ensure that necessary resources for your learning are made available, and accept and respond to your assessments of the value of tasks assigned and resources provided. You should ensure that course goals are compatible with your personal goals, make a good-faith effort to complete assigned tasks, utilize available learning resources, and assess the value of tasks assigned and resources provided.

Mathematical Competition in Modeling. MCM is a contest where teams of three undergraduates use mathematical modeling to present their solutions to real world problems. Goshen College has fielded several teams over the years. This year the MCM will take place February 18-23, 2010. Although the MCM is challenging and demanding, students who have competed have said that the experience was well worth the lack of sleep. Most of the students who have competed have done so for the "fun of it." But it is also possible to have your efforts rewarded with 1 credit hour in Math 400. Details about the contest can be found at <http://www.comap.com/undergraduate/contests/>. Please let me know of your interest soon.