**GAU, Faculty of Engineering**

|  |  |
| --- | --- |
| **Course Unit Title** | Calculus I |
| **Course Unit Code** | MT111 |
| **Type of Course Unit** | Compulsory for all departments |
| **Level of Course Unit** | 1st year BSc |
| **National Credits** | 4 |
| **Number of ECTS Credits Allocated** | 6 |
| **Theoretical (hour/week)** | 3 |
| **Practice (hour/week)** | 2 |
| **Laboratory (hour/week)** | 0 |
| **Year of Study** | 1 |
| **Semester when the course unit is delivered** | 1 |
| **Mode of Delivery** | Face to face, E-learning |
| **Language of Instruction** | English |
| **Prerequisites and co-requisites** |  |
| **Recommended Optional Programme Components** | Basic background in pre-calculus |

|  |
| --- |
| **Objectives of the Course:**   * Conceptual overview of law and methods in engineering subjects * To understand the major theoretical background of functions, limits, derivatives and their application in   engineering problems |

|  |  |  |
| --- | --- | --- |
| **Learning Outcomes** | | |
| When this course has been completed the student should be able to | | Assess. |
| 1 | Analyze functions and functions of graphs | 1,2 |
| 2 | Understand concept of limit and continuity | 1,2 |
| 3 | Analyze differentiation | 1 |
| 4 | Understand concept of differentiation | 1,2 |
| 5 | Understand concept of drawing graph of derivatives and limits | 1,2 |
| Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab Work | | |

|  |  |  |
| --- | --- | --- |
| **Course’s Contribution to Program** | | |
|  | | CL |
| 1 | Ability to understand and apply knowledge of mathematics, science, and engineering | 4 |
| 2 | Ability to design and conduct experiments as well as to analyze and interpret | 2 |
| 3 | Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct | 1 |
| 4 | Ability to apply systems thinking in problem solving | 5 |
| 5 | Knowledge of contemporary issues while continuing to engage in lifelong learning | 2 |
| 6 | Ability to use the techniques, skills and modern engineering tools necessary for engineering practice | 3 |
| 7 | Ability to express their ideas and findings, in written and oral form | 4 |
| 8 | Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints | 2 |
| 9 | Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner | 3 |
| CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High) | | |

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Contents** | | | |
| Week |  |  | Exams |
| 1 |  | Introduction |  |
| 2 |  | Pre-calculus |  |
| 3 | Chapter 1 | Limits |  |
| 4 |  | Continuity |  |
| 5 | Chapter 2 | Differentiation:Tangent Line and their slopes |  |
| 6 |  | Derivative, Leibniz Notation |  |
| 7 |  | Differentiation rules ,The chain rule, The derivative Of Trigonemetric Functions |  |
| 8 |  |  | Midterm |
| 9 |  | Higher Order Derivative , Implicit Differentiation |  |
| 10 | Chapter 3 | Inverse Functions: Exponential and Logorithmic |  |
| 11 |  | Inverse Functions: Trigonometric Functions |  |
| 12 | Chapter 4 | Extreme values concavity and Inflection |  |
| 13 |  | Optimization Problems |  |
| 14 |  | Sketching Graphs |  |
| 15 |  |  | Final |

|  |
| --- |
| **Recommended Sources**   * Textbook: "Calculus a Complete Course", Robert A. Adams, Pearson 6th Edn 2006 * "Calculus Early Transcendental Functions", Robert T.Smith & Roland B. Minton 4th Edition,2012 * "Calculus Early Transcendental" Briggs Cochran, William Briggs, Lyle Cochran, Bernard Gillett |

|  |  |
| --- | --- |
| **Assessment** | |
| Attendance and Assignment and Quiz | 20 % |
| Midterm Exam (Written) | 35 % |
| Final Exam (Written) | 45 % |

|  |  |  |  |
| --- | --- | --- | --- |
| **ECTS Allocated Based on the Student Workload** | | | |
| Activities | Number | Duration (hour) | Total Workload (hour) |
| Course duration in class (including the Exam week) | 15 | 3 | 45 |
| Tutorials | 13 | 2 | 26 |
| Assignments | 5 | 2 | 10 |
| Project/Presentation/Report Writing | 0 | 0 | 0 |
| E-learning Activities | 0 | 0 | 0 |
| Quizzes | 1 | 6 | 6 |
| Midterm Examination | 1 | 20 | 20 |
| Final Examination | 1 | 30 | 30 |
| Self Study | 14 | 2 | 28 |
| Total Workload | | | 165 |
| Total Workload/30 (h) | | | 5.50 |
| ECTS Credit of the Course | | | 6 |