

Welcome to Mathematical Modeling (Math 475) – Fall 2022

12:00 – 12:50 pm M-Th in SAMU 138; Course page: <http://canvas.cwu.edu>

Changes may be made to this syllabus at a later date due to instructional necessity. These changes will be discussed in class. This syllabus will be updated on Canvas, and significant changes will also be announced in a Canvas announcement.

Course Goals

This course is an introduction to mathematical modeling. We can find examples of mathematical models in physics, chemistry, biology, and social science. We will explore a few examples and use these examples to so that you get practice making modeling decisions. The main goal of the class is to have you work through a modeling project with a small group of fellow students to understand the modeling process and how models are used to make decisions. The use of software, critical thinking, and technical communication are emphasized. Mathematical modeling is a course where we try to connect your mathematical studies with problems and questions in the world.

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Student drop-in hours Tu 2:00 – 4:00 pm, W 11-11:50 am

If you can't make the student drop-in hours, please email or Canvas message me with at least two day/time combinations that work for you to make an appointment. Working with you is the best part of my job, so don't be shy!

The best ways to contact me are Canvas message and email and coming to student drop-in hours. If there's something you need me to remember, please put it in an email or Canvas message. I try to be responsive and prompt, but sometimes things get put off for later and unintentionally forgotten. If you don't hear from me within 24 hours over a business day, please reach out again.

We don't use a textbook so attendance is important

Class time will be less lecture and more hands-on work, often in collaboration with classmates. If circumstances force you to miss class, please let me know so we can figure out how to keep you on track.

Computers

You can use the Calclab computers for this course, saving your files on the N: drive, or backing them up to OneDrive through your CWU account. Some students prefer to use their own computer. If you are using your own computer, make sure you are backing up your course files regularly. You can use CWU's One Drive, a free Dropbox or Google Drive account for this, or another service like iCloud. Reach out if you need tech support or suggestions.

If you are planning to use your own computer install Anaconda for Python (Python 3):
<https://www.anaconda.com/>

Learning outcomes

1. Students will select mathematical models to best describe the process of mathematical modeling.
2. Students will judge what to include and what to leave out of a mathematical model, and defend their choices based on results and constraints.
3. Students will appraise the requirements of a problem to make modeling decisions.
4. Students will evaluate which mathematical model performs best in a modeling situation.
5. Students will predict modeling results.
6. Students will assess mathematical models by obtaining numerical results.

Grades and assignments

At the beginning of the class there will be weekly homework assignments, but the main goal of the class is for you to work on a modeling project, producing a professional project report, computer code that produces modeling results, and either a slide presentation or a poster presentation on your project. Instead of a final exam, I ask that you produce a reflective final portfolio of your work and growth over the course of the term.

Individual assignments will be graded on the following scale: E – Exceeds standards, M – meets standards, NY – not yet, NS – not submitted. You will have a chance to revise all your assignments **due before finals week** at least once for a higher grade.

Final grades will be calculated based on the following table. Each grade has a requirement specified in its row in the table. **To earn a grade, you will need to meet all the requirements in the row for that grade.** A grade of F will be earned if none of the rows have been fully completed.

Final grade	Weekly Assignments	Major assignments*
A	80% at E, all at M	80% at E, all at M
B	50% at E, all at M	50% at E, all at M
C	All at M	All at M
D	70% at M	70% at M

*Project report, Presentation, Code, Final Portfolio

Plus/minus grades will be assigned at my discretion based on how close you are to the next grade level. The quality of reflection in the Final Portfolio can also be a big influence, see that assignment description below.

Weekly assignments

Early in the quarter, expect to have weekly homework assignments to get you up to speed on mathematics or computer skills you need to complete the project report, presentation, code, and final portfolio.

Class journal

One special assignment that will count as a weekly assignment is participation in creating a class journal and glossary of important terms. This is a shared responsibility of the entire class. You should keep a running list of your contributions to the class journal.

Project report

This is a report (possibly produced in collaboration with other students) on a modeling project. A project report, like many scientific papers, has an abstract, an introduction, a methods section, a results section, a conclusion section, and a bibliography of works cited. If three people are working on the report, I would expect each person have primary responsibility for a major section of the report (introduction, methods, results, conclusions) with the remaining sections produced in collaboration with the rest of the group. Final grades will be assessed based on the quality of the person's individual section and contribution modified by the quality of the report of the whole and an assessment of the group dynamics.

Group Work Assessment

This is to be submitted individually as part of the final project/project report. Each member of a project group should work to pull their own weight, and make reasonable accommodations for the rest of the group. That said, if someone isn't pulling their weight or if a situation is unbalanced, it is my (the supervisor's) responsibility to make sure no one is taken advantage of. I will ask you to submit a group work assessment in which you tell me what your individual contributions to the project are, what the other member's contributions are, your reasoning for what you think a fair split of a \$1000 payment to the group for the work would be, and a reflection on your group collaboration – what went well, what went poorly, what you would do differently in the future.

Code

My former students were united in telling me that one of the most loving things I could do for you was to get you a working knowledge of the Python computing language for solving mathematical problems and making graphs and figures, as this is a practical skill that is often a selling point to employers to get you hired in a professional job. This assignment will be to submit final, professionally documented (commented) code that produces some or all of the mathematical results in your project report. The code that you submit should be code that you wrote, possibly with a colleague (or Dr. Linhart) sitting next to you giving you guidance. You may not copy and paste someone else's code (not even if you change some variable names here and there).

Presentation

Poster presentations and slide show presentations are a common feature of professional work, but often are very nerve-wracking for students doing this the first time. I want to help you feel confident and safe in presenting what you know to our mathematics and university community. We will go over posters and slides in class and practice in class before you are asked to present to a wider audience, and know that I am always here for a pep talk. Plan on a final presentation

on Monday December 5, 2022 at 3 pm at the Mount Stuart Mathematics Seminar. If this date and time do not work for you, let me know ASAP so that we can make alternate arrangements.

Final Portfolio

The final portfolio is to showcase some of your best work from the class and to provide a professional reflection on what you've learned and how you've grown in the class. I take great delight in reading these. A final portfolio that shows me that you have had meaningful and exceptional growth in the class as a mathematician can be reflected in your final grade.

Late work

I will be checking in with the class regularly about due dates so that I am not pushing you too fast to get things done, but I also know that it is my responsibility to set and enforce reasonable due dates – if not for the last minute nothing would get done in my life either! Let me know ahead of time if you need an extension. I will accept work due before finals week up to 24 hours late without penalty. Contact me as soon as you can if you need a longer extension or you need an extension on work due during finals week; understand that I will not agree to requests for longer extensions that come after the original due date for the assignment unless there are extenuating circumstances.

Feedback on work

Assignments will generally be handed in by 11:59 pm on Wednesday, and I will generally look those over and provide you with a score and feedback by 11:59 pm on the next Monday. I will let you know I need an extension by class time that Monday if I cannot get assignments graded that quickly. I hope you will extend me the same grace I try to extend you for late work.

CWU Policies

Policy on Academic Dishonesty

Students are on their honor to follow the student conduct code as outlined in the [Washington Administrative Code](#) (link <http://apps.leg.wa.gov/WAC/default.aspx?cite=106-125>.) Violations of this section will result in a failing grade in the course in addition to further possible university sanctions.

Policy on Diversity

University-level education is about broadening horizons and looking at academic issues from a variety of perspectives. With this in mind, the participants in this class are encouraged to bring their own life experiences and viewpoints to bear on classroom discussions and assignments. Along with the freedom to express one's own views comes the responsibility to respect the views of others. No student will be discriminated against on the basis of race, ethnicity, age, creed, religion, gender, sexual orientation, marital status, or political ideology.

Disability Services

Central Washington University is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any obstacles to learning,

contact Disability Services to discuss a range of available options. Student Disability Services is located in Hogue 126. Call (509) 963-2214 or email ds@cwu.edu for more information.

Responsible Employee Reporting

As a CWU employee I am a designated “responsible employee.” This means that when disclosures of sexual violence (including domestic violence, stalking, harassment, and sexual assault, including rape) are made to me, I am required to complete a report to our Title IX Coordinator. Our university has multiple options for students to provide disclosures and seek resources confidentially. [We Care: Reporting Sexual Violence at CWU](https://www.cwu.edu/wecare/reporting-sexual-violence): link <https://www.cwu.edu/wecare/reporting-sexual-violence>.

Important dates

September 21, 2022 Classes begin

Sept 27, 2022 Change of schedule period ends

November 7, 2022 Uncontested withdrawal deadline

November 11, 2022 Veterans Day Holiday, no class

November 18, 2022 Final Project Report Due

November 23-25, 2022 Thanksgiving and Native American Heritage Recess, no class

December 2, 2022 Classes end; Hardship withdrawal petition deadline

December 5, 2022 3 pm Poster Presentations/Culminating experience

December 7, 2022 11:59 pm Final Portfolios Due