# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | **Calculus (2)** | | | **Module Delivery** | |
| **Module Type** | **Core** | | | ☒**Theory**<br>☒**Lecture**<br>☐**Lab**<br>☒**Tutorial**<br>☐**Practical**<br>☐**Seminar** | |
| **Module Code** | **MATH-102** | | | | |
| **ECTS Credits** | 5 | | | | |
| **SWL (hr/sem)** | 125 | | | | |
| **Module Level** | UG1 | | **Semester of Delivery** | 2 | |
| **Administering Department** | MATH | | **College** | UNI | |
| **Module Leader** | | | **e-mail** | | |
| **Module Leader's Acad. Title** | | | **Module Leader's Qualification** | | |
| **Module Tutor** | | | **e-mail** | | |
| **Peer Reviewer Name** | | | **e-mail** | | |
| **Scientific Committee Approval Date** | 01/06/2023 | | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | MATH-101 | **Semester** | 1 |
| **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- To introduce students to the fundamental concepts and properties of conic sections.<br>2- To develop students' understanding of polar coordinates and their applications.<br>3- To familiarize students with cylindrical coordinates and their relevance in three-dimensional spaces.<br>4- To provide students with the knowledge and skills to work with sequences and infinite series. |
| **Module Learning Outcomes**<br><br>مخرجات التعلم للمادة الدراسية | **By the end of this module, students will be able to:**<br>1- Demonstrate a solid understanding of conic sections, including the properties and equations of circles, ellipses, parabolas, and hyperbolas.<br>2- Apply polar coordinates to graph and analyze equations in two dimensions.<br>3- Convert between rectangular and cylindrical coordinates and use them to describe points and objects in three-dimensional space.<br>4- Manipulate and analyze sequences, including determining convergence, divergence, and limits.<br>5- Evaluate and manipulate infinite series using various convergence tests and techniques. |
| **Indicative Contents**<br>المحتويات الإرشادية | **1- Conic Sections:**<br>➢ Definition and properties of conic sections<br>➢ Equations and properties of circles, ellipses, parabolas, and hyperbolas<br>➢ Graphing conic sections and identifying key features<br>**2- Polar Coordinates:**<br>➢ Introduction to polar coordinates<br>➢ Conversion between rectangular and polar coordinates<br>➢ Graphing and analyzing equations in polar form<br>➢ Polar equations of conic sections<br>**3- Cylindrical Coordinates and Three-Dimensional Spaces:**<br>➢ Introduction to cylindrical coordinates<br>➢ Conversion between rectangular and cylindrical coordinates<br>➢ Equations and properties of cylinders and surfaces in cylindrical coordinates<br>➢ Visualizing and working with three-dimensional objects<br>4- **Sequences**:<br>➢ Definition and notation of sequences<br>➢ Arithmetic and geometric sequences<br>➢ Convergence and divergence of sequences<br>➢ Limits of sequences<br>**5- Infinite Series:** |

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| | ➢ Introduction to infinite series<br>➢ Convergence and divergence of series<br>➢ Common convergence tests (comparison, ratio, root tests)<br>➢ Manipulation of series (summation, arithmetic operations) |

| **Learning and Teaching Strategies**<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | 1- **Lectures:** The instructor will deliver lectures to introduce and explain the core concepts, properties, and techniques related to conic sections, polar coordinates, cylindrical coordinates, sequences, and infinite series.<br>2- **Problem-solving sessions:** Students will participate in problem-solving sessions where they can apply the learned concepts and techniques to solve numerical and conceptual problems.<br>3- **Tutorials and practice exercises:** Students will engage in tutorials and practice exercises to reinforce their understanding of the module's topics. These activities may include both individual and group work.<br>4- **Computer-based simulations and visualizations:** Interactive software and computer simulations will be utilized to help students visualize and explore conic sections, polar coordinates, three-dimensional spaces, and the behavior of sequences and series.<br>5- **Real-world applications:** The instructor will provide examples and applications of the module's topics in various fields such as physics, engineering, and economics to illustrate their practical relevance and encourage students' engagement. |

| **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 | 62 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 4 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **125** | | |

## Module Evaluation

تقييم المادة الدراسية

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|---|---|---|---|---|---|
| Formative assessment | Quizzes | 4 | 5% (5) | 5 and 10 | LO #1, #2 and #10, #11 |
| | Assignments | 2 | 30% (30) | 2 and 12 | LO #3, #4, #5 and #6, #7 |
| | Projects / Lab. | | | | |
| | Report | 1 | 5% (5) | 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) | | |

## Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

| | Material Covered |
|---|---|
| Week 1 | Introduction to conic sections<br>Equations and properties of circles<br>Graphing circles |
| Week 2 | Equations and properties of parabolas<br>Graphing parabolas |
| Week 3 | Equations and properties of ellipses<br>Graphing ellipses |
| Week 4 | Equations and properties of hyperbolic<br>Graphing hyperbolic |
| Week 5 | Applications of conic sections |
| Week 6 | Polar coordinates: introduction and conversion |
| Week 7 | Graphing equations in polar form<br>Polar equations of conic sections<br>Review and practice |
| Week 8 | Introduction to cylindrical coordinates<br>Conversion between rectangular and cylindrical coordinates<br>Equations and properties of cylinders |
| Week 9 | Surfaces in cylindrical coordinates<br>Visualizing three-dimensional objects<br>Applications of cylindrical coordinates |
| Week 10 | Introduction to sequences<br>Arithmetic and geometric sequences<br>Convergence and divergence of sequences |
| Week 11 | Limits of sequences<br>Introduction to infinite series<br>Convergence and divergence of series |
| Week 12 | Comparison test and ratio test for series |

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|---|---|
| | Manipulation of series: arithmetic operations<br>Applications of sequences and series |
| **Week 13** | Root test and other convergence tests for series |
| **Week 14** | Review and practice<br>Module assessment and feedback |
| **Week 15** | Review and practice<br>Module assessment and feedback |
| **Week 16** | **Preparatory week before the final Exam** |

| **Delivery Plan (Weekly Lab. Syllabus)**<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | |
| **Week 2** | |
| **Week 3** | |
| **Week 4** | |
| **Week 5** | |
| **Week 6** | |
| **Week 7** | |

**Learning and Teaching Resources**

مصادر التعلم والتدريس

| | **Text** | **Available in the Library?** |
|---|---|---|
| **Required Texts** | 1- Calculus Tomas 1990<br>2- Calculus and Analytic Geomatry Thomas. G. B.4th 1984<br>3- Advanced Calculus and analysis MA 1002 Craw. I. 2000 | yes |
| **Recommended Texts** | 4- Calculus and Analytic Geometric Durfee. W.H 1971 New York | no |
| **Websites** | | |

| 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.