University of Salahaddin – College of Engineering – Architectural Engineering Department

Module Name	Mathematics I			Course Status	Core
Frequency	Yearly in spring semester	Code	107	Credit point	5
Duration:	15 week – 1 semester			Module Language	English
Pre-requisites	Non			Required Level	

Course Description

This course will cover topics in the first undergraduate course in Mathematics including calculus and includes the following syllabus:

1- The first chapter is Function and graph which includes (introduction, defining of a function, graphing of a function, absolute function, and inversed function).
2- The second chapter is derivatives which includes (Definition of derivates, derivatives of rational function, derivatives of implicit function, composite function, and their derivatives (chain rule) and parametric function and their derivatives)
3- The third chapter is application of derivatives, and the
4- Fourth chapter is integration, and the
5- Fifth chapter is the application of integration.

Week Lecture

Week 1	Introduction – Course Book.
Week 2	Chapter 1: Defining of a function, graphing of a function.
Week 3	Chapter 1: Absolute function, and Inversed function.
Week 4	Chapter 2: Definition of derivates, derivatives of rational function, derivatives of implicit function.
Week 5	Chapter 2: Composite function, and their derivatives (chain rule) and parametric function and their derivatives.
Week 6	Chapter 3: Application of derivatives: Extreme Value of Functions, Monotonic Functions and The First Derivative Test, Concavity, Point of Inflection.
Week 7	Chapter 3: Application of derivatives: Applied Optimization Problems.
Week 8	**Midterm Exam.**
Week 9	Chapter 4: Antiderivative, Indefinite Integral.
Week 10	Chapter 4: Estimating with Finite Sums, Sigma Notation and Limits of Finite Sums.
Week 11	Chapter 4: Definite Integral.
Week 12	Chapter 5: Area Between Curves, Volume Using Cross-Section.
Week 13	Chapter 5: Volume by Cylindrical Shell (Shell Method), Length of a Curve.
Week 14	Chapter 5: Integration Formula, Trigonometric Integrals.
Week 15	**Final Exam.**

Course Objectives

Comprehend, analyze, synthesize, evaluate, and make generalizations to solve mathematical problems. Collect, organize, represent, analyze, interpret data, and make conclusions and predictions from its results. apply mathematical knowledge and skills to familiar and unfamiliar situations.

Learning Outcome

At the end of the semester, students would be able to

1- Display fluency in algebraic and numerical manipulations of functions including polynomial, rational, trigonometric, exponential, and logarithmic.
2- Understand the concepts of limit theory and nth order differential equations and their applications to our daily life.
3- Able to solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables. Use the differential to determine the error of approximations.
4- Demonstrate the connection between area and the definite integral. Apply the Fundamental theorem of calculus to evaluate definite integrals and use integration in finding the area and volume.
5- Use differentiation and integration to solve real world problems such as rate of change, optimization, and area problems.

<table>
<tr><td>Literature & Textbooks</td><td colspan="4">1- George B. Thomas, Jr, Maurice D. Weir, Joel Hass, Christopher Heil <<THOMAS' CALCULUS 14/E>> Pub, Pearson, 2020.
2- George B. Thomas, Jr, Maurice D. Weir, Joel Hass, Frank R. Gird <<THOMAS' CALCULUS 11/E>> Pub, Pearson, 2005.</td></tr>
<tr><td rowspan="2">Type of Teaching</td><td>Theory Lectures</td><td>Tutorial</td><td colspan="2">Practical</td></tr>
<tr><td>3 hr</td><td>1 hr</td><td colspan="2">0 hr</td></tr>
<tr><td rowspan="5">Evaluation Profile</td><td colspan="4">Students are required to take the first midterm exam on 8 weeks, classroom activities, quizzes, homework, and final exam on week 15th. So that the final grade will be based upon the following criteria:</td></tr>
<tr><td colspan="3">Midterm Exam (90 min written exam at week 8)</td><td>20 %</td></tr>
<tr><td colspan="3">Classroom activities, quizzes, assignments (during the course period)</td><td>20 %</td></tr>
<tr><td rowspan="2">Final Course Exam</td><td colspan="2">Written exam (120 min written exam week 15)</td><td>60 %</td></tr>
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<tr><td>Workload:</td><td>Total Workload 135 hr</td><td>Class Attendance 60 hr</td><td colspan="2">Self-Studies 75 hr</td></tr>
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