

QF01/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Department of Mathematics
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Study plan No.	2021/2022	University Specialization	Bachelor of Mathematics
Course No.	0101372	Course name	Mathematical Modeling 1
Credit Hours	3	Prerequisite/ Co-requisite	Principles of Programming
Course type	<input type="checkbox"/> MANDATORY UNIVERSITY REQUIREMENT <input type="checkbox"/> UNIVERSITY ELECTIVE REQUIREMENTS <input type="checkbox"/> FACULTY MANDATORY REQUIREMENT <input type="checkbox"/> Support course family requirements	<input checked="" type="checkbox"/> Mandatory requirements <input type="checkbox"/> Elective requirements	
Teaching style	<input type="checkbox"/> Full online learning <input checked="" type="checkbox"/> Blended learning	<input type="checkbox"/> Traditional learning	
Teaching model	<input type="checkbox"/> 1 Synchronous: 1 asynchronous <input checked="" type="checkbox"/> 1 face to face : 1 asynchronous	<input type="checkbox"/> 2 Traditional	

Faculty member and study divisions' information (to be filled in each semester by the subject instructor)

Name	Academic rank	Office No.	Phone No.	E-mail	
Division number	Time	Place	Number of students	Teaching style	Approved model
1				Blended	

Brief description

Programming and coding for solving mathematics problems. Introductions to Matlab and its use for matrices, Plotting, Integration and differentiation, Curves and If conditions, Optimizing and solving system of polynomials.

Learning resources

Course book information (Title, author, date of issue, publisher ... etc)	1-" Mastering MATLAB" by Duane C. Hanselman and Bruce R. Littlefield, (2014), Pearson Education.
Supportive learning resources (Books, databases, periodicals, software, applications, others)	2-"Essential MATLAB for Engineers and Scientists", by B. H. Hahn and D. T. Valentine, 5th Ed., (2013), Elsevier Ltd. 3-"Learning MATLAB", Tobin A. Driscoll, (2009), Society for Industrial and Applied Mathematics, SIAM. 4- "Numerical Computing with MATLAB, Cleve B. Moler, (2004), the Society for Industrial and Applied Mathematics. 5- "Programming in MATLAB", by Marc E. Herniter, (2001), Brooks/Cole, Thompson Learning.
Supporting websites	1. https://www.mathworks.com/help/matlab/mathematics.html 2. https://www.mccormick.northwestern.edu/documents/students/undergraduate/introduction-to-matlab.pdf
The physical	<input type="checkbox"/> Classroom <input checked="" type="checkbox"/> labs <input checked="" type="checkbox"/> Virtual educational <input type="checkbox"/> Others

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environment for teaching			platform	
Necessary equipment and software	Matlab			
Supporting people with special needs				
For technical support	Lab Supervisor			

Course learning outcomes (S= Skills, C= Competences K= Knowledge,)

No.	Course learning outcomes	The associated program learning output code
Knowledge		
K1	Having access to MATLAB.	MK 1
K2	Identify the difference between numeric and symbolic computation.	MK 2
K3	Illustrate how to graph in 2D and 3D.	MK 2
K4	Recognize how to use control structures like conditional statements and loops.	MK 2
Skills		
S1	Perform and analyze a series of mathematical computations.	MS3
S2	Organize and use function script files.	MS4
S3	Do computations on vectors and arrays	MS4
S4	Use MATLAB to explore a mathematical theorem, example, or concept.	MS4
S5	Develop a computational spirit that will allow the students to use MATLAB on a regular basis to investigate mathematical and scientific ideas.	MS4
Competences		
C1	Reaching the use of applied mathematics for solving real live problems	MC1
C2	Cooperate to work effectively in the group assignments.	MC 1

Mechanisms for direct evaluation of learning outcomes

Type of assessment / learning style	Fully electronic learning	Blended learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
Midterm exam	30%	30%	40%	30%
Participation / practical applications	0	0	10%	30%
Asynchronous interactive activities	30%	20%	0	0
Final exam	40%	50%	50%	40%

Schedule of simultaneous / face-to-face encounters and their topics

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Week	Subject	learning style	Reference
1	Introduction: Accessing MATLAB; The MATLAB. Windows; Managing the MATLAB Workspace; Memory Management; Number Display Formats; The MATLAB. Search Path in MATLAB.	Lecture	Ref 1 (20-50)
2	Variables and Expressions Entering Commands; Integer. Data Types; Floating-Point Data Types; Character Data Types; Creating Variables.	Lecture	Ref 1 (51-90)
3	Accessing and Modifying Data. Files M- Files; Creating Script Files; Running Scripts; Dividing Code into Sections.	Lecture	Ref 1 (91-120)
4	Getting Help and Using Some Useful Matlab Functions.	Lecture	Ref 1 (145-170)
5	Arrays Creating and Manipulating Arrays; Array Size; Performing Calculations with Arrays; Scalar-Array Mathematics.	Lecture	Ref 1 (171-185)
6	Array-Array Mathematics; Visualizing Array Data.	Lecture	Ref 1 (186-200)
7	Polynomials: Evaluation; Roots; Multiplication ; Addition; Derivatives and Integrals; Calling MATLAB Functions involving Polynomials.	Lecture	Ref 1 (239-250)
8	Control Structures : Logical Operators; For Loops; While Loops; If-Else-End Constructions	Lecture	Ref 1 (251-270)
9	Midterm Exam: Writing Functions: M-File Function Construction Rules; Input and Output Arguments	Lecture	Ref 1 (289-300)
10	Function Workspaces; Functions and the MATLAB Search Path; Nested Functions. Calling in built MATLAB Functions for Differentiation, Integration and root finding such as the Bisection Method and Newton's method.	Blended	Ref 1 (367 -390)
11	Graphing: Two-Dimensional Graphics; The plot Function; Line styles; Markers and Colors; Axes and their Labels; Plot Grids; Plotting Polynomials	Blended	Ref 1 (391-410)
12	Curve Fitting; Interpolation; Plotting Some Basic Mathematical Functions.	Blended	Ref 1 (411-422)
13	Multiple Plots; Three-Dimensional Graphics: Scalar Functions of Two Variables; Mesh Plots; Surface Plots; Contour Plots.	Blended	Ref 2 (223-240)
14	Some Advanced Programming Assignments.	Blended	Ref 2 (241-269)
15	Some Advanced Programming Assignments.	Blended	Ref 2 (270-300)
16	Final Exam		

Schedule of asynchronous interactive activities (in the case of e-learning and blended learning)

Week	Task / activity	Reference	Expected results
1	Background	Ref 1	Self-reading and Discussion
2	Video 1 Solving exercises	Ref 1	Discussion in the class
3	Home work1: On the basics	Ref 1	Submit a pdf or word sheet
4	Quiz 1	Ref 1	Submitting on the E-learning

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5	Assignment 1: On Matlab Operations	Ref 1	Presentation
6	Video 2	Ref 1	Discussion in the class
7	Home work 2 On the subjects studied in weeks 4,5 and 6	Ref 1	Submit a pdf or word sheet
8	Assignment 2: On Plotting of functions	Ref 1+2	Submitted with the mid exam
9	Self-reading	Ref 1+2	Talk
10	Video3 Solving exercises	Ref 2	Discussion in the class
11	Home work 3: On the subjects studied after the Mid-Exam	Ref 3	Submit a pdf or word sheet
12	Self-reading	Ref 3	Talk
13	Quiz 2	Ref 4	Submitting on the E-learning
14	Presentation of the subject: Matlab for differential equations	Ref 4	Video
15	Video 4 Revision of all the course	Ref 1-5	Self-reading and Discussion
16	Final Exam		