

ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
ELECTRICAL AND COMPUTER ENGINEERING PROGRAM
COURSE DESCRIPTION AND SYLLABUS

Course Title	Code	Semester	T+L Hours	Credit	ECTS
SCIENTIFIC COMPUTING WITH MATLAB	ECE-551	FALL-SPRING	3 + 0	3	10

Prerequisite Courses N/A

Type	Selective
Language	English
Coordinator	Prof. Bülent Yılmaz
Instructor	Prof. Bülent Yılmaz
Adjunt	none
Aim	-Learn the details of MATLAB and practice them in various types of problems. -Acquire theoretical concepts in scientific computing or numerical techniques and apply them in MATLAB.
Learning Outcomes	<ul style="list-style-type: none"> • learn and apply the concepts like scripts, variables, plots, vectors, matrices, indexing, functions, for and while loops, structure and cell arrays, debugging, • apply this knowledge in relatively complex scenarios, • grasp the idea of unavoidable errors in computing, • learn root-finding methods and apply them in various mathematical functions in MATLAB, • understand the fundamental approaches used in solving systems of linear equations, least-squares fitting of a curve to data, interpolation, numerical integration and derivation, and optimization and apply them in MATLAB.
Course Content	<ul style="list-style-type: none"> • Getting Started with MATLAB • User Defined Functions and Loops • Vectorization • Symbolic Math • Data Structures • Solving Systems of Linear Equations • Curve Fitting • Finding Roots of a Polynomial • Interpolation • Optimization • Numerical Differentiation and Integration

WEEKLY TOPICS AND PRELIMINARY STUDY

Week	Topic	Preliminary Study
1	Motivation of the course	The relevant articles from the literature
2	Getting Started with MATLAB <ul style="list-style-type: none"> • Script, variables, arrays • Indexing and plotting 	The relevant articles from the literature
3	<ul style="list-style-type: none"> • User Defined Functions • Relational Operators for and while loops • Advanced plotting 	The relevant articles from the literature
4	<ul style="list-style-type: none"> • Vectorization • Symbolic Math • File I/O 	The relevant articles from the literature
5	<ul style="list-style-type: none"> • Probability and Statistics • Data Structures (cell arrays and structure) • Debugging 	The relevant articles from the literature
6	<ul style="list-style-type: none"> • Review of Linear Algebra • Solving Systems of Linear Equations 	The relevant articles from the literature
7	• Least Squares Fitting of a Curve to Data	The relevant articles from the literature
8	• Least Squares Fitting of a Curve to Data	The relevant articles from the literature
9	Midterm Exam	The relevant articles from the literature

10	<ul style="list-style-type: none"> Nonlinear Equations Polynomials Finding the Roots of a Function 	The relevant articles from the literature
11	<ul style="list-style-type: none"> Interpolation 	The relevant articles from the literature
12	<ul style="list-style-type: none"> Optimization 	The relevant articles from the literature
13	<ul style="list-style-type: none"> Numerical Differentiation 	The relevant articles from the literature
14	<ul style="list-style-type: none"> Numerical Integration 	The relevant articles from the literature
15	<ul style="list-style-type: none"> Graphical User Interfaces 	The relevant articles from the literature
16	Final Exam	

SOURCES

Lecture Notes Lecture slides

Other Sources **Additional Materials:**

- Gerald Recktenwald, Numerical Methods with MATLAB: Implementation and Application, Prentice-Hall, Inc., New Jersey, 2000.

COURSE MATERIALS SHARING

Documents Lecture notes and slides

Homeworks Students will be given one homework every two weeks

Exams 1 Midterm and 1 Final Exams

EVALUATION SYSTEM

SEMESTER STUDY	NUMBER	CONTRIBUTION
Midterm	1	25
Homework	6	30
Presentations	2	10
Quiz	5	15
SUB-TOTAL		80
Contribution of Semester Study		80
Contribution of Final Exam	1	20
TOTAL		100

Course Category

Sciences and Mathematics	50%
Engineering	50%
Social Sciences	0%

RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS

		Contribution Level				
No Program Qualifications		1	2	3	4	5
1	Ability to use math, science and engineering knowledge in advanced research					x
2	Ability to design, realize and analyze a novel system to solve engineering problems				x	
3	To be able to use modern measurement equipment, hardware and software for expertise area research			x		
4	Ability to plan and do detailed independent research				x	
5	Ability to do literature search, technical presentation, and prepare scientific manuscript				x	
6	Be able to do critical and creative thinking and finding innovative methods			x		

*Increasing from 1 to 5.

ECTS / WORK LOAD TABLE			
Activities	Number	Duration (Hours)	Total Work Load
Course Length (includes exam weeks: 16x total course hours)	16	3	48
Out-of-class Study Time (Pre-study, practice)	16	5	80
Internet search, library work, literature search	16	4	64
Presentation	2	15	30
Homework	6	7	42
Midterm	1	15	15
Final Exam	1	20	20
Total Work Load			299
Total Work Load / 30			299/30
Course ECTS Credit			10