MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

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| **Module Information****معلومات المادة الدراسية** |
| **Module Title** |  Mathematics II | **Module Delivery** |
| **Module Type** | Basic learning | * **☒ Theory**
* **☒ Lecture**
* **☐ Lab**
* **☒ Tutorial**
* **☐ Practical**
* **☐ Seminar**
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| **Module Code** | ENG102 |
| **ECTS Credits**  | 6 |
| **SWL (hr/sem)** | 051 |
| **Module Level** | UGx11 1 | **Semester of Delivery** | **2** |
| **Administering Department** |  |  **College** |  **Engineering College** |
| **Module Leader** | **Assist. Lect Hasan Allawi** |  **e-mail** | Hassan.as@uowa.edu.iq |
| **Module Leader’s Acad. Title** | **Assist. Lect**  | **Module Leader’s Qualification** | Msc |
| **Module Tutor** | Name (if available) |  **e-mail** | E-mail |
| **Peer Reviewer Name** | Name |  **e-mail** | E-mail |
| **Scientific Committee Approval Date** | 1/6/2023 | **Version Number** | 1.0 |

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| **Relation with other Modules****العلاقة مع المواد الدراسية الأخرى** |
| **Prerequisite module** |  Mathematics I | **Semester** | 1 |
| **Co-requisites module** | None | **Semester** |  |

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| **Module Aims, Learning Outcomes and Indicative Contents****أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية** |
|  **Module Aims****أهداف المادة الدراسية** | The aims of a mathematics module are to provide students with an understanding of mathematical concepts, skills, and techniques that can be applied to a range of real-world problems. This course aims to introduce the concepts of calculus, complex numbers, vectors, and linear algebra. Additionally, the module aims to prepare students for future academic and professional pursuits that require mathematical proficiency. |
| **Module Learning Outcomes****مخرجات التعلم للمادة الدراسية** | By the end of this module the student should be able to:1. Use asymptotic, first and second derivatives to graph functions.
2. Apply advanced rules/techniques of integration to compute integrals. sketch graphs of functions; approximation of functions.
3. Describe the polar coordinate system.
4. Convert from rectangular coordinates to polar coordinates.
5. Apply matrix techniques and elementary theory to problem in engineering.
6. Solve systems of linear equations and find the inverse of a matrix.
7. Perform the basic algebra operation of vectors.
8. Evaluate the scalar and vector product of two vectors.
9. Evaluate the gradient, divergence and curl of various scalar and vector fields.
10. Complex Numbers: Algebra of complex numbers, Solution of polynomial equations with complex roots, Argand Diagrams, Polar form of complex numbers, Exponential form of complex numbers, and Series expansion of trigonometric and exponential functions, De Moivre’s theorem.
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| **Indicative Contents****المحتويات الإرشادية** | The Indicative Contents of a Mathematics module will depend on the level and scope of the course. However, some common topics that may be covered in a mathematics module include:1. Arithmetic: Basic mathematical operations such as addition, subtraction, multiplication, and division.
2. Algebra: The study of mathematical symbols and the rules for manipulating these symbols to solve equations and represent real-world situations.
3. Geometry: The study of shapes, sizes, positions, and measurements of objects in space.
4. Calculus: The study of mathematical concepts such as limits, derivatives, and integrals.

Overall, the Indicative Contents of a Mathematics module aims to provide students with a comprehensive understanding of mathematical concepts and their applications in various fields of study. |

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| **Learning and Teaching Strategies****استراتيجيات التعلم والتعليم** |
| **Strategies** | The main strategy that will be adopted in delivering this module is to encourage students’ participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students. |

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| **Student Workload (SWL)****الحمل الدراسي للطالب** |
| **Structured SWL (h/sem)****الحمل الدراسي المنتظم للطالب خلال الفصل** | 78 | **Structured SWL (h/w)****الحمل الدراسي المنتظم للطالب أسبوعيا** | 6 |
| **Unstructured SWL (h/sem)****الحمل الدراسي غير المنتظم للطالب خلال الفصل** | 72 | **Unstructured SWL (h/w)****الحمل الدراسي غير المنتظم للطالب أسبوعيا** | 4 |
| **Total SWL (h/sem)****الحمل الدراسي الكلي للطالب خلال الفصل** | 150 |

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| **Module Evaluation****تقييم المادة الدراسية** |
| **As** | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 2 | 10% (10) | 5, 10 | LO #1, 2, 10 and 11 |
| **Assignments** | 2 | 10% (10) | 2, 12 | LO # 3, 4, 6 and 7 |
| **Projects / Lab.** | 1 | 10% (10) | Continuous |  |
| **Report** | 1 | 10% (10) | 13 | LO # 5, 8 and 10 |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 7 | LO # 1-7 |
| **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | 100% (100 Marks) |  |  |

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| **Delivery Plan (Weekly Syllabus)****المنهاج الاسبوعي النظري** |
| **Week**  | **Material Covered** |
|  **Week 1****Week 2****Week 3** | **Transcendental Functions:** Inverse Functions and Their Derivatives, Natural Logarithms, Exponential Functions, Indeterminate Forms and L’Hôpital’s Rule, Inverse Trigonometric Functions, Hyperbolic Functions and their inverse. |
| **Week 4****Week 5** | **Integration Techniques:** Integration by Parts, Trigonometric Integrals, Trigonometric Substitutions, Partial Fractions, Improper Integrals. |
| **Week 6** | **Polar Coordinates:** Polar Coordinates system, Graphing Polar Coordinate Equations, Areas and Lengths in Polar Coordinates |
| **Week 7****Week 8****Week 9** | **Matrices and Determinants**: Definitions, Properties and operations, Determinant, Inverse of a matrix, Solution of linear system equations, Eigenvalues and Eigenvectors**.** |
| **Week 10 Week 11 Week 12** | **Vector Theory:** Three-Dimensional Coordinate Systems, Representation of vectors in space, unit vectors, Scalar Product, Vector Product, Lines and Planes in Space, Vector Function. |
| **Week 13****Week 14** **Week 15** | **Complex Numbers:** Complex numbers and operations, Solution of quadratic equations, The argand diagram, Polar form of a complex number, Demoiver’s theorem. |
| **Week 16** | Preparatory week before the final Exam |

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| **Learning and Teaching Resources****مصادر التعلم والتدريس** |
|  | **Text** | **Available in the Library?** |
| **Required Texts** | George B. Thomas Jr., "CALCULUS", 14th Ed  | Yes |
| **Recommended Texts** | 1. Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th Ed.
2. Schaum's Outline of College Mathematics, Fourth Edition.
3. Mary Attenborough, "Mathematics for Electrical Engineering and Computing", 1st Ed.
 | No |
| **Websites** | Topics in a Calculus -Wolfram Mathworld. |

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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. |