



**MATH 484 - Capstone: Mathematical and Computational Modeling**

**Section A, Spring 2014**

**Instructor:** Prof. Pankavich

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**Office hours:** TR 10:30 – 11:00am, 12:15-1:00pm

**Class meeting days/times/location:** TR 11:00am-12:15pm, CO 210

**Instructional activity:** 3 hours lecture    0 hours lab    3 semester hours

**Course designation:** Major requirement

**Course description from Bulletin:** Students will apply computational and applied mathematics modeling techniques to solve complex problems in biological, engineering, and physical systems. Mathematical methods and algorithms will be studied within both theoretical and computational contexts. The emphasis is on how to formulate, analyze, and utilize nonlinear modeling to solve typical modern problems.

**Textbook and/or other requirement materials:**

**Required 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. effectively model physical, chemical, and biological systems throughout the fundamental and applied sciences
2. utilize computational tools, such as MATLAB, to simulate behavior arising from applied mathematical models
3. precisely communicate, via verbal and written means, pertinent information obtained from analysis and simulation in order to draw mathematical and scientific conclusions concerning applied models

**Brief list of topics covered:**

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

**Policy on academic integrity/misconduct:** 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](#).

**Grading Procedures:** Final grades will be measured and distributed as follows:

HOMEWORK:	40%	90-100%	A
FINAL PROJECT:	30%	80-89%	B
CLASS PARTICIPATION:	20%	70-79%	C
FINAL PRESENTATION:	10%	60-69%	D
		Below 60%	F

**Coursework Return Policy:** Homework will be graded and returned with suitable comments and feedback within two weeks of the submission date.

**Absence Policy** (e.g., Sports/Activities Policy): A student who misses class for an excused event is responsible for all material. He or she should review notes and in-class activities with classmates and the instructor (during office hours).

**Homework:** Assignments will occur on a weekly or bi-weekly basis. Due dates will be announced in class, and late homework will not in general 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.