هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Computer Application in Physics (1)
Course Code:	2032204-3
Program:	Bachelor in Physics
Department:	Physics Department
College:	College of Science
Institution:	Taif University
Version:	2
Last Revision Date:	2 October 2022

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (7th / 3rd)					
4. Course general Description:					
This course covers important parts in the computational programming in physics using Matlab program. Students will study the basics of Matlab. In addition, important topics including; the use of the different tool boxes and windows in Matlab, the use of vectors and matrices as well as the application of statistical analysis and mathematical algebra.					
5. Pre-requirements for this course (if any):					
None					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					
Students will be able to programming with Matlab, write different scripts and functions and solve physical problems. The plotting with 2D and 3D dimensions is also included.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	5	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	45
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		75

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	Recognize how to use Matlab to create scripts and functions in Matlab	K3	Lectures	Practical Exam Lab reports
1.2	Define the plotting, Loops structure, and condition statements	K3	Lectures Discussion	Written Exam
2.0	**Skills**			
2.1	Application of programming to complex physical calculations	S1	Lectures Problem Solving	Written Exam
2.2	Develop and solving a real problems in physics using Matlab.	S2	Lectures Problem Solving	Written Exam
3.0	**Values, autonomy, and responsibility**			
3.1	Show responsibility for work independently in implementing programming in MATLAB.	V1	Lectures Projects	Lab reports Practical Exam

C. Course Content

No	List of Topics	Contact Hours
	Part 1 (Lectures)	
1.	Unit 1: An introduction to Matlab and simple calculation • Looking inside Matlab program • Looking to the most important windows. • Simple mathematical functions. • The order and priority of the calculations. • Scalar and vector quantities and the variables.	3
2.	Unit 2: Format command and how can we control the output • Format commands • Initializing the format of the input and the output. • Protecting your data. • The variables and their sizes	3
3.	Unit 3: Vectors and Matrices in Matlab • Initializing vector and matrices in Matlab • Mathematical operation on the elements of vector and Matrix • Eigenvalues and Eigenvectors • Specific commands for vectors and matrices.	3
4.	Unit 4: Creating a script and functions • Simple script • Simple script • Call the functions inside the script • Save, update your functions and scripts	3
5.	Unit 5: Plotting in 2D and 3D dimensions. • Preparing data files • Import and export your experimental data • Evaluating polynomials and plotting curves. • Create your own plotting curves.	3
6.	Unit 6: Detecting the errors and Debugging • Numerical errors • User error • Debugging.	2
7.	Unit 7: Create your own functions. • Calling the built-in functions in a specific program • Calling the built-in function in several programs. • Function of functions	2
8.	Unit 8: Loops structure • Different statements of looping • Loop structures • Loops within loop	2

9.	Unit 9: Conditions statements • constructing logical statements • Different condition statements such as case, switch, if ... etc	2
10.	Unit 10: Interpolation and extrapolation • Saving and reading your data • Linear interpolation and extrapolation • Nonlinear interpolation and extrapolation • Spline, cubic spline and best fits. • Minimizing the resultant errors of the fitting.	3
11.	Unit 11: Application of some physics problems • Dealing with the experimental data of physics	2
12.	Revision	2
	Part 2 (Laboratory)	
1.	Introduction	3
2.	Matlab windows and simple calculations	3
3.	Output formatting and the output controlling	3
4.	Vector and Matrices in Matlab	6
5.	Creating script and functions	6
6.	Plotting in 2D and 3D dimensions	3
7.	Detecting and Debugging the errors	3
8.	Create your own functions	3
9.	Loops structures	3
10.	Condition Statements	3
11.	Interpolation and extrapolation	3
12.	Application of some physics problems	3
13.	Reports evolution and practical exam	3
	Total	**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam 1	8th - 9th	20%
2.	Midterm exam 2	13th - 14th	10%
3.	Activities	Periodically	10%
4.	Lab reports	Weekly/ 13th	15%
5.	Final Lab Exam	13th	5%
6.	Final exam	15th	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	"An introduction to programming and numerical methods in Matlab", by S. R. Otto, J. P. Denier, Springer verlag 2003.
Supportive References	A guide to Matlab for beginners and experienced users", B. R. Hunt, R. L. Lipsman, J. M. Rosenberg. Cambridge, 2001
Electronic Materials	Matlab Marina: http://www.matlabmarina.com/
Other Learning Materials	Lecture notes and PowerPoints presentations prepared by the lecturer.

2. Required Facilities and equipment

Items	Resources
Facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• Classrooms • Computational Physics laboratory
Technology equipment (projector, smart board, software)	• Data show • Laptop • Smart board
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	• Students	Indirect
Effectiveness of Students assessment	• Program coordinator • Advisory council • Faculty	Indirect
Quality of learning resources	• Students • Faculty	Indirect
The extent to which CLOs have been achieved	• Program coordinator • Faculty	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	PHYSICS DEPARTMENT COUNCIL
REFERENCE NO.	NO. 4-45
DATE	27/09/2023 (12/03/1445)

قسم الفيزياء
Physics Department
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