

Department of Medical Physics – MATLAB Course – Practical Component

Second Semester 2025

Course Description - Practical Component

College: Al-Zahrawi University College - Department of Medical Physics

Course Name: MATLAB

Units: 5

Theoretical Hours: 2 hours per week

Language of Instruction: English

Instructor: Asst. Lecturer Hussein Abdulali Al-Saadi

General Objectives (Practical Component)

The practical component of this course is designed to provide students with hands-on experience using MATLAB in the context of medical physics. By the end of the course, students will be able to:

- Navigate the MATLAB interface and use essential tools effectively.
- Define and manipulate different types of variables and data structures.
- Create and operate on vectors and matrices using MATLAB commands.
- Apply input/output functions to build interactive programs.
- Implement conditional logic and control structures (e.g., `if`, `switch`, `for`, `while`) in real scenarios.
- Generate 2D plots to visualize data and simulation results.
- Write and execute MATLAB scripts to automate tasks and solve practical problems related to medical physics.

This practical training prepares students to use MATLAB as a computational tool in laboratories, research projects, and clinical applications.

Week	Practical Topic
Week 1	Introduction to MATLAB interface and basic commands using the Command Window
Week 2	Creating variables and working with scalar values
Week 3	Creating and accessing vectors (row and column vectors)
Week 4	Creating and modifying matrices: input, edit, and delete elements
Week 5	Midterm Exam (Theoretical)
Week 6	Performing arithmetic operations on vectors and matrices
Week 7	Using built-in functions: sum, length, size, diag, numel, transpose
Week 8	Midterm Exam (Practical)
Week 9	Input and Output commands: input, disp, display, num2str
Week 10	Implementing conditional statements: if, else, elseif
Week 11	Using switch-case statements in simple applications
Week 12	Using for and while loops to perform repetitive calculations
Week 13	Plotting using plot(): adding titles, axis labels, and grid
Week 14	Final Exam (Practical)
Week 15	Final Exam (Theoretical)

Module Evaluation

The final grade for this course is based on a total of **100 marks**, distributed as follows:

A. Coursework (50 Marks)

Component	Frequency	Mark per Attempt	Weight
Quizzes	3 times	10 marks	10 marks
Reports	3 times	25 marks	10 marks
Home Assignments	3 times	25 marks	10 marks
Laboratory Assessment	1 time	25 marks	5 marks
In-Class Participation (College Tasks)	2 times	10 marks	5 marks
Midterm Exam (Theoretical)	1 time	10 marks	10 marks

Subtotal: 50 Marks

B. Final Examination (50 Marks)

Component	Weight
Final Practical Exam	20 marks
Final Theoretical Exam	30 marks

Subtotal: 50 Marks

Recommended References

1. **Chapman, Stephen J.**
MATLAB for Engineers
McGraw-Hill Education, 5th Edition, 2016.
→ A comprehensive introduction to MATLAB with practical engineering examples.
2. **Attaway, Stormy.**
MATLAB: A Practical Introduction to Programming and Problem Solving
Elsevier, 5th Edition, 2020.
→ Ideal for beginners with step-by-step explanations and hands-on exercises.
3. **Amos Gilat.**
MATLAB: An Introduction with Applications
Wiley, 6th Edition, 2017.
→ Offers clear explanations with scientific and mathematical applications.
4. **MathWorks Documentation**
<https://www.mathworks.com/help/matlab>
→ Official online resource for all MATLAB functions and examples.