

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

| Module Information                 |                                |                      |                                                                                                                                                                                                                                          |                                                                                    |
|------------------------------------|--------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| معلومات المادة الدراسية            |                                |                      |                                                                                                                                                                                                                                          |                                                                                    |
| Module Title                       | Mathematics I                  |                      | Module Delivery                                                                                                                                                                                                                          |                                                                                    |
| Module Type                        | Basic                          |                      | <input checked="" type="checkbox"/> Theory<br><input type="checkbox"/> Lecture<br><input type="checkbox"/> Lab<br><input checked="" type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |                                                                                    |
| Module Code                        | CET1103                        |                      |                                                                                                                                                                                                                                          |                                                                                    |
| ECTS Credits                       | 5                              |                      |                                                                                                                                                                                                                                          |                                                                                    |
| SWL (hr/sem)                       | 150                            |                      |                                                                                                                                                                                                                                          |                                                                                    |
| Module Level                       | 1                              | Semester of Delivery |                                                                                                                                                                                                                                          | 1                                                                                  |
| Administering Department           | CET                            | College              | EETC                                                                                                                                                                                                                                     |                                                                                    |
| Module Leader                      | Hala A. Hashim                 |                      | e-mail                                                                                                                                                                                                                                   | hala.solomon@gmail.com                                                             |
| Module Leader's Acad. Title        | Assistant Lecturer             |                      | Module Leader's Qualification                                                                                                                                                                                                            | M.Sc.                                                                              |
| Module Tutor                       | Haneen Jawad Abood             |                      | e-mail                                                                                                                                                                                                                                   | <a href="mailto:haneenjavadabood1994@gmail.com">haneenjavadabood1994@gmail.com</a> |
| Peer Reviewer Name                 | Assist prof.<br>Alhamzah Taher |                      | e-mail                                                                                                                                                                                                                                   | alhamza_tm@mtu.edu.iq                                                              |
| Scientific Committee Approval Date | 13/06/2023                     |                      | Version Number                                                                                                                                                                                                                           | 1.0                                                                                |

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

| <b>Module Aims, Learning Outcomes and Indicative Contents</b><br><b>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| <b>Module Aims</b><br><b>أهداف المادة الدراسية</b>                                                                               | <ol style="list-style-type: none"> <li>1. This course deals with differential and integral calculus.</li> <li>2. To develop problem solving skills and understanding of preliminaries to differential calculus.</li> <li>3. To understand differentiation, and differentiation methods.</li> <li>4. To perform applications using the derivative.</li> <li>5. To get a good grasp of Integrals, and Integration methods.</li> <li>6. To understand the relationship between differentiation and integration.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Module Learning Outcomes</b><br><b>مخرجات التعلم للمادة الدراسية</b>                                                          | <ol style="list-style-type: none"> <li>1. Recognize Line and Circle Equation and related evaluating formulas.</li> <li>2. List the various terms associated with Functions and their Types.</li> <li>3. Discuss the Limit and Continuity of a Function.</li> <li>4. Describe the Definition of a derivative as a limit, Differentiation Rules, and various types of Function's Derivatives.</li> <li>5. Identify when to use different Differentiation Methods.</li> <li>6. Discuss the Curve Sketching process, and the L'Hospital's Rule.</li> <li>7. Analyze Taylor and Maclaurin Series.</li> <li>8. Identify the Indefinite Integrals.</li> <li>9. Explain the Integration Methods u-substitution, By parts.</li> <li>10. Explain the Integration Methods Involving Trigonometric Functions, Trigonometric substitution.</li> <li>11. Explain the Integration Method Rational Functions by Partial Fractions.</li> <li>12. Explain the Integration Methods Functions Involving Roots, and Functions Involving Quadratics.</li> <li>13. Recognize the Definite Integral and its Application Area Under a Curve.</li> <li>14. Discuss the Definite Integral Applications Arc Length, Average Value of a Function.</li> <li>15. Discuss the Definite Integral Applications Areas Between Two Curves.</li> </ol> |
| <b>Indicative Contents</b><br><b>المحتويات الإرشادية</b>                                                                         | <p><u>Part A - Preliminaries to differential calculus.</u><br/> This part includes the Line and Circle Equation and related evaluating formulas and parameters. Furthermore, main mathematical Functions characteristics Domain, Range, Odd, Even, and their Types. Finally, The Limit and Continuity of a Function Laws, the behavior At Infinity, followed by important Special Limits, then the Continuity Conditions. <b>[9 hrs]</b> + Revision problem classes in weekly tutorials <b>[3 hrs]</b></p> <p><u>Part B – Differential calculus.</u><br/> This part will take in details the first key subject of the semester, the Differentiation process from the prospective of Definition as limit, Differentiation Rules, and Function-Derivative Table. Which will be followed by Differentiation Methods namely the Implicit, Logarithmic, and The Chain Rule. Furthermore, four Applications of differentiation will be discussed the Curve Sketching, L'Hospital's Rule, and Taylor and Maclaurin Series. <b>[12 hrs]</b> + Revision problem classes in weekly tutorials <b>[5 hrs]</b></p>                                                                                                                                                                                                             |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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|  | <p><b>Part C – Integral calculus.</b></p> <p>This part discusses the second key subject the Integration of functions. Followed by dissecting the main Integration Methods, u-substitution, By parts, Involving Trigonometric Functions, Trigonometric substitution, Rational Functions by Partial Fractions, Functions Involving Roots, and Functions Involving Quadratics. Furthermore, it will consider six definite Integral applications, namely The Area Under a Curve, Arc Length, Average Value of a Function, and Areas Between two Curves. <b>[22 hrs]</b> + Revision problem classes in weekly tutorials <b>[8 hrs]</b></p> |
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| <b>Learning and Teaching Strategies</b><br>استراتيجيات التعلم والتعليم |                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b>                                                      | <p>This module will primarily focus on encouraging students to participate in the activities, as well as refining and developing their critical thinking skills. This will be achieved through lectures, tutorials, discussions, and grading activities.</p> |

| <b>Student Workload (SWL)</b><br>الحمل الدراسي للطالب                          |     |                                                                            |     |
|--------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------|-----|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل       | 59  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعياً       | 4.2 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 91  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطالب أسبوعياً | 6.5 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطالب خلال الفصل              | 150 |                                                                            |     |

| <b>Module Evaluation</b><br>تقييم المادة الدراسية |                        |             |                  |          |                           |
|---------------------------------------------------|------------------------|-------------|------------------|----------|---------------------------|
|                                                   |                        | Time/Number | Weight (Marks)   | Week Due | Relevant Learning Outcome |
| <b>Formative assessment</b>                       | <b>Quizzes</b>         | 2           | 10% (10)         | 5, 10    | LO #1 - 4, LO # 5 - 9     |
|                                                   | <b>Assignments</b>     | 2           | 10% (10)         | 7, 14    | LO # 1 - 6, LO # 7 -13    |
|                                                   | <b>Projects / Lab.</b> | N/A         |                  |          |                           |
|                                                   | <b>Report</b>          | N/A         |                  |          |                           |
| <b>Summative assessment</b>                       | <b>Midterm Exam</b>    | 2 hr        | 30% (30)         | 8        | LO # 1-7                  |
|                                                   | <b>Final Exam</b>      | 3hr         | 50% (50)         | 16       | All                       |
| <b>Total assessment</b>                           |                        |             | 100% (100 Marks) |          |                           |

**Delivery Plan (Weekly Syllabus)**

المنهاج الاسبوعي النظري

|         | Material Covered                                                                                   |
|---------|----------------------------------------------------------------------------------------------------|
| Week 1  | Line and Circle Equation.                                                                          |
| Week 2  | Functions (Domain, Range, Odd, Even, Types.)                                                       |
| Week 3  | The Limit and Continuity of a Function (Laws, At Infinity, Special Limits, Continuity Conditions.) |
| Week 4  | Differentiation (Definition as limit, Differentiation Rules, Function-Derivative Table.)           |
| Week 5  | Differentiation Methods (Implicit, Logarithmic, The Chain Rule.)                                   |
| Week 6  | Applications of Differentiation (Curve Sketching, L'Hospital's Rule.)                              |
| Week 7  | Applications of Differentiation (Taylor and Maclaurin Series.)                                     |
| Week 8  | Midterm Exam + Introduction to Indefinite Integrals.                                               |
| Week 9  | Integration Methods (u-substitution, By parts.)                                                    |
| Week 10 | Integration Methods (Involving Trigonometric Functions, Trigonometric substitution.)               |
| Week 11 | Integration Methods (Integration of Rational Functions by Partial Fractions.)                      |
| Week 12 | Integration Methods (Functions Involving Roots, Functions Involving Quadratics.)                   |
| Week 13 | Definite Integral and Applications (Definite Integral, Area Under a Curve.)                        |
| Week 14 | Definite Integral and Applications (Arc Length, Average Value of a Function.)                      |
| Week 15 | Definite Integral and Applications (Areas Between two Curves)                                      |
| Week 16 | Preparatory week before the final Exam                                                             |

**Delivery Plan (Weekly Tutorial)**

المنهاج الاسبوعي الاضافي

|                                                                                                                      | Material Covered |
|----------------------------------------------------------------------------------------------------------------------|------------------|
| Each week, a question sheet related to the material presented in the theoretical lecture will be solved and debated. |                  |

**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. | 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          | <a href="https://www.khanacademy.org/math/differential-calculus">https://www.khanacademy.org/math/differential-calculus</a>                                                 |                           |

| Grading Scheme<br>مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                       |                         |                     |           |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|-----------|---------------------------------------|
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade                   | التقدير             | Marks (%) | Definition                            |
| <b>Success Group<br/>(50 - 100)</b>                                                                                                                                                                                                                                                                                                                                                  | <b>A</b> - Excellent    | امتياز              | 90 - 100  | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>B</b> - Very Good    | جيد جدا             | 80 - 89   | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>C</b> - Good         | جيد                 | 70 - 79   | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>D</b> - Satisfactory | متوسط               | 60 - 69   | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>E</b> - Sufficient   | مقبول               | 50 - 59   | Work meets minimum criteria           |
| <b>Fail Group<br/>(0 – 49)</b>                                                                                                                                                                                                                                                                                                                                                       | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)   | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>F</b> – Fail         | راسب                | (0-44)    | Considerable amount of work required  |
|                                                                                                                                                                                                                                                                                                                                                                                      |                         |                     |           |                                       |
| <b>Note:</b> 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. |                         |                     |           |                                       |