هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

Course Specification
(Bachelor)

Course Title:	**Math Software**
Course Code:	**MAT 1242**
Program:	**Bachelor of Science in Applied Statistics**
Department:	**Mathematics and Statistics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**2024 – V1**
Last Revision Date:	**08/10/2024**

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A. General information about the course:

1. Course Identification

1. Credit hours:					
3 (2 Lectures, 2 Lab, 0 Tutorial)					
2. Course type					
A.	☐University	☐ College	☒ Program	☐Track	☐Others
B.	☐ Required		☒ Elective		
3. Level/year at which this course is offered:					
Level 7 / Year 4					
4. Course general Description:					
The course provides an introduction to MATLAB, emphasizing its application for mathematical computations and visualizations. Students will learn to navigate the MATLAB environment, execute arithmetic operations, and create and manipulate arrays, including vectors and matrices. The curriculum includes essential operators, 2D and 3D plotting techniques, and scripting skills, featuring control structures such as loops and conditionals. Additionally, students will utilize the symbolic toolbox for manipulating algebraic expressions and solving equations. This course is designed to equip students with practical skills essential for advanced mathematical analysis and applications.					
5. Pre-requirements for this course (if any):					
MAT 1107 Calculus (2) **MAT 1222 Linear Algebra**					
6. Co-requisites for this course (if any):					
7. Course Main Objective(s):					
• **Cultivate MATLAB Proficiency:** Equip students with the skills to navigate and effectively use MATLAB for mathematical calculations and data visualization. • **Improve Problem-Solving Abilities:** Foster the application of programming techniques, including arrays, operators, and control structures, to efficiently tackle mathematical problems. • **Leverage Symbolic Tools:** Enable students to manipulate algebraic expressions and solve equations using MATLAB's symbolic toolbox, deepening their understanding of mathematical principles.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	**60**	**100%**
2	E-learning	**0**	**0%**
3	Hybrid • Traditional classroom • E-learning	**0**	**0%**

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the basic features of MATLAB, including the interface and essential commands.	K1	Lecture and guided demonstrations	Quizzes and written definitions
1.2	Describe how to create and manipulate arrays, including vectors and matrices in MATLAB.	K1	Interactive discussions and demonstrations	Homework assignments and written exercises
1.3	Identify the purpose and use of various MATLAB commands for matrix operations and array addressing.	K1	Tutorials with examples and group discussions	Exams and short-answer questions
1.4	Explain the structure and purpose of script files, including the use of functions in MATLAB.	K1	Lecture and analysis of script examples	Quizzes and written assignments
2.0	**Skills**			
2.1	Create code to provide a solution to a range of Mathematical problems ranging from simple to complex.	S1	Self-study Real-life problems	Participations, Short Quizzes

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	Design and implement, clearly and precisely, simple programs.	S4	Self-study. Real-life problems	Participations, Short Quizzes
2.3	Convert Matlab code into a given to online solver.	S4	Self-study Real-life problems	Participations, Short Quizzes
2.4	Construct algorithms, M-file script and calculus operation design to solve mathematical problems via Matlab.	S3	Self-study Real-life problems	Participations, Short Quizzes
3.0	**Values, autonomy, and responsibility**			
3.1	Work individually and in groups.	V1, V3	Personal questions	Participation
3.2	Show attitude of support the use of mathematical software in solving real life problems.	V1, V2	Team work	Homework and Mini-projects

C. Course Content

No	List of Topics	Contact Hours
1.	**Starting with MATLAB:** Introduction to the software and computer, MATLAB windows, ***help*** and ***look for*** commands, arithmetic operations, Display Formats, Built-in functions, Variables assignment, Elementary built-in functions, Command line editing.	**10**
2.	**Arrays:** Creating arrays (vectors, matrices), *Lin space* command, some major matrices, operators, Matrix operations in MATLAB, Array addressing, Adding and deleting elements, Strings.	**10**
3.	**Other Operators:** Operator Precedence, Relational operations, Logical operations, ***all*** and ***any*** commands, ***find*** command, ***sort*** command, ***max*** and ***min*** command.	**10**
4.	**2D and 3D graphs:** ***Plot*** and ***ezplot*** command, ***fplot*** command, multigraphs plots, others plot commands, axis and graphic handling, layout a figure, 3D line plot, Mesh and Surface plots, view command.	**10**
5.	**Script files:** Creating and saving a file, ***disp*** and ***fprintf*** commands, loading a file, search path, defining functions, structure of a function file, ***inline*** function, ***feval*** command, local and global variables, …	**10**
6.	**Programming**: If-else structure, for and while loops, Break and continue commands, Switch-case statement.	**5**

7.	**Symbolic toolbox:** Symbolic object and expressions, algebraic expression manipulation, factorization, simplification, solving equations.	5
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	HomeWorks, Quizzes, Mini-projects	During the term	10%
2.	First Midterm	Week 5-6	25%
3.	Second Midterm	Week 10-11	25%
4.	Final Exam	Week 15	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	***Introduction to MATLAB***, Delores Etter, Pearson Education Inc, 4th Edition, 2018. **ISBN: 978-0-13-461528-8 (Main Reference)**
Supportive References	***MATLAB: An Introduction with Applications,*** 3rd Edition; Amos Gilat, The Ohio State Univ. 2008. ***MATLAB Primer,*** K. Sigmon and T. Davis, Champan& Hall, 6th Edition, 2002. ***Maple V: learning Guide,*** K. Heal & K. Rickard, Springer Verlag, 1996. ***Mathematica by example,*** M. Abell& J. Braselton, Academic Express, 1997.
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• **Classrooms:** Equipped Computers with whiteboards, projectors, and Smart Boards for interactive lessons and group discussions. • **Laboratories:** Feature computers with internet access, enabling hands-on activities and exploration of algebraic and trigonometric concepts. • **Exhibition Rooms:** Spaces for showcasing projects and presentations to encourage collaborative learning.
Technology equipment (projector, smart board, software)	• **Data Show Projectors:** For clear presentations in classrooms and labs. • **Smart Boards:** To enhance interactivity during lessons.

Items	Resources
	• **Mathematical Software:** Matlab
Other equipment (depending on the nature of the specialty)	• **Computers:** For mini-projects and homework and practical applications in laboratories. • **Whiteboards and Markers:** To facilitate brainstorming and collaboration.

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Student and teaching staff	Surveys and Questionnaires
Effectiveness of Students assessment	Course Coordinator	Peer Reviews
Quality of learning resources	Students and teaching staff	Classroom Observations
The extent to which CLOs have been achieved	Student Representatives	Student Performance Evaluations (exams, projects) CLOs Excel sheet.
Other	**None**	

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL**
REFERENCE NO.	**8/1446**
DATE	**05/04/1446 (08/10/2024)**