Introduction to Numerical Methods of Engineering Analysis

EGM 3344   (Class #18434)
Class Periods: Tue, Periods 2-3, 8:30a to 10:25a
Thu, Period 3, 9:35a to 10:25a
Location: MAEA 303
Academic Term: Spring 2026

Instructor:

Name: Mike Griffis
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Office: NEB-137, 352-392-9473
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Office Hours: Thu: 2 to 4p, in person or Zoom (other times on arrangement).
Zoom Link:
https://ufl.zoom.us/j/99948407020?pwd=ZPYEbPHleVfB5sOHwxrpLEx19Mc4av.1

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

Course Description

Methods for numerical solution of mathematical problems, with emphasis on engineering applications and computer implementation in MATLAB. Modeling, computers, and error analysis. Roots and optimization. Linear algebraic equations and matrices. Curve fitting. Numerical differentiation and integration. Ordinary differential equations. Credits: 3

Course Pre-Requisites / Co-Requisites

Pre-requisites: MAC 2313 Analytic Geometry and Calculus 3
COP 2271 or equivalent Computer Programming for Engineers MATLAB
Co-requisites: MAP 2302 Elementary Differential Equations

Course Objectives

At the end of this course, the student will be able to:
- Numerical methods: Understand the most common numerical methods used in engineering analysis, when to use each method, and how to implement basic methods in a structured manner using MATLAB's programming language.
- Numerical accuracy: Estimate the amount of error inherent in different numerical methods.
- Numerical efficiency: Assess the efficiency of a selected numerical method when more than one option is available to solve a certain class of problems.
- Numerical stability: Understand the convergence properties and limitations of different numerical methods.

Materials and Supply Fees

None

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare,	

as well as global, cultural, social, environmental, and economic factors	
3. An ability to communicate effectively with a range of audiences	Low
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	High

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software
- Software: MATLAB Student Version (any recent version should be fine)
- You may consider using UFApps (not recommended) to access a number of popular software applications for "free" including MATLAB at: http://info.apps.ufl.edu/
- MATLAB is also available for purchase and download at https://www.mathworks.com/products/matlab/student.html
- I recommend against using UFApps and instead purchasing a MATLAB student license because it eliminates friction caused by using UFApps (downloading data files, saving .m files, poor Internet connection, etc.). Furthermore, I highly recommend purchasing the $100 version that comes with Simulink and various toolboxes. While we may not use these in this course explicitly, it is very possible you will need those toolboxes and/or Simulink in future courses (e.g., EML 4312).

Title: Applied Numerical Methods with MATLAB for Engineers and Scientists
- Author: Steven C. Chapra
- Publication date and edition: 2017, 4th Edition (McGraw Hill)
- ISBN number: 978-0-07-339796-2
- **Any recent version will suffice for content**. However, occasional homework problems may be assigned from the book, and problem numbers sometimes change from one edition to another.
- We will largely follow the layout of the Chapra book. It is extremely useful. I suggest you read the relevant chapters, especially if you are having issues with the homework.

Recommended Materials
Get the $100 version of MATLAB and get the actual Chapra book. Not a pirated PDF.

Required Computer
HWCOE Computer Requirements:
https://www.eng.ufl.edu/undergraduate/programs-and-partnerships/advising-center-for-student-excellence/newly-admitted-students/computer-requirements/

Course Schedule

	Topic	Chapters	
Week 1	Introduction, Matlab basics, Integers	1,2,3	HW1
Week 2	Floating point accuracy	4	HW2
Week 3	Taylor series and Finite Differences	4	HW3
Week 4	Root Finding	5,6,7	HW4
Week 5	**Exam 1**, Intro to Matrices	8	HW5
Week 6	Allowable Row Ops, Gaussian 1	8,9	HW6
Week 7	Gaussian 2, Norms, Condition	9,10,11	HW7
Week 8	Eigen, Iteration (linear)	12,13	HW8
Week 9	Regression	14,15	HW9
Week 10	**Exam 2**, Polynomial Interpolation	17	HW10
Week 11	Iteration (multivariate), Fourier	16	HW11
Week 12	Splines, Geewhiz	18	HW12
Week 13	Numerical Integration, Ordinary Differential Equations	19,22	HW13
Week 14	**Discussion**: what's on Final Exam		
Week 15	Final Exam		

Important Dates (required attendance)

Feb 10:   Midterm Exam 1 (in-class) 8:30a to 10:25
Mar 24:   Midterm Exam 2 (in-class) 8:30a to 10:25
Apr 21:   Final Exam Prep (in-class) 8:30a to 10:25
Apr 28:   Final Exam (in-class)   10:00a to 12:00

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Preview Quiz (13)	100 each	15%
Homework Sets (13)	100 each	15%
Midterm Exam (lowest)	100	20%
Midterm Exam (highest)	100	25%
Final Exam	100	25%
		100%

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

Preview Quiz and Homework

My goal is to provide the course in a "flipped" format.   My goal is to provide videos and resources on **theory** before class for you to review. My goal is to **only work problems** in class. For this to work, you need to **watch the theory** before coming to class. Then take the "Preview Quiz" before coming to class. Homework follows the lecture to make sure you've captured the content. The two lowest Preview Quizzes and two lowest Homework scores will be dropped. I established my office hour on late Thursday to help. Homework is due Thursday night with a one-day grace (10% penalty). I will not reopen Preview Quiz or Homework assignment.

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:
• Your academic advisor or Undergraduate Coordinator
• HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
• Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu