COURSE INFORMATION: Spring 2018
MATH 380 Introduction to Mathematical Modeling

Time and Place: 11:25am, Tuesday-Thursday at 025, REC (Engg. 1 Bldg.)

Instructor: Hemanshu Kaul

Office: 125C, REC

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Office Hours: 1:50-2:50pm Tuesday and Thursday; and by appointment.
Emailed questions are also encouraged.
As well as the discussion forum at Piazza: https://piazza.com/iit/spring2018/math380/home

Math TA Office Hours: Check the schedule at 129, REC.

Course Communications: https://www.math.iit.edu/∼kaul/TeachingSpr18/Math380.html
Check the course webpage regularly for homework assignments, announcements, and a lecture log (useful when you miss a class and when reviewing for an exam).
I often send emails with comments regarding HW problems, Exams, etc. Make sure your IIT email account is active and working.

Prerequisites: Math 251 (Multivariable Calculus), Math 252 (Differential Equations), Math 332 (Matrices and Linear Algebra), knowledge of basic Probability, and knowledge of a computing environment like Mathematica/ Matlab, or any computer language like C/ Java.

Course Description: The primary aim of this course is to develop understanding of applied mathematics as a thought-process and a toolbox for the study of real-world phenomenon. It will focus on introducing concepts/tools from different parts of mathematics, both continuous and discrete, - Differential Equations, Discrete Optimization, Analysis, etc. to describe how to build and refine models for various applications. The secondary but equally important aim is the development of good habits of understanding, communicating, and writing mathematical tools and models as applied to a real-world problem.
An official description of the lecture topics and the course objectives is available at
"https://science.iit.edu/applied-mathematics/courses"

Textbook: Giordano, Fox, Horton, *A First Course in Mathematical Modeling, 5th edition*, Cengage, 2013.

Grade Break-down: (subject to change)
Homework is worth 20%; Project is worth 25%, Two mid-term exams are worth 30% total; Final exam is worth 25%. The grading scale will be no more strict than A:90-100, B:75-89, C:65-74, D:55-64.

Class Attendance: You are expected to attend all lectures and participate in class discussions. You are also expected to read the primary textbook, including examples not covered in class.

Examinations: The exam dates and their precise topics will be announced in class and on the course webpage. The final exam will be on all the topics covered during the semester. Make-up exams will be given only in case of a documented emergency.

Homework Assignment: Homework problems will be assigned once a week (typically on Thursday) which will be due one week later. In addition, I will assign reading homework during or after lectures. It is in your best interest to do this reading before the next lecture.
It is your responsibility to check the webpage for assignments and their due dates. Homework needs to be submitted at the beginning of class on the due date. It should be typed or written legibly. Be sure to staple the pages together and write your name, course number, assignment number, and the date of submission on the front.

Project: Students will do a project on a topic provided by the instructor by February 27th. Each project can be done by teams of 2-3 students. The final submission will consist of a project report and the related computer programs with data, due before April 28th. Additional instructions will be available on the course webpage.

'Why and How' of Homework: Homework serves as an opportunity for students to practice communicating written mathematics with clarity of thought and language. In a course like this, learning good communication skills in mathematics is very important. As significant is the opportunity that a homework provides you to test your understanding of the material covered in class that week. Mathematics cannot be learned by listening or just reading a book - you have to do it. Considering the varying pace of learning of students in class and the lack of class time to explore every detail of every concept/model, working through problems in the HW (both written and reading HWs) is an easy way for you to make sure that you are keeping up with the class. This is why homework is given a lot of importance in this course - dedicate enough time to it every week.

Every homework will contain some straightforward exercises and a few slightly more challenging problems. Dont be disheartened if some problems take a while to solve. Such problems help develop your mathematical creativity. Discuss such problems with your classmates, and/ or ask me for help, but only after you have given them sufficient thought. Please remember that **homework is NOT meant to be an examination**, it is meant to assist in your learning and development. Unlike an exam, if you need help with a HW problem, dont hesitate to ask.

Almost all problems that you encounter will have a modeling aspect to them, so you should **carefully follow and describe the process of modeling**: stating the primary underlying problem, stating and justifying your simplifying assumptions, formulating the model and its variables, solving or computing it, making conclusions from it, and validating it with real-data (if possible). **You have to explain what you are doing IN WORDS. Its not enough to write down an equation without explaining how/why/what of it - you have to define what the variables mean. It is not acceptable to simply input data into Mathematica/Maple/Matlab and ask it to figure out the best "model" for you. You can use these software to aid in your computations, not to simply solve the whole thing for you.**

To improve your mathematical writing quickly, start by writing draft solutions to homework early. A day or two later after you have had time to forget what you wrote, read it. If it doesnt make sense or convince you, rewrite it. Writing a solution requires saying what you mean and meaning what you say. Be intellectually honest. **Include enough detail in your solutions so that your explanation is convincing to someone who hasnt thought about the problem before.**

You are allowed to discuss homework problems with no one except your classmates, the TA, and the instructor. However, the solutions should be written by you and you alone in your own words. Any incident of plagiarism/ cheating (from a person or from any online resource) will be strictly dealt with. Solutions for homework and exams must be written clearly, legibly, and concisely, and will be graded for both mathematical correctness and presentation. Points will be deducted for sloppiness, incoherent or insufficient explanation, or for lack of supporting rationale.

HELP: You are encouraged to ask questions during class, or in office hours, or through email. If you are having trouble solving a homework problem, I will be glad to direct you in the right direction. The same goes for any reading assignment given during class, or any concept you have difficulty understanding. In the past, a lot of my students have regularly communicated with me over email. I encourage you to do the same, if that suits you better.
Don't hesitate to ask for help! I cannot help you if you don't take the initiative.

Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources and make an appointment to speak with me as soon as possible.