Math 3583, Introduction to Mathematical Modeling

Course Information   Fall 2020

Professor: Dr. Lisa Mantini, 410 Math Sciences
    ▷ Email: lisa.mantini@okstate.edu,
    ▷ Course Times: MW 2:30–3:45 PM Online, for conferences and student presentations.
    ▷ Office Hours: Additional consultation times are available by appointment via online conference. Email for an appointment.

Prerequisites: The prerequisites are Calculus II (Math 2153) and Linear Algebra (Math 3013) with grades of "C" or better. We will talk about modeling with differential and difference equations, so experience with those topics from Math 2233 might be helpful but is not specifically required. We will also use a spreadsheet program for modeling, so make sure you have one such as Microsoft Excel available to you. Our class meetings will be online so you should have access to technology enabling you to participate.

Course Objectives: The aim of this course is for students to become proficient in various aspects of the modeling process, which is the application of mathematical and computational techniques to analyze complex, real-world situations in order to make predictions and solve problems. The modeler will

    ▷ gain experience with mathematical techniques that aid in the modeling process;

    ▷ complete projects modeling real-world situations mathematically to predict behavior or answer other questions;

    ▷ write clear and correct papers (technical reports) summarizing the modeling process and solutions obtained;

    ▷ report results to the class, to gain experience in communicating technical material to a broad audience.

Text: The required text is *A First Course in Mathematical Modeling*, Fifth Edition, by Frank R. Giordano, William P. Fox, and Steven B. Horton, ISBN-13: 978-1285050904, a Cengage text. There is a hard copy on reserve in Edmon Low Library. A new hardback available on amazon.com for just over $140, and there are used versions. There is an ebook available for $37.56 on vitalsource.com as a rental until December. I have put a link to this site in a module. There is a deal called "Cengage Unlimited" for those who have multiple courses using Cengage textbooks for a discounted price. I may be able to get additional information on that. The editions on amazon.com called "Paperback" are bootleg foreign editions for exorbitant prices – please **avoid these**.

Course Format: In times when we do not have a pandemic, class sessions might consist of lecture, in-class activities or experiments that illustrate parts of the modeling process, or work by student teams on their projects or other assignments. This year we have moved the course online. Lectures will be available in canvas. Our Monday class times will be reserved for groups who wish to meet with the instructor *by appointment.* Our Wednesday class times will be a drop-in session for students to ask questions of the instructor. No appointment needed. For those with conflicts, additional times are available, of course. Just email to find a convenient time.

Course Requirements: Students enrolled in this course will complete the following:

ITEM	DATE	POINTS	WEIGHT
Homework and quizzes	various	140 pts	28%
Project Papers (3)	various	240 pts	48%
Project Oral Presentations	various	90 pts	18%
Team Evaluations	various	30 pts	6%
TOTAL		500 pts	100%

There are no exams in this course. I expect that we will be completed with all course work by the end of Pre-Finals Week.

Grading: Preliminary grade cutoffs are that earning 90% of the available points guarantees an A in the course; earning 80% guarantees a B; and earning 70% guarantees a C. There may be a slight curve if circumstances warrant, but it is not guaranteed.

Projects: The core of the work in this course are the three group projects, with approximate dates as follows:

▷ Project 1, due September 18, worth 60 points;

▷ Project 2, due October 21, worth 80 points;

▷ Project 3, due December 4, worth 100 points.

I will typically provide a short list of possible topics, though other topics are possible with my approval. Students will create a model for the problem and solve it, and then writing a technical report summarizing the problem, the model, its solution, and any conclusions or applications obtained. Reports will be typed up neatly using a mathematical typesetting system such as LaTeX (preferred) or the equation editor in MS Word. Typically students work in groups of 3.

Presentations: Each team will present their work on their three projects to the class. Students will upload their slides in powerpoint (or other presentation software) so that I can have the slides available before the presentation. Team members will then take turns discussing the slides during the presentation. The presentation usually takes place before the due date for the paper, so that students can get some feedback during the presentation that might be helpful for the paper. Presentations are worth 30 points each. The presentation dates are approximately as follows:

▷ Presentation 1 on September 16;

▷ Presentation 2 on October 21; and

▷ Final Presentation on November 30 or December 2.

Rubrics: Rubrics for the presentations and for the 80 point paper are available in our Canvas site (look for "Rubrics" on the menu). I'll adapt the 80 point rubric by scale factor .75 for the 60 point paper, and by 1.25 for the 100 point paper. See the separate document on Technical Reports for more detail on contents and format of a report.

Homework and Quizzes: Homework assignments covering various aspects of the modeling process will be done individually. There should be about 9 assignments, worth 15 points each. Please prepare all written work neatly on 8.5 by 11 inch sheets, preferably unlined, scan into a single legible pdf file, and upload into the appropriate dropbox. No image files (jpg, etc.) will be accepted. Please use a scanning app which makes a clear scan such as Adobe Scan, which is available to you using OSU's Adobe license. I can explain more about it in class. Quizzes may cover material intended to be read out of class or other topics.

Team Evaluations: After every group project, team members will turn in a short evaluation for their team members on a scale from 0 to 5, where 0 indicates the team member did not participate in the project *at all* and a 5 indicates great effort and strong, reliable participation. Your score is out of 10 points for each of the three projects.

Writing Center: OSU has a Writing Center staffed with people who assist anyone on campus with their writing projects, be it fiction or non-fiction, technical or non-technical. A meeting with a staff member of the Writing Center may be highly beneficial as you are learning to write precisely and clearly about technical material. Students in past semesters have really appreciated their guidance on the technical writing process.

Course Policies: The following policies will be followed in this course.

GROUP WORK Projects will be completed by groups of students and may require meeting times outside of class. Groups may benefit by having members with different areas of expertise! Group members will also evaluate each other's contribution to the project. Group members are not guaranteed to each earn the same grade on the project. Students will fill out an information sheet indicating their group member preferences during the first week of class, to facilitate assignment of groups. I will need to know the members of each group in advance, so that I can set up group dropboxes for projects in canvas.

ATTENDANCE POLICY During the pandemic, we do not require attendance or assign points to it. But I am expected to take roll during every class period. Please let me know if you cannot attend for any reason. It is possible that we can set aside class time for individual groups to work on projects, in which case lecture material may be pre-recorded. We'll discuss this as the course progresses.

CANVAS I will post course information, assignments, and other material on our Canvas page. All student work will be submitted electronically using the Assignments feature in Canvas. It would be wise for you to set your notifications so that you will know about any announcements I post at minimum the same day.

EMAIL COMMUNICATION I will use the Class List in Canvas to email students with news about the course, schedule changes, or other items. Group members may also contact each other using the link on the Class list. Please set your email address in the OSU system to one you check *daily* and check it regularly.

WITHDRAWAL The last day to drop the course with no fees encumbered and no grade is Monday, August 24. The last day to drop with a partial refund is Friday, August

28. The last day to drop with an automatic grade of W is Friday, November 6. The last day to request a drop with an assigned grade of W or F is Friday, November 20.

SPECIAL ACCOMMODATIONS If you have a qualified disability and need special accommodations, you should notify me as soon as possible and request verification of eligibility for accommodations from the Office of Student Disability Services.

Academic Integrity: Simply put, don't cheat. Don't copy off of other students, allow other students to copy your work, or present work you find in printed or electronic sources as your own. You may get help on homework from other people or sources such as the MLSC tutors, but you should write your solutions independently without looking at anything someone else has produced. Having cell phones or other prohibited devices out during a quiz or exam is an academic integrity violation regardless of what you are doing with the device. If you need to access your device during an assessment for some reason, please clear it with me first.

You are not allowed to use Chegg or other similar services in this class. Use of Chegg or similar services on homework, class work, papers, quizzes, exams, or any other activity is an academic integrity violation in this class. These services do a poor job of facilitating learning and are frequently simply a source of (often incorrect) solutions that students copy without understanding. By "similar services," I mean any website, app, or other service that allows access to solutions to textbook exercises and/or user-submitted exercises.

For questions about academic integrity, contact the Office of Academic Affairs, 101 Whitehurst, (405) 744-5627, https://academicintegrity.okstate.edu. I take cheating seriously and apply penalties consistent with OSU's policy. These penalties can be substantial; cheating is not worth the risk.