

Syllabus for MA/CS/EGR 537-002 Spring 2019

Introduction to Numerical Methods

MWF 11:00-11:50

CB 347

3 hrs. credit

Prerequisite: MA 321 or graduate standing and knowledge of a procedural computer language

Instructor: Dr. Lawrence Harris 939 POT Office Hours: MWF 3-3:50

Text: *Numerical Analysis*, Third Edition, Cheney and Kincaid ISBN 978-0-8218-4788-6. We plan to cover the following topics:

Chapter 2. Computer arithmetic: Floating point numbers and roundoff errors, IEEE 754, Absolute and relative errors.

Chapter 3. Solutions of nonlinear equations: Bisection, Newton and secant methods, Iteration and fixed points.

Chapter 6. Approximating functions: Polynomial, Birkhoff and Spline interpolation, Best approximation, Least squares, Chebyshev alternation theorem.

Chapter 7. Numerical differentiation and integration: Richardson extrapolation, Gaussian quadrature, Newton-Cotes quadrature, Romberg integration.

Chapter 8. Numerical solution of ODE's: Taylor Series, Runge-Kutta and multistep methods, Boundary value problems.

An important component will be learning algorithms associated with these topics and incorporating them into programs written in **matlab** and **Maple**. Previous experience with these languages will not be assumed.

The course grade will be computed according to the approximate percentages:

3 hour exams	100 pts each
1 final exam	100 pts
homework and quizzes	100 pts
total	500 pts

The lowest A is 450 pts, lowest B is 400 pts, lowest C is 350 pts and lowest D is 300 pts.

Hour exams will be held on Friday, February 1, Friday, March 1, and Friday, April 5, respectively. The final exam is comprehensive and will be held on Tuesday, April 30, from 10:30 am-12:30 pm in our classroom.

To receive credit, homework and programming solutions must be written out neatly and handed in at the beginning of class on the date due. Homework and programming solutions are to be done without collaboration or copying. Students may use a graphing calculator on exams but may not use any device with the ability to do symbolic computations such as the TI-89, TI-92, HP48 or a laptop, netbook, tablet, etc., computer. Moreover, any device capable of electronic communication such as a cell phone or computer must be turned off and put away out of sight during all examinations. During regular class periods cell phones must be turned off and laptops and tablets may not be used.

Attendance in class is expected. In particular, a student who is not present for the entire class period on a day when homework or a program is due will receive a score of zero for that work. A student will receive an additional 20 pts extra credit added to their final score at the end of the semester if the number of lectures for which the student is not present during the entire class period is no greater than three not counting excused absences. (There will be 10 points extra credit if the number of unexcused absences is 4 and 5 points extra credit if the number of unexcused absences is 5.) A student with 12 or more unexcused absences will automatically receive an E in the course.

You are required to present full documentation that any makeups you request are required by University rules. This documentation needs to be submitted to me within 10 days of your absence and the earlier the better. Please notify me as soon as possible if you have an excused absence for an exam. If I have authorized you to take a makeup exam during dead week, it is your responsibility to contact me the week before dead week and schedule a time during dead week for you to take the exam. A Tier 2 or Tier 3 document provided by UHS is appropriate verification for an excused absence due to illness. Excused absences for religious holidays require written notification one week in advance.

Course information is posted at <http://www.ms.uky.edu/~larry/ma537>