



GOSHEN COLLEGE
MATHEMATICS DEPARTMENT
MATH 351 MATHEMATICAL MODELING – SPRING 2018

Catalog Description	The modeling process, built around a study of applications from a variety of both social as well as natural sciences. A variety of mathematical and computing techniques will be employed including discrete structures, probability, calculus, differential equations and algorithms. Completion of modeling projects will be a major component of the course.
Learning Objectives	The student will <ol style="list-style-type: none">1. Apply the mathematical modeling process to study phenomena and solve problems;2. Use function, simulation, and optimization techniques adeptly;3. Use the computer as a powerful computational aid;4. Learn mathematics by reading, listening, exploring, and conversing in an effective manner;5. Explain mathematical reasoning through writing in a precise and articulate manner in both informal and formal settings; and6. Exhibit curiosity, playfulness, creativity, confidence, perseverance, interest in multiple perspectives, and a collaborative spirit.
Prerequisites	This is an upper-level mathematics course that requires mathematical maturity and computer programming competence. The catalog prerequisite of Math 213, 201, 321, or 323 is a proxy indicator for mathematical maturity. The catalog prerequisite of Programming I is a proxy indicator for computer programming competence. Unless you are unusually well prepared, you will be asked to rapidly assimilate unfamiliar mathematical and computational concepts and techniques.
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, SC 117, dhousman@goshen.edu, 574-535-7405, 574-612-7185 (cell). See office door or Moodle for availability.
Class	TR 8:00 – 9:15 AM 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.
Text	There is no text book for this course. The Mathematics and Computer Science Reading Room (SC 105) and Moodle will contain relevant materials. The Good Library, the Mathematics and Computer Science Reading Room, and my office shelves have a number of excellent books about mathematical modeling that students can borrow.
On-line	https://moodle.goshen.edu
Software	<i>Mathematica</i> and <i>CoCalc</i> will be used extensively as a mathematical and computational tool. Because of its expense, Goshen College no longer has a <i>Mathematica</i> site license. Instead, students in this class will receive a one semester rental for <i>Mathematica</i> and <i>CoCalc</i> .
Grading	Your grade will be based upon assignments (40%) and three group projects (60%). An excellent, very good, good, or adequate display of ability will earn grades of A, B, C, and D, respectively.
Assignments	Develop and verify your understanding of concepts and your ability to use a variety of techniques by completing exercises. While you may seek assistance and collaborate, each student must submit his or her own solutions.

Projects	Apply your knowledge and skills to model real-world phenomena. Project reports will be due and oral presentations will be made on September 25, November 6, and December 12 (during the scheduled final exam period 8:00 AM – 10:00 AM).
Due Date Policy	Assignments and projects can only be rescheduled or made up if (1) there is a serious medical problem, a death in the immediate family, or an irreconcilable conflict with another official Goshen College activity; (2) there is written documentation signed by proper authorities; and (3) the instructor is notified prior to the due date or as soon as possible afterwards.
Extra Credit	Receive extra credit toward your assignment grade by doing one or more of the following: (1) find errors in the text or posted course materials and describe the error; (2) attend a quantitative presentation (e.g., Science Speakers) or participate in a quantitatively based activity and describe in writing some interesting mathematical aspect of the presentation or activity; or (3) participate in a Career Networks event and describe your most important discovery. Turn in to the instructor a single piece of paper containing your description.
Tutoring Assistance	The Academic Success Center provides tutoring and writing support for free to all undergraduate students. Make an appointment at goshen.edu/asc . Tutoring will be available beginning Sunday, September 2, 2018. Unfortunately, there is no current student who has previously taken this course. Therefore, your best bet to receive assistance is to make use of David's office hours.
Disability Services	Goshen College is committed to providing all students equal access to programs and facilities. Students who need accommodations based on disability should contact the Director of the Academic Success Center (ASC). Students must register with ASC before faculty are required to provide reasonable accommodations. For more information or to register, please contact the Director of the ASC, Judy Weaver, Good Library 112, jweaver@goshen.edu or 574-535-7560. To ensure that learning needs are met, contact the director of the ASC the first week of classes.
Collaboration and Academic Integrity	<p>You are encouraged to use all available resources in order to learn the concepts and techniques discussed in this course. In particular, conversations with other students and the instructor can be an effective learning method. Reading other books and web pages can be another effective learning method. However, copying someone else's work subverts the learning process.</p> <p>For assignments and projects, you may look at and discuss another student's work, but any written work developed during collaboration with another student should be destroyed before writing your own solutions. You should give written acknowledgement to people with whom you have had discussions and to any written materials that were helpful.</p> <p>Failure to observe the above rules will result in a zero on the assignment or project. Any violation of academic integrity will be reported to the Associate Dean.</p> <p>Observation of the above rules will help you learn the material well and give you the satisfaction of knowing that you have earned your grade.</p>
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.