

SYLLABUS
MATHEMATICAL MODELING MA2431 B16
MAYER HUMI

COURSE GOAL AND CONTENT

With the proliferation of software packages to perform many of the computational needs in science and engineering there still remains the basic creative task of translating and simplifying a real life problem into a mathematical language. This is the prime goal of Mathematical modeling.

The purpose of this course is to provide the student with a firm introduction to mathematical modeling methodology in various fields of science and engineering. The material covered by this course will prove to be essential to any scientist, engineer and applied mathematician who has to work on real life problems and communicate with professionals from other disciplines.

Basic Texts: My Lecture notes "Mathematical modeling" (available at WPI bookstore) My book on the same topic will be available in Nov.

My class-written Lecture notes will be posted on canvas.wpi.edu within 24hours after class.

Additional texts: M. Humi & W.B.Miller -Second course in ODEs

OFFICE: SH303 TELEPHONE: 831-5213 E-MAIL: mhumi@wpi.edu

Please contact me by e-mail or phone whenever you need help in this course. In general e-mail is preferred.

OFFICE HOURS MTRF 2:00 - 3:00

Please note that other times are available by appointment. In general however I am not available in the mornings as I prepare lectures at that time.

COURSE SETTINGS:

Examinations**.(See notes at the bottom of the page).

There will be two one hour exams. Each hour exam will count for 36% of your final grade .

THE TESTS ARE CLOSED BOOK AND NOTEBOOKS AND YOU MUST SHOW AND EXPLAIN ALL YOUR STEPS. OTHERWISE ZERO CREDIT WILL BE GIVEN. I am very strict about enforcing this rule.

All test problems are to be worked using techniques presented in this course.

Exams dates are Nov 16, Dec 13.

THERE WILL BE NO OTHER EXAMS DATES. UNLESS YOU BRING A NOTE FROM ACADEMIC ADVISING THAT YOU WERE SICK ON THAT DATE.

Review Sessions:

Nov 15, Dec 12. Time and place:TBA

MAKE-UP.

You can take a makeup on ONE of the tests without penalty (i.e I will discard the lower score on that test)

make-up date : Dec 15.

Quiz

There will be one quiz of 30mins on Nov 4. These quiz will count for 8% of the course grade.

During these quiz you can use your notebooks but you can NOT use the book or consult with other students and you can not use computers/calculators.

PRESENTATIONS:

The class will be divided into groups 3-4 students. Each group will read a modeling paper and make an initial oral presentation to me (not during class). Then each student in the group will make oral presentation of 10min during class and the group will submit a "report" on the paper by Dec 13.

The list of papers will be made available on Nov 11.

Presentation dates: Dec 8, 9, 12.

These presentations will count for 10% of the course grade.

LABS.

Throughout the course we shall use MAPLE for symbolic computations and MATLAB for numerical computations and simulation.

STUDENTS ARE STRONGLY ENCOURAGED TO PARTICIPATE IN THE MINI-COURSE ON MATLAB THAT IS OFFERED BY SESA. To see the schedule and register please go to <https://web.wpi.edu/webapps/regi/sesa.html> or contact ahera@wpi.edu

The labs are designed to help you explore the modeling concepts you are learning. I strongly suggest that you view the lab exercises as open ended problems and experiment and explore to obtain deeper insights. Attendance at the lab sessions is required; there will be 2 labs during the term, Exercises related to the Lab will assigned and will count for 5% of course grade.

Lab dates: Nov 9, Nov 30. THE LABS WILL BE HELD IN KEVIN HALL RM. 203

SUMMARY of SCHEDULES:

Quiz 1 Nov 4
Lab Nov 9
Review Session Nov 15
Test 1 Nov 16
Lab Nov 30
Presentations Dec 8
Presentations Dec 9
Presentations Dec 12
Review Session Dec 12
Test 2 Dec 13
Makeup Dec 15

ALL OTHER DATES WILL BE USED FOR REGULAR CLASSES.

Homeworks.

Problems from the text will be assigned weekly. Doing these problems regularly is essential to your understanding of the material. Homework will be due weekly on Mondays. (Late homeworks will NOT be accepted without VALID reasons).

HWS should be scanned in pdf format and sent by email to the TA

Jiaxuan Ye, jye@WPI.EDU.

These homeworks will count for 5% of the total grade.

In addition suggested practice problems will be given. These problems are NOT usually handed in since study and practice are the responsibility of the student.

GRADES

Ranges for grades are given approximately by

A: 100%-90+%

B: 90-80+%

C: 80-65%

Please note that NO grades will given out by phone or e-mail.

EXAMS, HOMEWORKS or LAB and Presentation reports that were not collected by students by Jan 30,17 WILL BE DESTROYED.

TENTATIVE TABLE OF CONTENTS.

It is STRONGLY recommended that students read the material in the book before it is presented in class

chapter 0. Introduction to modeling

chapter 1. Modeling with ODES

chapter 3. Stability

chapter 4. Topics in Modern Applied Mathematics (Bifurcations, Chaos, Fractals and Wavelets)

INTEGRITY/HONESTY CODE: Please note the integrity/honesty code will be strictly enforced in this class. For more please read <http://www.wpi.edu/Pubs/Policies/Honesty/>

*** 1. Special needs students should identify themselves to me (in person or email) at the beginning of the course to make proper arrangements.

2. Students who for religious reasons can not take an exam or a make-up at the scheduled time should inform me about this (in person or email) at the beginning of the course to make proper arrangements.