

Mathematical Analysis, ENGR 2145

Spring 2024

A Sophomore Ignatian Residential College Course

Time & Location:

Sec. 1, J. Denenberg: TF, 9:30-10:45 am, Room: TBD

Sec. 2, J. Denenberg: TF, 11:00 am-12:15 pm, Room: TBD

Peer Learning Group: PLG Leaders:

Sec. 1, TA1 (T, rm TBD, 5:00-6:15 pm)

Sec. 2, TAs 2&3 (W, rm TBD, 11:00 am-12:15 pm)

Sec. 3, TA4, (W, rm TBD, 2:00 pm-3:15 pm)

Equipment: Personal laptop (CPU: Intel Core i5 or equivalent, with MS Windows)

Instructor: J. Denenberg, Ph.D, Adjunct Professor, Electrical & Biomedical Engineering

Email: jdnenberg@fairfield.edu, jeffrey.dnenberg@ieee.org

Web Site: <http://doctord.dyndns.org>

Office: BNW GR33

Google Voice: (203) 513-9427 (Texting works)

Office Hours: Tues & Fri 12:30-1:30 and Tues 3:30-4:30 in BNWGR33
or via Zoom (ID# 710 293 2408) by appointment

Textbooks:

1. An Introduction to MATLAB Programming and Numerical Methods for Engineers
Author(s): Timmy Siau and Alexandre Bayen
2. Matlab: MATLAB A Practical Introduction to Programming and Problem Solving,
4rd Ed. Author: Attaway

Software: MATLAB (download instructions are on BlackBoard)

Course Description:

In this course, as you reflect on the question of "Who Am I Called to be?" in your mentoring groups this semester, you will learn mathematical and numerical methods such as root finding, differentiation, integration, solve system of linear equations and through weekly reflection exercises (modeled on the Ignatian Examen) you will understand how to apply these methods to solve scientific problems. Additionally, the course will cover statistics including data analysis, data fitting, and interpolation. The programming language that will be used in this course is MATLAB.

Prerequisite(s): MATH 1142 or equivalent.

Corequisite(s): ENGR 2145P (PLG).

Credit Hours: 3

Course Objectives:

1. Learn and develop a foundational understanding of computer programming and how it is applied in the field of engineering.
2. Develop an understanding of mathematics, numerical methods, and statistics especially relevant to the field of engineering.
3. Encourage methodical, orderly, and disciplined study of engineering.

Course Outcomes:

1. Show proficiency in MATLAB including the understanding of the workspace, using m-files, graphics and plotting, and vector manipulation. [I] (1)
2. Demonstrate mastery of mathematical, numerical, and statistical engineering topics such as matrix algebra, data analysis and statistics, data interpolation, curve fitting, integration, differentiation, and optimization. [II] (2)
3. Identify how programming and mathematical content applies to the field of engineering and understand the impact of engineering solutions in global economic, environmental, and societal contexts. [I,II] (4) knowledge

[] course outcome link to the Blooms Taxonomy levels goal

() link to ABET student outcomes

Grade Distribution:

Participation	5%
Quizzes	10%
Mathworks Certificates	10%
Homeworks (WS)	10%
Programing Assignments (PA)	20%
Midterm Exam	20%
Final Exam	25%

Attendance Policy: Students are responsible for acquiring notes and homework assignments from classmates in case of absence. Poor attendance - without valid excuse - will be reflected on grades.

Special Needs Assistance: If you have a documented disability and wish to discuss academic accommodations, please contact: Office of Accessibility (203) 254-4081 or email: acdc@fairfield.edu, and notify the course instructor within the first two weeks of the semester.

Important: This syllabus is subject to change depending on the mode of teaching online, hybrid, or in person. Course procedures and requirements may change with emerging conditions and public health requirements. All changes will be announced and posted on Blackboard.

Tentative Course Outline:

The weekly coverage might change as it depends on the progress of the class.

Week	Content
Week 1 (2) 1-17	• MATLAB Basics
Week 2 (2) 1-24	• Vectors and Matrices
Week 3 (2) 1-31	• Scripts & Functions
Week 4 (2) 2-7	• Control Flow (Conditional Statement)
Week 5 (2) 2-14	• Control Flow (Loops)
Week 6 (1 F) 2-24	• Advanced Functions
Week 7 (2) 2-28	• Symbolic & Plotting
Week 8 (2) 3-7	• Midterm Exam: March 10
Week 9 (2) 3-21	• Root Finding & Optimization
Week 10 (2) 3-28	• Linear Algebra
Week 11 (1 T) 4-4	• Integration & Differentiation
Week 12 (2) 4-11	• Data Analysis & Statistics
Week 13 (2) 4-18	• Data Analysis & Statistics
Week 14 (2) 4-25	• Interpolation & Regression • Review
Week 15(1) Final Exam	• Sec. 1: TBD • Sec. 2: TBD • Sec. 3: TBD