**Ministry of Higher Education and Scientific Research**

**Supervision and Scientific Evaluation Body**

**Quality Assurance and Academic Accreditation Office**

**Course Description Sample**

**Subject: COMPUTER SKILLS**

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| Differential mathematics is a branch of calculus that focuses on the concept of differentiation. It involves finding rates of change, slopes of curves, and optimizing functions. Differential equations are used to model various phenomena and solve problems in fields such as physics, and engineering. |

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| 1. Educational Institution | Shatt Al-Arab University College |
| 2. Department / Center | Medical Devices Technical Engineering |
| 3. Course Title /Code | MIET1103/ Differential mathematics |
| 4. Lecturer Name | Aya Abdul Hussein |
| 5. Type of Teaching | Assistant teacher |
| 6. Academic Year /Term | First course\ 2023\_2024 |
| 7. Total No. of Teaching Hours | 125 |
| 8. Date f Preparing this Course Description | 20/11/2023 |

9. **Course Objectives**

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| • The student develops problem-solving skills and understanding of calculus through a wide range of differentiation techniques. |
| • To understand the limits and theory of derivatives and their application to different types of functions. |
| • The student must have basic knowledge that qualifies for all engineering fields. |
| • Demonstrate basic knowledge and understanding of the essence of planar analytic geometry, algebra and applied mathematics. |
| • To learn to draw trigonometric functions accurately |
| • For students to become familiar with the derivatives and inverses of trigonometric functions. |
| • To deal with different types of functions efficiently |

10. **Course Output, Methodology and Evaluation**

(A) **Cognitive Objectives**

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| 1. Remembers the basic concepts of calculus: functions, variables, limits, and continuity.  2. Use the laws of limits to evaluate the limit of a function.  3. Discuss continuity at a point and continuity over a period of time.  4. Understanding transcendent functions and how a function is related to its opposite.  5. Defining analytic plane geometry and learning how conic sections are formed, in addition to defining the words and algebraic formulas, the circle, its center and radius, and the ellipse and its focus.  6. Learn how to convert rectangular coordinates into polar coordinates and vice versa, as well as drawing points using polar coordinates.  7. Differentiating between algebraic and transcendent functions in the middle term  8. Discuss chain rules and applications of derivatives.  9. Define determinants and understand their relationship to matrices. · Explain the methodology for finding the determinant.  10. Learn how to solve linear equations using Cramer’s rule. |

(B) **Skill Objectives Related to the Program**:

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| 1. The ability to perform mathematical analysis efficiently  2. Being able to divide the problem into several steps and find solutions gradually  3. The ability to draw functions and determine their properties  4. Connecting different sports topics and their purpose |

**Methods of Teaching and Learning**

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| 1. Explanation and clarification through periodic study lectures.  2. Discussions between student groups of selected models of questions.  3. Use multiple means to increase understanding and clarification through drawing, writing, and using the screen.  4. Extracurricular assignments to increase understanding and ability by assigning students to complete learning some skills after giving them their basics. |

**Methods of Evaluation**

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| **Number calendar element degree**  - Tests of various types daily.  - The duties assigned to the student, including solving and clarifying various mathematical problems  - Discussion among students about examples and how to best solve the problem while identifying good students. |

(C) **Sentimental and Value Objectives**

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| 1. Promoting thinking and implanting responsibility for the teaching profession with a professional vision that meets the continuous need for learning and development.  2. Understanding the actual benefit of mathematics and linking it with other disciplines to benefit from it realistically.  3. Active participation in serving his peers with specializations and serving the community and the country. |

**Methods of Evaluation**

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| - Tests of various types daily.  - The duties assigned to the student, including solving and clarifying various mathematical problems  - Discussion among students about examples and how to best solve the problem while identifying good students. |

D) **General and Qualitative Skills (other skills related to the ability of employment and personal development)**

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| 1- Communication skills with others.  2- Analyzing mathematical problems in the form of sub-problems to reach the final solution  3- Use the calculator efficiently and discover its many advantages. |

11. **Course Structure**

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| **Week** | **No of Hours** | **Required Learning Output** | **Title of Subject** | **Teaching Method** | **Evaluation** |
| 1 | 4 | The student should be able to find the value of purpose and continuity and differentiate between them | Limits and Continuity | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 2 | 4 | For the student to understand trigonometric functions and inverse trigonometric functions and differentiate between them | Transcendental functions- trigonometric functions, and their inverses. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 3 | 4 | The student will learn to calculate the values of hyperbolic functions and differentiate between them and inverse hyperbolic functions | Transcendental functions-Hyperbolic and inverse hyperbolic functions | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 4 | 4 | The student understands exponential and logarithmic functions and solves problems related to them | Transcendental functions-Exponential function and logarithmic function. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 5 | 4 | The student should understand conic sections well | Plane analytical geometry, parabola & ellipse, hyperbola. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 6 | 4 | The student understood the polar coordinates well | Polar coordinates. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 7 |  |  | Mid-term Exam |  |  |
| 8 | 4 | The student should know all the rules of the derivative and know the usefulness of the derivative | Theory and rules of derivatives | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 9 | 4 | The student understands implicit differentiation and series rules. | Implicit Differentiation and Chain rules. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 10 | 4 | The student should be able to understand the derivatives of trigonometric functions and distinguish them from the derivatives of inverse trigonometric functions. | Derivatives of trigonometric functions Derivatives of inverse trigonometric functions. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 11 | 4 | The student should be able to understand the derivatives of exponential and logarithmic functions | Derivatives of the exponential and natural logarithms functions. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 12 | 4 | The student will be able to understand the derivatives of hyperbolic and inverse hyperbolic functions | Derivatives of Hyperbolic and inverse hyperbolic functions. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 13 | 4 | The applicant must understand the applications of derivatives well | Applications of the derivatives. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 14 | 4 | The student understands determinants and properties of determinants and solves problems related to them | Determinants and properties of determinants. | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |
| 15 | 4 | The student should be able to solve linear equations using Cramer’s rule efficiently | Solution of Linear equations by Cramer’s rule. + Preparatory week before the final Exam | Clarifying basic concepts, solving questions, using the blackboard and display screen, and using modern technologies. | Assignment + quiz + discussion |

12.**Infrastructure**

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| a. Textbooks | Engineering Mathematics I (pdf) |
| b. References | Thomas ‘ Calculus (pdf) Fouteenth edition Based on the original work by GEORGE B. THOMAS, JR. |
| c. Recommended books and periodicals (journals, reports, etc.) | [https://elearningatria.files.wordpress.com/2013/10/differential-calculus-1-23.pdf](https://elearningatria.files.wordpress.com/2013/10/differential-calculus-1-23.pdf%20) |
| d. Electronic references, internet websites, etc | <http://dl.konkur.in/post/Book/Paye/Thomas-Calculus-14th-Edition-%5Bkonkur.in%5D.pdf> |

13. **The Plan of Improving the Course**

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| - Giving the derivative topic priority in presentation by placing it in the second week, then the derivative topics are presented separately after each unit.  - Before each study unit, a mini-unit is presented that explains the importance of the upcoming unit, its applications, its connection with other fields, where it is located in the real world, and what its uses are. |