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 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 Website: drsuyyagh.com
Schedule & Duration:	11 Weeks, 9 Lab sessions, 180 minutes each (weeks include exams and holidays)
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:	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. This course further introduces the basics of numerical analysis.

Upon successful completion of this course, a student should be able to:

Course Outcomes and Relation to ABET Program Outcomes:

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]

ABET outcome to be assessed 6 and 7

Course Topics:	The lab includes nine experiments that cover the following 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 MATALB – 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	Lab	Experiment
6th Mar	Exp. 1	MATLAB Fundamentals I
13th Mar	Exp. 2	MATLAB Fundamentals II
20th Mar	Exp. 3	MATLAB Programming - Function and Script Files + **(Quiz1)**
27th Mar	Exp. 4	Plotting
3rd Apr	Exp. 5	Statistical and Probability Analysis
10th Apr	Exp. 6	Solving Linear Equations, Basics of Linear Regression and Curve Fitting, and Interpolation
17th Apr	-	**Midterm Exam (Labs 1-5)**
24th Apr	-	**No Lab**
1st May		**No Lab (Labour's Day)**
8th May	Exp 7	Error Analysis and Optimization Algorithms
15th May	Exp. 8	Numerical Methods for Finding Roots
22nd May	Exp. 9	Numerical Integration and Differentiation
29th May		**Report Submission**

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. **Students who do not attend 3+ lab will be officially withdrawn from class**
Assessments:	Quizzes, Reports, Lab sheets and Exams.

Grading policy:

	60/40
Lab sheets	**15%**
Quiz 1	**7%**
Report	**8%**
Midterm Exam	**30%**
Final Exam	**40%**

Instructors:	Professor: Dr. Ashraf Suyyagh: a.suyyagh@ju.edu.jo Teacher / TA: Eng. Abeer Awad :a.awad@ju.edu.jo Online Contact Hours: Sunday – Thursday 8:00 A.M. – 3:30 P.M. **(Email & MS Teams only)**
Class Time and Location:	Section 1: Monday 1:30 – 4:30

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