

# Math 3583, Introduction to Mathematical Modeling

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Course Information

Fall 2021

**Professor:** Dr. Lisa Mantini, 410 Math Sciences

- ▷ Email: [lisa.mantini@okstate.edu](mailto:lisa.mantini@okstate.edu),
- ▷ Course Times: MW 2:30–3:45 PM in 445 MSCS,
- ▷ Office Hours: TBA, by zoom or other video conference.

**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 copy on reserve in Edmon Low Library. New this semester: the Bookstore arranged with the Publisher that an ebook is posted to our canvas site which will **bill you automatically through your Bursar account for rental**. This is not required and you may *opt out* of viewing that ebook and paying for it with direct bill if you follow the link on canvas in the first week of the semester. You may obtain access to the text through any method you wish. By the way, you might find editions on amazon.com called “Paperback” for exorbitant prices – those are bootleg, illegal copies for the foreign market. Please **avoid these**.

**Course Format:** Class sessions will be a blend of lecture, discussion, and in-class collaborative activities, often with your group. The class consists of smaller homework assignments and three larger modeling projects, with papers and in-class presentations. There are no exams, but there may be quizzes on various topics throughout the semester.

**Pandemic Safety:** As you know, the covid pandemic is not over, and cases are increasing rapidly in Oklahoma during this fourth wave. OSU is requiring faculty members to

create a seating chart for each course, and to log attendance during each class, to assist with contact tracing if anyone becomes ill. OSU and the Math Department strongly encourage the use of masks, especially in a classroom such as this one with students facing each other and working together. Wearing a mask during class not only protects you, it also protects those around you who may be more vulnerable. If you feel sick, do not attend class, contact University Health Services at 405-744-7665 immediately, and email me as soon as possible about any missed work. I can space different study groups as far apart as possible, as one small means of being a bit safer.

**Course Requirements:** There are no exams in this course. Students enrolled in this course will complete the following:

ITEM	DATE	POINTS	WEIGHT
Assignments and quizzes	various	150 pts	30%
Project Papers (3)	various	260 pts	52%
Project Oral Presentations	various	90 pts	18%
TOTAL		500 pts	100%

**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, Presentation Sept 22, paper due Sept 27, worth 70 points;
- ▷ Project 2, Presentation Oct 27, paper due Nov 1, worth 90 points;
- ▷ Project 3, Presentation Dec 1 or 6, paper due Dec 10, 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 L<sup>A</sup>T<sub>E</sub>X (preferred) or the equation editor in MS Word. Typically students work in groups of 2 or 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. However, any errors that remain after the instructor's feedback are the responsibility of the group members. Presentations are worth 30 points each. The presentation dates are approximately as follows:

- ▷ Presentation 1 on September 22;
- ▷ Presentation 2 on October 27; and
- ▷ Final Presentation on November 29 or December 1 or 6.

**Rubrics:** Rubrics for the presentations and for the first paper will be available in our Canvas site (look for “Rubrics” on the menu). 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 10 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 indicating if they are satisfied with their own contribution, and other team members’ contributions, to the project. When there are concerns about group members not pulling their weight, grades may be adjusted.

**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. 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. Groups will need to be formed during the first week of class, since typically you will sit with your group members and I need to create a seating chart for use for contact tracing during the still-present covid pandemic. 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 I can provide some electronic resources, if we need to move instruction online eventually, but I try to have in-class work to do that will help students learn new material. So I don’t think online materials can quite reproduce what happens in a collaborative class experience.

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 23. The last day to drop with a partial refund is Friday, August 27. The last day to drop with an automatic grade of W is Friday, November 5. The last day to request a drop with an assigned grade of W or F is Friday, November 19.

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.