# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | Engineering Mathematics | | | **Module Delivery** | |
| **Module Type** | Support | | | ☒**Theory**<br>☐**Lecture**<br>☐**Lab**<br>☒**Tutorial**<br>☐**Practical**<br>☐**Seminar** | |
| **Module Code** | MIET2104 | | | | |
| **ECTS Credits** | **4** | | | | |
| **SWL (hr/sem)** | **100** | | | | |
| **Module Level** | | UGII | **Semester of Delivery** | | 3 |
| **Administering Department** | | MIET | **College** | EETC | |
| **Module Leader** | ALI ABDULKAREEM RAHEEM | | **e-mail** | nncu097hnb@gmail.com | |
| **Module Leader's Acad. Title** | | Lecturer | **Module Leader's Qualification** | | Ph.D. |
| **Module Tutor** | ALI ABDULKAREEM RAHEEM | | **e-mail** | nncu097hnb@gmail.com | |
| **Peer Reviewer Name** | | ALI.A.RAHEEM | **e-mail** | Nncu097hnb@gmail.com | |
| **Scientific Committee Approval Date** | | 2026/09/1 | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | Integral Mathematics-MIET1204 | **Semester** | UGI-S2 |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
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| **Module Objectives**<br>أهداف المادة الدراسية | 1. The goal of this module is to give students the necessary mathematical skills and tools to solve a range of design engineering issues.<br>2. Demonstrate basic knowledge and understanding of a core of vector analysis, linear algebra and applied mathematics.<br>3. Introduce student to Infinite and power series.<br>4. Understand how to solve Differential equations of the 1st and nth order.<br>5. Introduce student to Integral Transforms: Fourier series and Laplace transform and their applications in signal and systems. |
| **Module Learning Outcomes**<br>مخرجات التعلم للمادة الدراسية | 1. Define a vector, represent a vector by a directed straight line, add vectors, write a vector in terms of component vectors, write a vector in terms of component unit vectors, set up a coordinate system for representing vectors, and obtain the direction of a vector.<br>2. Explain the concept of a vector field and make sketches of simple vector fields in the plane<br>3. Memorize algebraic definitions and explain geometric meanings of dot and cross products<br>4. Compute dot and cross products given either algebraic or geometric information.<br>5. Apply dot or cross product to determine angles between vectors, scalar and vector projections, and volumes of parallelipipeds.<br>6. Memorize change of coordinate formulae between rectangular and cylindrical coordinate systems.<br>7. Memorize change of coordinate formulae between rectangular and spherical coordinate systems.<br>8. Identify coordinate surfaces in cylindrical and spherical coordinate systems as well as Converting equations between rectangular, cylindrical and spherical coordinate systems.<br>9. know what is meant by infinite series & its convergence,<br>10. Learn formation of Differential Equations - solutions of first order Differential Equations: Homogeneous-Non-homogeneous - Exact – Non-exact and solutions of nth order Differential Equations as well.<br>11. Definition of Laplace and Fourier transforms, Condition for existence, Laplace |

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| | transform of standard functions, Properties of Laplace transform,<br>12. Application of Laplace and Fourier transforms to ordinary differential equations. |
| **Indicative Contents**<br>المحتويات الإرشادية | Indicative content includes the following.<br><br>Vector analysis,Vector fields,Orthogonal vectors and Dot Product, Parallel vectors and Cross Product, in addition to Partial Derivatives: Formulas for Del operation. [25 hrs]<br><br>Polar Coordinates,Cylindrical Coordinates Systems, Spherical Coordinates Systems, and Infinite series.Power series. [23 hrs]<br><br>Convergence and divergence series, Differential equation of the first order, Differential equation of *nth* order.Integral Transforms: Fourier series and Laplace transform.[25 hrs] |

| **Learning and Teaching Strategies**<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | The major approach used to offer this module will be to promote student engagement in the exercises while also enhancing and broadening their critical thinking abilities. Classes and interactive lessons will be used to achieve this. |

| **Student Workload (SWL)**<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 63 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 4 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 37 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 2 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **100** | | |

## Module Evaluation

تقييم المادة الدراسية

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|---|---|---|---|---|---|
| Formative assessment | Quizzes | 2 | 5% (10) | 4 and 10 | LO #1- #4 and #5 - #9 |
| | Online assignments | 2 | 5% (10) | 3 and 6 | LO #1- #4 and #5 - #8 |
| | Report | 1 | 10% (10) | 14 | LO #1- #6 and #7 - #12 |
| | OnSite assignment | 2 | 5% (10) | 5 and 14 | LO #1- #5 and #6- #12 |
| Summative assessment | Midterm Exam | 2hr | 10% (10) | 7 | LO #1 - #8 |
| | Final Exam | 3hr | 50% (50) | 16 | LO #1- #12 |
| Total assessment | | | 100% (100 Marks) | | |

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

| | Material Covered |
|---|---|
| Week 1 | Vector analysis. |
| Week 2 | Vector fields. |
| Week 3 | Orthogonal vectors and Dot Product. |
| Week 4 | Parallel vectors and Cross Product. |
| Week 5 | Partial Derivatives: Formulas for Del operation. |
| Week 6 | Polar Coordinates. |
| Week 7 | **Mid-term Exam** + Cylindrical Coordinates Systems. |
| Week 8 | Spherical Coordinates Systems. |
| Week 9 | Infinite series. |
| Week 10 | Power series. |
| Week 11 | Convergence and divergence series. |
| Week 12 | Differential equations. |
| Week 13 | Differential equation of the first order. |
| Week 14 | Differential equation of *nth* order. |
| Week 15 | Integral Transforms: Fourier series and Laplace transform. |
| Week 16 | **Preparatory week before the final Exam.** |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Required Texts** | https://dokumen.tips/download/link/engineering-mathematics-5th-ed-by-k-a-stroud.html ( **pdf** ) | No |
| **Recommended Texts** | https://www.bau.edu.jo/UserPortal/UserProfile/PostsAttach/59003_3812_1.pdf | No |
| **Websites** | https://dokumen.tips/download/link/engineering-mathematics-5th-ed-by-k-a-stroud.html | |

| Grading Scheme<br>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 |
| | | | | |

**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.