



MATH 484

Spring 2015

Capstone: Mathematical and Computational Modeling

Instructor: Prof. Stephen Pankavich

• **Contact Information:**

Office: Stratton Hall (SH) 223

Phone: x3584

Email: pankavic@mines.edu

• **Office Hours:** 12:15 - 1:30pm TR

• **Class Day/Time:** 11:00am - 12:15pm TR,

Class Location: Marquez Hall 235

Instructional Activity: 3 Hours Lecture 0 Hours Lab 3 Semester Hours

Course Designation: X Major Requirement

Course Description:

Students will utilize applied mathematics modeling techniques to solve complex problems stemming from biological, physical, and engineering systems. Mathematical methods and algorithms will be studied within both theoretical and computational contexts. The emphasis will focus on how to formulate, analyze, and utilize nonlinear modeling to solve typical modern problems.

Text: *Industrial Mathematics: A Course in Solving Real-World Problems* by Friedman and Littman (SIAM).

Student Learning Outcomes:

At the conclusion of the class students will:

1. Construct, interpret, and critique fundamental models of physical, chemical, and biological systems throughout the fundamental and applied sciences
2. Utilize computational tools, such as MATLAB, to simulate behavior arising from mathematical models
3. Describe and interpret, via oral and written means, pertinent information obtained from mathematical analysis and simulation in order to draw scientific conclusions concerning applied models

Brief list of topics covered:

1. Mathematical modeling of physical, chemical, and biological phenomena
2. Computational methods for solving ordinary and partial differential equations
3. Analysis of mathematical models and computational results
4. Group projects and presentations on applied mathematics

Grading Procedures:

Class Participation:	20%	90 - 100%	A
Homework:	40%	80 - 89%	B
Final Project:	30%	70 - 79%	C
Final Presentation:	10%	60 - 69%	D
Total:	100%	Below 60%	F

Coursework Return Policy:

Barring any unforeseen circumstances, coursework (including homework and projects) will be graded and returned to students within two weeks. Feedback will be provided or solutions will be posted.

Absence Policy:

The website <http://inside.mines.edu/Student-Absences> outlines CSM's policy regarding student absences. It contains information and documents to obtain excused absences. Note: "All absences that are not documented as excused absences are considered unexcused absences. Faculty members may deny a student the opportunity to make up some or all of the work missed due to unexcused absence(s). However, the faculty members do have the discretion to grant a student permission to make up any missed academic work for an unexcused absence. The faculty member may consider the student's class performance, as well as their attendance, in the decision."

Homework:

Assignments will generally be made on a bi-weekly basis. Due dates will be announced in class. One score will be dropped in determining the final homework grade for the semester. In general, homework is due in class on the indicated due date. Though faculty members may choose, at their discretion, to collect work at other times. The late policy for homework is determined by the individual instructor of the course. The late policy for this course is: Late homework will not be accepted.

Final Project:

Throughout the semester, students will work collaboratively on a final group project. Further details regarding the project will be provided in class.

Disability Accommodations:

The website <http://disabilities.mines.edu/accommodations.html> outlines CSM's disability services. The AMS department requests that any student requiring accommodations contact the instructor via email or individual meeting within the first two weeks of class or within two weeks of receiving the accommodation.

Policy on Academic Integrity/Misconduct:

You may collaborate with other students on homework. I do, however, consider any form of exchanging exact solutions with another student to be a violation of the academic honor code (i.e., I consider it cheating).

- *What is acceptable:* You may discuss the problems with other students and help each other with general ideas involved within the solution to specific problems.
- *What is unacceptable:* You may NOT copy code or solutions from another classmate or any other individual or source. In addition, other people may not write solutions for you.

The goal is that any piece of work you submit is something that you could do alone, once you have understood the collaboratively created solution. If you are copying any part of your solutions, you are not submitting your own work, and that is cheating. As a student, you must abide by the university honor code.

The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining and fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student's academic achievements, and giving credence to the university's educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed. The complete policy is online at

<http://bulletin.mines.edu/undergraduate/policiesandprocedures/>