MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

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| **Module Information**  **معلومات المادة الدراسية** | | | | | | | |
| **Module Title** | Mathematics IV | | | | **Module Delivery** | | |
| **Module Type** | Basic Learning Activity | | | | * **☒ Theory** * **☐ Lecture** * **☐ Lab** * **☒ Tutorial** * **☐ Practical** * **☐ Seminar** | | |
| **Module Code** | MATH224 | | | |
| **ECTS Credits** | 5 | | | |
| **SWL (hr/sem)** | 125 | | | |
| **Module Level** | | UGI | **Semester of Delivery** | | | | Two |
| **Administering Department** | | Type Dept. Code | **College** | Type College Code | | | |
| **Module Leader** | Azhar Malik | | **e-mail** | Azhar.m.alnaseri@uotechnology.edu.iq | | | |
| **Module Leader’s Acad. Title** | | Senior Lecturer | **Module Leader’s Qualification** | | | | M.Sc. |
| **Module Tutor** |  | | **e-mail** |  | | | |
| **Peer Reviewer Name** | |  | **e-mail** |  | | | |
| **Scientific Committee Approval Date** | | /5/2024 | **Version Number** | | | 1.0 | |

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| **Relation with other Modules**  **العلاقة مع المواد الدراسية الأخرى** | | | |
| **Prerequisite module** | MATH224 | **Semester** | Two |
| **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. Helping the student to possess knowledge of engineering mathematics. 2. Possessing problem-solving skills. 3. Develop the ability to deduce, generalize, and use their own logic. 4. Ability to analyze and interpret data. |
| **Module Learning Outcomes**  **مخرجات التعلم للمادة الدراسية** | 1. Solving double integral to find area. Finding inverse double integral in Cartesian coordinates. 2. Finding double integral in Polar coordinates. Converting from polar to rectangular form and vice versa, graphing polar equations. 3. Standard Polar Graphs (circle, cardioids and leaves rose) then finding area for them. 4. Dealing with dot product vectors and applications. 5. Dealing with cross product vectors and applications. 6. Solving Partial Differentiations and their Properties. 7. Finding the Gradient & directional derivative, Maxima, Minima & Saddle points. |
| **Indicative Contents**  **المحتويات الإرشادية** | **Part A – Double Integrals.**  Focuses on double integral, definition, area in curves, reverse double integral. Polar Coordinates and Graphs, converting from polar to rectangular form and vice versa, graphing polar equations, area in polar curve. Standard Polar Graphs: Circles, Cardioids, Roses. [12 hrs]  Revision problem tutorial sessions [6 hrs]  **Part B – Vectors.**  Focuses on vectors in space. Product of two vectors (dot product) and  applications. Angles between vectors. Product of two vectors (cross product) and applications. Equations of lines & planes in space. Angles between planes. [8 hrs]  Revision problem tutorial sessions [4 hrs]  **Part C – Partial Differentiations.**  Definitions. Properties. Total differential and Chain rule. Gradient & Directional derivatives. Maxima, minima & saddle points. [10 hrs]  Revision problem tutorial sessions [5 hrs] |

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| **Learning and Teaching Strategies**  **استراتيجيات التعلم والتعليم** | |
| **Strategies** | The primary approach for presenting this module will be encouraging students to participate in the activities, as well as enhancing and improving their critical thinking abilities. This will be accomplished through lectures, tutorials, debates, and assessing activities. |

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| **Student Workload (SWL)**  **الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا** | | | |
| **Structured SWL (h/sem)**  **الحمل الدراسي المنتظم للطالب خلال الفصل** | 48 | **Structured SWL (h/w)**  **الحمل الدراسي المنتظم للطالب أسبوعيا** | 3 |
| **Unstructured SWL (h/sem)**  **الحمل الدراسي غير المنتظم للطالب خلال الفصل** | 77 | **Unstructured SWL (h/w)**  **الحمل الدراسي غير المنتظم للطالب أسبوعيا** | 5 |
| **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** | 2 | 10% (10) | 2 and 4 | LO #1 - #4 and #5 - #7 |
| **Assignments** | 2 | 10% (10) | 5 and 9 | LO #1 - #5 and #6 - #7 |
| **Homework** | 2 | 10% (10) | 10 and 11 | LO #1 - #7 |
| **Report** | 1 | 10% (10) | 13 | LO #1 - #7 |
| **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 الاسبوعي النظري** | |
| **Week** | **Material Covered** |
| **Week 1** | Double integral, definition, area in curves. |
| **Week 2** | Finding inverse double integral in Cartesian coordinates. |
| **Week 3** | Finding double integral in Polar coordinates. |
| **Week 4** | Converting from polar to rectangular form and vice versa, graphing polar equations. |
| **Week 5** | Standard Polar Graphs (circle and cardioids) then finding area for them. |
| **Week 6** | Standard Polar Graphs (leaves rose) then finding area. |
| **Week 7** | Vectors in space and their properties. |
| **Week 8** | Product of two vectors (dot product) and applications. Angles between vectors |
| **Week 9** | Product of two vectors (cross product) and applications. |
| **Week 10** | Equations of lines & planes in space. |
| **Week 11** | Angles between planes. |
| **Week 12** | Partial Differentiations**,** Definitions and Properties. |
| **Week 13** | Total differential and Chain rule. |
| **Week 14** | Gradient & Directional derivatives. |
| **Week 15** | Maxima, minima & saddle points. |
| **Week 16** | **Preparatory week before the final Exam** |

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| **Delivery Plan (Weekly Tutorial)**  **المنهاج الاسبوعي للدرس التدريبي** | |
| **Week** | **Material Covered** |
|  | Each weak a questions sheet will be solved and discussed related to the material covered in the theoretical lecture. |

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| **Learning and Teaching Resources**  **مصادر التعلم والتدريس** | | |
|  | **Text** | **Available in the Library?** |
| **Required Texts** | Joel R. Hass, Christopher E. Heil, Maurice D. Weir, "Thomas' Calculus: Early Transcendentals", Pearson Education, 14th Edition, (January 1, 2017), ISBN-13 ‏ : ‎ 978-0134439020.  Advanced Mathematics for Engineering studies (أز رياض احمد عزت) | Yes |
| **Recommended Texts** | Anthony Croft, Robert Davison, "Mathematics for Engineers: A Modern Interactive Approach", Prentice Hall, 3rd edition, (January 1, 2008), ISBN-13 ‏ : ‎ 978-0132051569. | No |
| **Websites** | https://www.khanacademy.org/math/integral-calculus/ic-integration | |

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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. | | | | |