

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

| Module Information                 |                      |                      |                                                                                                                                                                                                                                          |                          |
|------------------------------------|----------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| معلومات المادة الدراسية            |                      |                      |                                                                                                                                                                                                                                          |                          |
| Module Title                       | Calculus 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                        | ATU11103             |                      |                                                                                                                                                                                                                                          |                          |
| ECTS Credits                       | 5                    |                      |                                                                                                                                                                                                                                          |                          |
| SWL (hr/sem)                       | 125                  |                      |                                                                                                                                                                                                                                          |                          |
| Module Level                       | UGI                  | Semester of Delivery |                                                                                                                                                                                                                                          | 1                        |
| Administering Department           |                      | College              | NETC                                                                                                                                                                                                                                     |                          |
| Module Leader                      | Ahmed Mohammed Zeki  |                      | e-mail                                                                                                                                                                                                                                   | Ahmed.alhilli@atu.edu.iq |
| Module Leader's Acad. Title        | Assistant Professor  |                      | Module Leader's Qualification                                                                                                                                                                                                            | Ph.D.                    |
| Module Tutor                       | Name (if available)  |                      | e-mail                                                                                                                                                                                                                                   | E-mail                   |
| Peer Reviewer Name                 | Nasir Hussein Selman |                      | e-mail                                                                                                                                                                                                                                   | Coj.nas@atu.edu.iq       |
| Scientific Committee Approval Date | 01/10/2024           |                      | 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> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br><b>أهداف المادة الدراسية</b>                                                                         | <ol style="list-style-type: none"> <li>1. To develop problem solving skills and understanding of functions and their differentiation.</li> <li>2. To understand differentiation and its geometric meaning.</li> <li>3. To understand differentiation applications.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Module Learning Outcomes</b><br><b>مخرجات التعلم للمادة الدراسية</b>                                                          | <ol style="list-style-type: none"> <li>1. Understand the meaning of functions and their properties</li> <li>2. Combining functions.</li> <li>3. Understanding shifting and scaling of functions.</li> <li>4. Definition of Trigonometric and exponent functions.</li> <li>5. Basic understanding of rates of changes and tangent of curves.</li> <li>6. Limit of functions and limits laws.</li> <li>7. Continuity of functions.</li> <li>8. Tangent and derivative of a point.</li> <li>9. The derivative as a function.</li> <li>10. Differentiation rules.</li> <li>11. The chain rule.</li> <li>12. Implicit differentiation, the inverse function and logarithms</li> <li>13. Inverse trigonometric functions</li> <li>14. Application of derivatives</li> </ol> |
| <b>Indicative Contents</b><br><b>المحتويات الإرشادية</b>                                                                         | <p>Functions, types of functions, graph of the functions, domain and range of function</p> <p>Trigonometric function: graph of trigonometric function, range and domain of trigonometric functions, identities.</p> <p>Limits and Continuity: Properties, limits involving infinity, continuity.</p> <p>Transcendental functions: Inverse function, graph of inverse function, Logarithmic and exponential functions, inverse trigonometric functions, hyperbolic functions, inverse hyperbolic functions.</p> <p>Derivatives: Definition, rules of derivative, Implicit differentiation, Applications of derivatives: rate of change problems, derivative, Linearization, Mean value theorem, Initial value problem.</p>                                             |

| <b>Learning and Teaching Strategies</b><br><b>استراتيجيات التعلم والتعليم</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b>                                                             | <p>The main strategies that will be adopted in delivering this module is to encourage students to engage in exercises, while at the same time honing and expanding their critical thinking skills. Teaching methods include interactive lectures, where basic mathematical principles are explained in detail. Regular formative assessments will be conducted to monitor students' understanding of the material, and immediate feedback will be provided to guide their learning process. Emphasis will be placed on linking mathematical concepts to real-world engineering applications to make the learning experience more relevant and engaging.</p> |

| Student Workload (SWL)                                                         |     |                                                                           |     |
|--------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------|-----|
| الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا                                        |     |                                                                           |     |
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطلاب خلال الفصل       | 63  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطلاب أسبوعيا       | 4.2 |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 62  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 4.1 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | 125 |                                                                           |     |

| Module Evaluation     |              |             |                  |            |                           |
|-----------------------|--------------|-------------|------------------|------------|---------------------------|
| تقييم المادة الدراسية |              |             |                  |            |                           |
|                       |              | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
| Formative assessment  | Quizzes      | 2           | 10% (10)         | 5 and 10   | LO #1, #2 and #10, #11    |
|                       | Assignments  | 2           | 10% (10)         | 2 and 12   | LO #3, #4 and #6, #7      |
|                       | Home Work    | 2           | 10% (10)         | Continuous | All                       |
|                       | Report       | 1           | 10% (10)         | 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                          | Understand the meaning of functions and their properties       |
| Week 2                          | Combining functions.                                           |
| Week 3                          | Understanding shifting and scaling of functions.               |
| Week 4                          | Definition of Trigonometric and exponent functions.            |
| Week 5                          | Basic understanding of rates of changes and tangent of curves. |
| Week 6                          | Limit of functions and limits laws.                            |
| Week 7                          | Continuity of functions.                                       |
| Week 8                          | Tangent and derivative of a point.                             |
| Week 9                          | The derivative as a function.                                  |

|                |                                                               |
|----------------|---------------------------------------------------------------|
| <b>Week 10</b> | Differentiation rules.                                        |
| <b>Week 11</b> | The chain rule.                                               |
| <b>Week 12</b> | Implicit differentiation, the inverse function and logarithms |
| <b>Week 13</b> | Inverse trigonometric functions                               |
| <b>Week 14</b> | Application of derivatives                                    |
| <b>Week 15</b> | Application of derivatives                                    |
| <b>Week 16</b> | <b>Final Exam</b>                                             |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس |                                                                                                                                                                     |                           |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
|                                                          | Text                                                                                                                                                                | Available in the Library? |
| <b>Required Texts</b>                                    | Thomas' Calculus 14 <sup>th</sup> edition                                                                                                                           | Yes                       |
| <b>Recommended Texts</b>                                 | Calculus 10 <sup>th</sup> edition by Anton, Bivens, and Davis                                                                                                       | Yes                       |
| <b>Websites</b>                                          | <a href="https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/">https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/</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  |
|                                     |                         |                     |          |                                       |

**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.