Math 336: Introduction to Mathematical Modeling
4:00-5:15pm MW, Classroom NE-173, Fall 2019

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Office Hours: 7:00-8:30 MW or by appointment

Text: *"Introduction to Modern Mathematical Modeling with R" Lecture notes authored by Samuel Shen. The lecture notes will be posted on Blackboard, available to students for free.*

Prerequisites: Math 254: Introduction to Linear Algebra

Topics covered in this course: Dimensional analysis, R programming, linear regression models, linear algebra models, probability models, calculus models, differential equation models, stochastic models, big data models, data visualization models, machine learning, and real-world applications (e.g., global climate change).

Computing: Students are required to bring a laptop computer to each class. R will be the computer program used for this course and will be taught in class from beginning. R is free and can be downloaded and installed easily for either PC or Mac. To download and install R and RStudio, follow a video instruction by YouTube or a text instruction by UCLA, or search the Internet for "R and RStudio installation" instructions on your own. Computer programming experience is not required for this course, and learning R is part of this course.

Grading Policy: The final grades for this class will be determined as follows:

Homework assignments (3 times)	30%
Midterm exam (4:00-5:00 pm, October 21/Mon)	20%
Consulting project report (due Nov 27/Wed)	15%
Class attendance and discussion	5%
Final exam (3:30-5:30 pm, Dec 16/Mon)	30%
Total----------	100%

Class Attendance and Discussion: The students are required to attend all classes and to submit questions to BB for classroom discussion. The class attendance will be taken randomly.

Note-taking: Each student should build a paper or computer portfolio/folder for this class. Class notes are an important part of the folder. Each student should take class note either on paper or computer.

Learning outcome: Students are expected to master the basic concept of mathematical modeling in science and engineering. Students will be able to develop and understand introductory mathematical models. They will also be able to solve the models, either analytically or numerically, and interpret the modeling results using statistical methods. They will master basic principles of model error estimation, model validation by observed data, and model revision for improvement. Students will be able to write a mathematical modeling report for a specific problem from engineering and science, with high quality tables, figures and visualization movies.