Math 4194: Group Studies in Mathematics Adventures in Mathematical Modeling

Mathematics 4194
First Session Spring 2019
Location: Jennings Hall 014
Time: Th 4:10PM - 6:00PM
Carmen Homepage: https://osu.instructure.com/courses/53245

Instructors: Adriana Dawes and Veronica Ciocanel

Contact info:

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I Course Description:

In this course in mathematical modeling, students will meet once a week to learn a variety of mathematical techniques and their applications to real world problems. The weekly class meetings will begin with a brief introduction to a mathematical concept, with the remainder of the class devoted to working in a team on a given problem. Practice problems will be drawn from those offered in the COMAP Mathematical or Interdisciplinary Contest for Modeling (MCM/ICM). Students will also have the opportunity to compete in teams of their choice in the annual MCM/ICM contest offered late January.

II Course Goals and Learning Outcomes:

By the end of the course, students will be able to:

- Construct mathematical models based on real world problems.

- Identify mathematical techniques appropriate for their models or analysis.

- Work in teams to solve interdisciplinary problems and write a scientific report describing their mathematical model and results.

- Participate in the Mathematical Contest for Modeling or the Interdisciplinary Contest for Modeling.

III Course Prerequisites:

The course is open to all students in all disciplines at OSU, but knowledge of calculus (Math 1151/1156) is recommended.

IV **Course Materials:**

No textbook will be required for this course. Course materials will include instructor notes based on the course topics as well as problems from the extensive database of the Mathematical Contest for Modeling, available online at http://www.comap.com/undergraduate/contests/matrix/index.html.

V **Course Requirements:**

Participation (12%)

- Students are expected to regularly participate in classroom discussion of the real world problems and mathematical techniques.
- Given that group work is essential to this course, students should also be actively engaged with their team in the weekly group work sessions.

Mini-projects (48%)

- Each week students will get to work in a different team on a mini-project based on the week's problem. To mimic the competition's conditions, students will work in teams of three and will be required to write a 1-2 page team summary of their progress, due at the next class.
- After submitting their summaries, students will also provide peer review for another team's report.
- Each mini-project will be worth 8% of the grade.

Final Project (40%)

- There will be a final project and report due at the end of course. Students will get to organize themselves in teams of three and work on a more extensive model and report for an MCM problem of their choice.
- Teams interested in participating in the MCM competition will simply use their contest report as their final project.

VI **Grading Policy:**

Graded work	Weight
Participation	12%
Mini-projects (6)	48%
Final project	40%

VII **Tentative Course Schedule**

Week	Topic/Assignment
1	Introduction to Latex and Matlab
	Mini-project in Matlab
2	Constructing mathematical models
	Mini-project
3	Sensitivity analysis
	Contest starts
4	Equations of motion
	Mini-projects
5	Optimization
	Mini-project
6	Network and agent-based modeling
	Mini-project
7	Final project and report

Software:

- For any work that requires the use of software such as Matlab, Mathematica, or Python, students may use their personal laptops.

- Tutorials for these programs will be available on Carmen in advance of weekly sessions where they might be useful.

VIII **Academic Support:**
Office Hours will be posted on Carmen and announced in class. You are encouraged to take advantage of this resource available for the class.

IX **Academic Misconduct Statement:**
It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-48.7). For additional information, see the Code of Student Conduct at http://studentlife.osu.edu/csc/.

X **Disability Services Statement:**
The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can

privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.