



37. Course Specification of Computer Programming & Applications

I. Course Identification and General Information:						
1.	Course Title:	Computer Programming & Applications.				
2.	Course Code & Number:	ME201				
3.	Credit hours:	C.H				TOTAL CR. HRS.
		Th.	Seminar/Tu	Pr	Tr.	
		2	-	2	-	3
4.	Study level/ semester at which this course is offered:	Third Year-Second Semester.				
5.	Pre –requisite (if any):	Computer Skills.				
6.	Co –requisite (if any):	None.				
7.	Program (s) in which the course is offered:	Mechanical Engineering Program.				
8.	Language of teaching the course:	English Language.				
9.	Location of teaching the course:	Mechanical Engineering Department.				
10.	Prepared By:	Assoc. Prof. Dr. Radwan Al bouthigy				
11.	Date of Approval:					

II. Course Description:
<p>This course introduces mechanics engineer basic principles and concepts required to solve problems using computer programming. Subjects for the course include an introduction to computer programming, problem solving, building simple structured program based on functions using C/C++ programming language and MATLAB software. The objective of the course is to develop the programming skills of mechanic students to solve problems using C++ programming language and MATLAB m-files. Laboratory works include the working on C++ Language and MATLAB environments to build simple structured programming for solving different problems. Finally, students may work on group to demonstrate, solve, and presents solutions to simple mechanical practices in programming.</p>

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III. Alignments course intended learning outcomes (CILOs) of the course		Referenced PILOs
a1	Illustrate knowledge & understanding of basic programming principles and concepts relevant to mechanical engineering.	A1
a2	Explain the working principles and applications of C++ and MATLAB programming environments in solving problems relevant to mechanical engineering.	A4
b1	Investigate the principles of structured programming to model and solve mechanical problems using C++ and MATLAB environments in innovative ways.	B1
c1	Use C/C++ and MATLAB working environments to design, debug, and build structured program for solving mechanical engineering practice.	C1
c2	Apply rules and regulations of industrial safety while solving mechanical engineering practices in programming.	C3
d1	Evaluate the needs for programming solving to problems using C/C++ and MATLAB, or any modern programming environment as a life-long learning.	D3

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(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Illustrate knowledge & understanding of basic programming principles and concepts relevant to mechanical engineering.	Lectures, Laboratory, Seminars.	Examinations, Laboratory Reports, Homework Presentations
a2- Explain the working principles and applications of C++ and MATLAB programming environments in solving problems relevant to mechanical engineering.	Lectures, Projects.	Examinations, Homework Presentations, Individual and Group Project Reports

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Investigate the principles of structured programming to model and solve mechanical problems using C++ and MATLAB environments in innovative ways.	Lectures, Tutorials, Laboratory, Seminars. Projects	Examinations, Homework Presentations, Individual and Group Project Reports Laboratory Reports Presentations,

© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

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Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Use C/C++ and MATLAB working environments to design, debug, and build structured program for solving mechanical engineering practice.	Lectures, Laboratory, Seminars. Projects, Small Group	Examinations, Laboratory Reports, Presentations, Individual and Group Project Reports
c2- Apply rules and regulations of industrial safety while solving mechanical engineering practices in programming.	Tutorials, Laboratory, Seminars. Projects, Small Group	Examinations, Laboratory Reports, Presentations, Individual and Group Project Reports

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Evaluate the needs for programming solving to problems using C/C++ and MATLAB, or any modern programming environment as a life-long learning.	Seminars, Problems Based Learning, Projects.	Presentations, Reports

IV. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours
1.	Course Orientations and Introduction	a1, a2, d1	<ul style="list-style-type: none"> Course Orientations, Introduction to Programming Language and their Applications. 	1	2
2.	Problem Solving Using Programming and Input/ Output	a1, a2, b1	<ul style="list-style-type: none"> How to Solve Problems Using Programming? Waterfall Model Steps to Design and Construct C/C++ Program, 	2	4

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	Functions in C/C++		<ul style="list-style-type: none"> • Use of Flow-Chart Diagram and Pseudo Code • Problem Solving Steps of Mathematical Equation, • Basic Input/ Output Functions, • Simple C/C++ program • Program Layout and its Components • Variables Declarations, • Constraint on Variables Naming and Syntax 		
3.	Conditional Statements	a1, a2, b1, c2	<ul style="list-style-type: none"> • Arithmetic and Logic Operators Used in C/C++, • How to Write Mathematical & Logical Expressions in C/C++, • Break Word Operation, • Examples 	2	4
4.	Loops in C/C++	a1, a2, b1, c2	<ul style="list-style-type: none"> • Loops in C/C++, • Examples, • While Loop and Do While Loop Operations and Application • Examples. 	2	4
5.	Mid-Term Examination (Theoretical)	a1, a2, b1, c2, d1	All Previous Topics	1	2
6.	Functions in C/C++	a1, a2, b1, c2, d1	<ul style="list-style-type: none"> • Explanation the Use of Functions to Build Complete Structured Program, • Input, Output, and Retuned Variables/Values • Examples 	1	2
7.	Getting Starting with MATLAB, Variables, Functions, Flow Control,	a1, a2, b1, c2, d1	<ul style="list-style-type: none"> • Getting Start Working and Programming in MATLAB Environment, • Scripts (m-Files) in MATLAB • Explanation Similarities and Differences Between the 	2	4

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	and Basic Plotting.		Program in C/C++ and MATLAB, <ul style="list-style-type: none"> • Variables in MATLAB, • If Statement Syntax in MATLAB • Loops and Functions Syntax in MATLAB • Basic Plotting in MATLAB. 		
8.	Visualization and Solving Equations & Curve Fitting in MATLAB,	a2, b1, c2, d1	<ul style="list-style-type: none"> • Input / Output Dialog, • Line Plots, • Image/Surface Plots, • Arrays & Vectorization, • Solving Equations in MATLAB, • Linear Algebra, • Polynomials, • Differentiation/Integration, and • Differential Equations. 	2	4
9.	Advanced Programming Methods in MATLAB	a2, b1, c2, d1	<ul style="list-style-type: none"> • Symbolic Math, • Simulink, • File/Image Input/ Output, • Graphical User Interface 	2	4
10.	Final Exam	a1, a2, b1, c2, d1	ALL Topics	1	2
Number of Weeks /and Units Per Semester				16	32

B - Practical Aspect:				
Order	Tasks/ Experiments	Number of Weeks	Contact hours	Learning Outcomes
1.	<ul style="list-style-type: none"> • Getting Start Working with C/C++ Environment, • How to Make C/C++ Program File? • Building and Compiling it, 	3	6	a1, a2, c1, d1

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	<ul style="list-style-type: none"> • Building Simple C/C++ Program of Input/ Output Functions in C/C++, and Their Associated Libraries, • Solving Mathematical Equations in C++, • Design and Implementation of Simple I/O Program • Input Values (keyboard), • Output Results (Screen). 			
2.	<ul style="list-style-type: none"> • Design & Implementation of Simple C++ Conditional Program to Verify the Operation of If Statement and Switch.. Statement and the Break Keyword 	2	4	a2, c1, c2, d1
3.	<ul style="list-style-type: none"> • Programming with Loops in C++, • Design & Implementation of Simple C++ Program that Illustrate the Operation of Loop Statements 	2	4	a2, c1, c2, d1
4.	<ul style="list-style-type: none"> • Design and Implementation of Structured Program in C++ Using Functions, 	1	2	b1, c1, c2, d1
5.	<ul style="list-style-type: none"> • Starting with MATLAB, • MATLAB Working Environment, • Creating Manuscripts (m-Files) in MATLAB, • Manipulating Variables, Flow-Control Statements, Loops and Functions, Simple Line Plotting 	2	4	a2, b1, c1, c2, d1
6.	<ul style="list-style-type: none"> • Use MATLAB to Implement Programs that Illustrates the Following Concepts: Visualizations, Arrays (Vectorizations), Plotting, Manipulating Different Math Functions, • Reading and Writing Files/Images, • Simulink, and • Graphical User Interface in MATLAB. 	2	4	b1, c1, c2, d1

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7.	• Project Report Presentations,	1	2	a2, b1, c1, c2, d1
8.	• Final Examination (Practical)	1	2	a1, a2, b1, c1, c2, d1
Number of Weeks /and Units Per Semester		14	28	

V. Teaching strategies of the course:	
<ul style="list-style-type: none"> • Lectures, • Tutorials, • Laboratory, • Seminars. • Problems Based Learning, and • Projects 	

VI. Assignments:				
No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	Problem Solving Assignment	a1, a2, b1, c1, c2, d1	3 rd week	2
2	Flow Control Statements in C++	a2, c1, c2, d1	4 th & 5 th weeks	2
3	Loop Statements in C++	a2, c1, c2, d1	6 th & 7 th weeks	2
4	Functions in C++	a2, b1, c1, c2, d1	9 th week	2
5	Flow Control, Loops and Functions in MATLAB	a1, a2, b1, c1, c2, d1	10 th & 11 th weeks	2
6	Visualizations, Vectorizations, Equation Solving in MATLAB	a2, b1, c1, c2, d1	12 th & 13 th weeks	2
7	Simulink & GUI in MATLAB	a2, b1, c1, c2, d1	14 th & 15 th weeks	3
8	Homework	a1,a2.b1,c2,d1	Weekly	10
Total				25

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VII. Schedule of Assessment Tasks for Students During the Semester:					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments: Computer Based Laboratory Work & Homework	Weekly	25	16.7 %	a1, a2, b1, c1, c2, d1
2	Project Presentations	13 th week	10	6.7 %	a2, b1, c1, c2, d1
3	Mid-Term Exam (Theory)	8 th week	20	13.3 %	a1, a2, b1, c2, d1
4	Final Exam (Practical)	14 th week	20	13.3 %	a1, a2, b1, c1, c2, d1
5	Final Exam (Theory)	16 th week	75	50 %	a1, a2, b1, c2, d1
Total			150	100 %	

VIII. Learning Resources:	
<ul style="list-style-type: none"> Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher). 	
1- Required Textbook(s) (maximum two).	
1-	Paul Deitel, Harvey Deitel, 2010, How to Program using C/C++ - 5 th Edition- USA Pearson.
2-	Peter I. Kattan, 2008, MATLAB for Beginners: A Gentle Approach- Revised Edition-Petra Books, ISBN:978-1438203096.
2- Essential References.	
1-	Bjarne Stroustrup, 2013- the C++ Programming Language- 4 th edition- USA-Add Wesley Professional.
2-	Brian R, Hunt Roland L, Lipsman, Jonathan M- 2014 - A Guide in MATLAB Beginners and Experienced Users- 3 rd Edition- Amazon.
3- Electronic Materials and Web Sites etc.	
1-	To get MATLAB student Version, https://msca.mit.edu/cgi-bin/matlab
2-	https://mathworks.com/MATLAB
3-	http://nptel.iitm.ac.in
4-	https://ocw.mit.edu/courses .

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5- Lectures will be prepared by lecturer-

I. Course Policies:	
1	<p>Class Attendance:</p> <p>- The student should be attending not less than 75% of total contact hours of the subject, otherwise he will not able to take exam and be considered as an exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic.</p>
2	<p>Tardy:</p> <p>- For lateness in attending the class, the student will be initially notified. If he repeats late in attending class he will be considered absent.</p>
3	<p>Exam Attendance/Punctuality:</p> <p>- The student should attend the exam on time. He is permitted to attend the exam half one hour from exam beginning, after that he/she will not be permitted to take exam and he/she is considered absent in the exam.</p>
4	<p>Assignments & Projects:</p> <p>- In general one assignment is given after each chapter of a course. The student should submit the assignment on time, mostly one week after giving the assignment</p>
5	<p>Cheating:</p> <p>- For cheating in exam, the student is considered as failure. In case the cheating is repeated three times during study the student will be disengaged from the Faculty</p>
6	<p>Plagiarism:</p> <p>Plagiarism is the attending of the student the exam of a course instead of other student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Affair Council of the university.</p>
7	<p>Other policies:</p> <ul style="list-style-type: none"> - The mobile phone is not allowable to be used during class lecture. It must be switched off, otherwise the student will be ordered to leave the lecture room. - The mobile phone is not allowed to be taken during the examination time. - Lecture notes and assignments may be given directly to students using soft or hard copy.

Reviewed By	Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi
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Faculty of Engineering
Mechanical Engineering Department
Mechanical Engineering Program



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