MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

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| **Module Information****معلومات المادة الدراسية** |
| **Module Title** | Computer Programming II | **Module Delivery** |
| **Module Type** | B (Basic learning activities) | * **☐ Theory**

 **☐ Lecture*** **☒ Lab**
* **☐ Tutorial**
* **☐ Practical**
* **☐ Seminar**
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| **Module Code** | AME224 |
| **ECTS Credits**  | 5 |
| **SWL (hr/sem)** | 125 |
| **Module Level** | 2 | **Semester of Delivery** | 4 |
| **Administering Department** | AME |  **College** |  Type College Code |
| **Module Leader** | Huda Hatam Dalef |  **e-mail** | huda@kecbu.uobaghdad.edu.iq |
| **Module Leader’s Acad. Title** | Lecturer | **Module Leader’s Qualification** | Ph.D. |
| **Module Tutor** | Waleed Khaleel Shihan |  **e-mail** | Eng.waleed.kha@gmail.com |
| **Peer Reviewer Name** |  |  **e-mail** |  |
| **Scientific Committee Approval Date** | 01/06/2023 | **Version Number** | 1.0 |

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| **Relation with other Modules****العلاقة مع المواد الدراسية الأخرى** |
| **Prerequisite module** | Computer Programming I (AME122) | **Semester** | 2 |
| **Co-requisites module** | None | **Semester** |  |

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| **Module Aims, Learning Outcomes and Indicative Contents****أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية** |
| **Module Objectives****أهداف المادة الدراسية** | 1. To provide a foundation in programming for engineering problem solving using the MATLAB software package.
2. To develop the skills, analyze, break down an engineering program, think computationally and start building their programming skills to solve it algorithmically by using MATLAB.
3. To provide a comprehensive understanding of Matlab software.
4. To learn how to write code for solving the problems and automate tasks by logical thinking, algorithm design, debugging, and code documentation.
5. To learn programming concepts such as variables, data types, control structures (conditionals and loops), functions, and basic algorithms.
6. To deepen students' programming skills and prepare them for real-world software development scenarios.
7. To gain exposure to debugging techniques, software testing, and version control systems.Top of Form
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| **Module Learning Outcomes****مخرجات التعلم للمادة الدراسية** | 1. Understand the main features of the MATLAB development environment
2. Design simple algorithms to solve problems and implement larger-scale programs, utilizing concepts such as classes, inheritance, encapsulation, and polymorphism.
3. Write simple programs in MATLAB to solve scientific and mathematical problems
4. Plot 2D graph of a function by specifying the range of x values for which the function is to be plotted
5. Become familiar with common inputs used in control system design and analysis by using different operators such as Arithmetic Operators and Relational Operators, and understand their effects on system behavior.
6. Evaluate or test the system by specifying one or more conditions to be, along with a statement or statements to be executed if the condition is determined to be true, and optionally, other statements to be executed if the condition is determined to be false.
7. Create various control structures that allow for more complicated execution paths by using a loop statement. It allows to execute a statement or group of statements multiple times.
8. Cover topics such as Vectors, object-oriented programming, data structures, algorithms, file handling, and software development methodologies.
9. Create a matrix by entering elements in each row as comma or space delimited numbers and using semicolons to mark the end of each row.
10. Build special arrays. For all these functions, a single argument creates a square array, double arguments create rectangular array.
11. load data from an external file by using the importdata function that allows loading various data files of different formats.
12. Export data by writing into files MATLAB that allows to use different data in another application and reads ASCII files.
13. Understand various numeric classes that include signed and unsigned integers, and single-precision and double-precision floating-point numbers.
14. Creating a character string to type the commands prompt
15. familiar with the plotting and graphics capabilities of MATLAB, such as Drawing bar charts, Drawing contours and Three dimensional plots

As above, students will have an understanding of various programming constructs and how they can be used to solve a computational problem at the end of the Computer Programming II module. It equips students with the ability to design and develop more complex and efficient programs, fostering their capacity to tackle advanced programming challenges in various domains. |
| **Indicative Contents****المحتويات الإرشادية** | Indicative content includes the following;* Introduction to Matlab (features of Matlab, Uses and local Environment setup). [5 hrs]
* Variables and Commands (format command, input/ output commands and commands for working with system). [5 hrs]
* M-File and Data Types (M-Files, creating and running script file, data type available in Matlab, data type conversion and determination of data types). [5 hrs]
* Plotting (Adding titles, labels, grid lines and scale of graph / drawing multiple functions on the same graph, and setting axis scales with color on graph. [5 hrs]
* Operators (Arithmetic Operators with functions, Logical Operators with functions). [5 hrs]
* Decision making (if…end statement, if…else…end statement, if…elseif…end statement and the switch statements). [5 hrs]
* Loop types (while Loop, for Loop and loop control statements, the break statement and continue statement). [5 hrs]
* Vectors (row vectors, column vector, vector operations, addition and subtraction of vectors, scale multiplication of vectors and transpose of a vector). [5 hrs]
* Matrix (Referencing the elements of a matrix, delete a row or column, matrix operation addition and subtraction of matrix, transpose of a matrix, multiplication and determinate of a matrix). [5 hrs]
* Arrays (special arrays in Matlab, a magic square, array functions and sorting arrays). [5 hrs]
* Data import (low-level file I/O and import text data files with low-level I/O). [5 hrs]
* Data output (writing to diary files and exporting data to text data files with low-level I/O). [5 hrs]
* Numbers (conversion to vaiouse numeric data types, smallest / largest integers and smallest / largest floating point numbers). [5 hrs]Top of Form
* Strings (Rectangular characters’ array, combining strings into a cell array and strings functions in Matlab). [5 hrs]
* Graphics (Drawing bar charts, Drawing contours and Three dimensional plots). [5 hrs]
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| **Learning and Teaching Strategies****استراتيجيات التعلم والتعليم** |
| **Strategies** | The learning and teaching strategies in the Computer Programming II (Matlab Software) module involve lectures for covering topics such as data structures, algorithms, object-oriented programming, file handling, and software development methodologies. |

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| **Student Workload (SWL)****الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا** |
| **Structured SWL (h/sem)****الحمل الدراسي المنتظم للطالب خلال الفصل** | 78 | **Structured SWL (h/w)****الحمل الدراسي المنتظم للطالب أسبوعيا** | 5 |
| **Unstructured SWL (h/sem)****الحمل الدراسي غير المنتظم للطالب خلال الفصل** | 47 | **Unstructured SWL (h/w)****الحمل الدراسي غير المنتظم للطالب أسبوعيا** | 3 |
| **Total SWL (h/sem)****الحمل الدراسي الكلي للطالب خلال الفصل** | **125** |

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| **Module Evaluation****تقييم المادة الدراسية** |
| **As** | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 3 | 15% (15) | 4, 7, 14 | LO #1- #3, LO #5 and #6, LO #8 - #13 |
| **Assignments** | 3 | 15% (15) | 3, 5, 6, 15  | LO #1 and #2, LO #3 and # 4, LO #5, LO #7 - #15 |
| **Projects / Lab.** | 1 | 10% (10) | Continuous | All  |
| **Report** |  |  |  |  |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 8 | LO #1 - #7 |
| **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | 100% (100 Marks) |  |  |

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| **Delivery Plan (Weekly Syllabus)****المنهاج الأسبوعي النظري** |
| **Week**  | **Material Covered** |
| **Week 1** | Introduction to Matlab  |
| **Week 2** | Variables and Commands |
| **Week 3** | M-Files and Data Types |
| **Week 4** | Plotting |
| **Week 5** | Operators |
| **Week 6** | Decision Making  |
| **Week 7** | Loop Types |
| **Week 8** | Vectors |
| **Week 9** | Matrix |
| **Week 10** | Arrays |
| **Week 11** | Data Import |
| **Week 12** | Data Output |
| **Week 13** | Numbers |
| **Week 14** | Strings |
| **Week 15** | Graphics |
| **Week 16** | **Preparatory week before the final Exam** |

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| **Delivery Plan (Weekly Lab. Syllabus)****المنهاج الأسبوعي للمختبر** |
| **Week**  | **Material Covered** |
| **Week 1** | Lab 1: Environment of Matlab program |
| **Week 2** | Lab 2: Basic Input and Output of Matlab program |
| **Week 3** | Lab 3: Plotting |
| **Week 4** | Lab 4: Decision Making |
| **Week 5** | Lab 5: Arrays and Matrix |
| **Week 6** | Lab 6: Data Import / Data Output |
| **Week 7** | Lab 7: Graphics |

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| **Learning and Teaching Resources****مصادر التعلم والتدريس** |
|  | **Text** | **Available in the Library?** |
| **Required Texts** | Solving Mechanical Engineering Problems with MATLAB, Dr Simin Nasseri, Website: <http://facultyweb.kennesaw.edu/>snasser1/ | No |
| **Recommended Texts** | Introduction to matlab for Engineering students, David Houcque, Northwestern University, (version 1.2) | No |
| **Websites** |  |

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|  **Grading Scheme****مخطط الدرجات** |
| **Group** | **Grade** | **التقدير** | **Marks %** | **Definition** |
| **Success Group****(50 - 100)** | **A -** Excellent | **امتياز** | 90 - 100 | Outstanding Performance |
| **B -** Very Good | **جيد جدا**  | 80 - 89 | Above average with some errors |
| **C -** Good | **جيد** | 70 - 79 | Sound work with notable errors |
| **D -** Satisfactory | **متوسط**  | 60 - 69 | Fair but with major shortcomings |
| **E -** Sufficient | **مقبول**  | 50 - 59 | Work meets minimum criteria |
| **Fail Group****(0 – 49)** | **FX –** Fail | **راسب (قيد المعالجة)** | (45-49) | More work required but credit awarded |
| **F –** Fail | **راسب** | (0-44) | Considerable amount of work required |
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| **Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. |