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| | Ministry of Higher Education and Scientific Research - Iraq<br><br>University of Warith Al_Anbiya<br>College of Engineering<br>Aircraft Engineering Department | |

# MODULE DESCRIPTOR FORM

## Module Information

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| **Module Title** | Mathematics II | | **Module Delivery** | |
| **Module Type** | CORE | | | |
| **Module Code** | AIE122 | | **Theory** | |
| **ECTS Credits** | 6 | | | |
| **SWL (hr/sem)** | 150 | | | |
| **Module Level** | 1 | **Semester of Delivery** | 2 | |
| **Administering Department** | Aircraft | **College** | Engineering | |
| **Module Leader** | Aws Akram | **e-mail** | | |
| **Module Leader's Acad. Title** | | **Module Leader's Qualification** | Doctorate | |
| **Module Tutor** | | **e-mail** | | |
| **Peer Reviewer Name** | | **e-mail** | | |
| **Review Committee Approval** | 26/09/2025 | **Version Number** | 2025 | |

## Relation With Other Modules

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| **Prerequisite module** | MATH112 | **Semester** | 1 |
| **Co-requisites module** | None | **Semester** | |

## Module Aims, Learning Outcomes and Indicative Contents

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| **Module Aims** | 1. To provide a course of high academic quality in Mathematics in a challenging and supportive learning environment that encourages students to reach their full potential, personally and academically.<br>2. To provide a course that is suitable both for students aiming to pursue research and for students going into other careers.<br>3. To provide an integrated system of teaching which can be tailored to the needs of individual students.<br>4. To develop in students the capacity for learning and clear logical thinking.<br>5. To continue to attract and select students of outstanding quality.<br>6. To provide an intellectually stimulating environment in which students have the opportunity to develop their skills and enthusiasm to their full potential. |
| **Module Learning Outcomes** | Knowledge and Understanding: This Course will develop learners' ability to:<br>1. Understand and use mathematical concepts and relationships<br>2. Select and apply operational skills in algebra, geometry, trigonometry and statistics within mathematical contexts<br>3. Select and apply skills in numeracy<br>4. Use mathematical models<br>5. Use mathematical reasoning skills to interpret information, select a strategy to solve a problem, and communicate solutions.<br>Subject-specific skills: It is expected that learners will develop the following:<br>6. Broad, generic skills through this Course.<br>7. Skills for Learning, and drawn from the main skills areas listed below.<br>8. Skills for Life<br>9. and Skills for Work<br>These must be built into the Course where there are appropriate opportunities. |
| **Indicative Contents** | Indicative content includes the following.<br>**Integration:**<br>Definite integration, basic integration formulas, integration by parts, trigonometric functions integrals, odd and even powers of sine and cosine, trigonometric functions substitutions, completing the square method, integration of rational functions by partial fractions. [34 hrs]<br>**Applications of definite integrals:**<br>The area under the graph of nonnegative functions, mean value theorem for definite integrals, definite integral, polar coordinates, double integral, distance, velocity and acceleration, volumes by slicing and rotation about an axis, volumes by cylindrical shells, lengths of plane curves, areas of surfaces |

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| | of revolution. [25 hrs]<br>**Complex numbers:**<br>Algebra of complex numbers, Argand diagrams, Euler's formula, De Moivre's theorem. Roots. [12 hrs]<br>**Curve fitting:**<br>Simple linear regression, Polynomial regression. [12 hrs]<br>**General Applications** [4 hrs] |
| **Learning and Teaching Strategies** | |
| **Strategies** | All lectures reflect the higher values, purposes and principles. They offer flexibility, provide more time for learning, focus on skills and applying to learn, and scope for personalization and choice.<br>In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practices, enabling learners to achieve the highest standards they can.<br>This course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities, as well as skills for learning, skills for life and skills for work. |

| **Student Workload (SWL)** | | | |
|---|---|---|---|
| **Structured SWL (h/sem)** | 63 | **Structured SWL (h/w)** | 4 |
| **Unstructured SWL (h/sem)** | 87 | **Unstructured SWL (h/w)** | 5.8 |
| **Total SWL (h/sem)** | 150 | | |

## Module Evaluation

| | | Time/ Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|---|---|---|---|---|---|
| **Formative assessment** | **Quizzes** | 4 | 20% (20) | 3, 6, 9, 12 | LO #1, 2, 3,4 and 9 |
| | **Assignments** | 2 | 10% (10) | 5, 10 | LO #6, 7 |
| | **Projects / Lab.** | - | - | - | - |
| | **Report** | 1 | 10% (10) | 13 | LO #8 |
| **Summative assessment** | **Midterm Exam** | 2 hrs. | 10% (10) | 7 | LO # 1-5 |
| | **Final Exam** | 3 hrs. | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

## Delivery Plan (Weekly Syllabus)

| | Material Covered |
|---|---|
| **Week 1** | **Integration:** Definite integration. Basic integration formulas. |
| **Week 2** | **Methods of Integration:**<br>Integration by parts. |
| **Week 3** | Trigonometric functions integrals. |
| **Week 4** | Odd and even powers of sine and cosine. |
| **Week 5** | Completing the square method. |
| **Week 6** | Partial fractions. |
| **Week 7** | **Applications of definite integrals:**<br>The area under the graph of nonnegative functions. Mean value theorem for definite integrals. Definite integral. Double integral. |
| **Week 8** | Distance, velocity and acceleration. Volumes by slicing and rotation about an axis. |
| **Week 9** | Volumes by cylindrical shells. Lengths of plane curves. Areas of surfaces of revolution. |
| **Week 10** | **Polar coordinates** |
| **Week 11** | **Complex numbers:**<br>Algebra of complex numbers. Argand diagrams. Euler's formula. |
| **Week 12** | De Moivre's theorem. Roots. |
| **Week 13** | **Curve fitting:**<br>Simple linear regression. |
| **Week 14** | Polynomial regression. |
| **Week 15** | **General Applications** |
| **Week 16** | **Preparatory week before the Final Exam** |

## Delivery Plan (Weekly Lab. Syllabus)

| | Material Covered |
|---|---|
| **Week 1** | Exp. 1: |
| **Week 2** | Exp. 2: |
| **Week 3** | Exp. 3: |
| **Week 4** | Exp. 4: |
| **Week 5** | Exp. 5: |
| **Week 6** | Exp. 6: |
| **Week 7** | Exp. 7: |

| Learning and Teaching Resources | | |
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| | **Text** | **Available in the Library?** |
| **Required Texts** | George B. Thomas, Jr., Maurice D. Weir and Joel Hass, Thomas' calculus, 12th edition, Addison Wesley, 2010. | Yes |
| **Recommended Texts** | H.S. Gangwar, Prabhakar Gupta. A textbook engineering mathematics-I. Second edition, 2010. | No |
| **Websites** | | |

**APPENDIX:**

| GRADING SCHEME | | | | |
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| **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 | مقبول بقرار | (45-49) | More work required but credit awarded |
| | **F** – Fail | راسب | (0-44) | Considerable amount of work required |
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Note:

NB 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.