



Course:	Practical Numerical Analysis – 0907313 (1 Cr. – Core Course)
Catalog Data:	Computer packages for mathematical manipulations (MATLAB).
Prerequisites by Course:	0301241 Linear Algebra I
Prerequisites by Topic:	Students are assumed to have had sufficient knowledge in calculus, statistics, probability and random variables, linear algebra, and computer programming. Knowledge in electrical circuits and signals is a plus.
Textbook:	Applied Numerical Methods with MATLAB® for Engineers and Scientists, Fourth Edition, Steven C. Chapra, 2018
References:	MATLAB Programming for Numerical Analysis, César Pérez López, 2014 Mastering MATLAB 7, Duane Hanselman and Bruce Littlefield, Pearson Prentice Hall, 2005.
Course Website:	Microsoft Teams Group and Resources Dr. Ashraf Suyyagh <u>Website:</u> drsuyyagh.com
Schedule & Duration:	6 Weeks, 9 Lab sessions, 180 minutes each (including exams).
Minimum Student Material:	Textbook, class lab sheets, instructor videos, and access to a personal computer, MATLAB software, and internet.
Minimum College Facilities:	Classroom with whiteboard and projection display facilities, library, and computational facilities. Licensed MATLAB software.
Course Objectives:	<p>This course introduces the students to MATLAB as a powerful tool in the analysis, design, and solution of engineering problems, as well as the implementation and use of major numerical analysis techniques and functions.</p> <p>This course further introduces the basics of numerical analysis.</p> <p>Upon successful completion of this course, a student should be able to:</p> <ol style="list-style-type: none">1. Use MATLAB to perform different types of mathematical operations and apply numerical analysis concepts. [1,2]2. Be able to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (e.g. design experiments to find the number of iterations, or bins that makes a numerical method converge to a solution within a tolerance level) [6]3. Be able to learn a new numerical method on your own other than the one taught in class, understand its concepts, governing equations, and write its code to apply it on an engineering, scientific, or mathematical problems. Be able to learn new numerical on their own and apply them on an engineering, scientific, or mathematical problem [7]
Course Outcomes and Relation to ABET Program Outcomes:	ABET outcome to be assessed 6 and 7

The lab includes nine experiments that cover the following topics:

Course Topics:

1. An overview of MATLAB environment
2. Numeric structure arrays and their associated operations
3. Data Import and Preprocessing, Discrete Math and Timing
4. Programming with MATLAB – Scripts and Functions
5. Advanced MATLAB plots
6. Statistical and Probability Analysis and Error Modelling
7. Root Finding Algorithms
8. Solving Linear Systems
9. Numerical Integration and Differentiation
10. Curve Fitting, linear regression, Interpolation and Optimization

Course Outline

Lab Date	Experiment	Lab Due Date
11 th July, 2021	MATLAB Fundamentals I + Syllabus distribution	18 th July, 2021
13 th July, 2021	MATLAB Fundamentals II	20 th July, 2021
18 th July, 2021	MATLAB Fundamentals III	25 th July, 2021
19th – 24th July	Eid Al-Adha Holiday	
25 th July, 2021	MATLAB Programming - Function and Script Files + (Quiz1)	1 st Aug, 2021
27 th July, 2021	Plotting	3 rd Aug, 2021
1 st Aug, 2021	Statistical and Probability Analysis	8 th Aug, 2021
3 rd Aug, 2021	Error Analysis and Root Finding Algorithms	10 th Aug, 2021
5th Aug, 2021	Midterm Exam (Labs 1-5)	Tentative Date
10th Aug, 2021	Hijri New Year Holiday	
15 th Aug, 2021	Optimization, Integration and Differentiation	22 nd Aug, 2021
17 th Aug, 2021	Solving Linear Systems, Linear regression and Interpolation	24 th Aug, 2021

Final Exam TBA per university calendar

Computer Usage:

Students perform lab experiments and quizzes on their home PCs/Laptops
Students have practical exams on computers available in the lab.

Attendance:

Class attendance will be taken depending on Board of Trustees decisions and the universities polices will be enforced in this regard.

Assessments:

Quizzes and Exams.

Grading policy:

	60/40 (Default)
Lab sheets	20%
Quiz 1	10%
Midterm Exam	30%
Final Exam	40%

Professor: Dr. Ashraf Suyyagh: a.suyyagh@ju.edu.jo

TA: Eng. Hanan Al-Yasin h.alyasini@ju.edu.jo

Instructors:

Contact Hours: **Sunday – Thursday 8:30 A.M. – 3:00 P.M.**
(Email & MS Teams only)

Class Time and Location:

Section 1: Sunday/Tuesday 1:30 – 4:30 (Dr. Ashraf Suyyagh)

Program Outcomes (PO)

1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
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
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 and inclusive 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