Salahaddin University-Erbil College of Science Department of Chemistry

Course Book of Mathematics I

First Year Chemistry

2022-2023

Assistant Lecturer : Muzhda Amjad Abdullraheem

Room: Mathematics Department, Room 02

Course objective

This course is divided into two semesters and is designed to acquaint you with calculus principles such as numbers, functions, limits, continuous, derivatives, trigonometric and hyperbolic functions, integrals, and applications. During this course you will gain experience in the use of calculus methods and learn how calculus methods may be applied to practical applications.

Upon completion of this course you will:

- be able to work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal
- understand the connections among these representations
- understand the meaning of the derivative in terms of a rate of change and local linear approximation be able to use derivatives to solve a variety of problems
- be able to use derivatives to solve a variety of problems
- understand the meaning of the definite integral both as a limit of Riemann sums and as the net accumulation of change
- be able to use integrals to solve a variety of problems
- understand the relationship between the derivative and the definite integral as expressed in both parts of the fundamental theorem of calculus

Forms of Teaching

Magic board and discussion and allowing students to write some problems on the board and assignments

Grading

The students are required to do three closed book exam during of the study year. The exam has 30 marks, the attendance, classroom activities and quizzes 10 marks. There will be a final exam on 60 marks

Course material

• *Robert T. Smith and Roland B. Minton*, Calculus: Early Transcendental Functions, Third Edition, Publishing by McGraw-Hill, a business unit of the McGraw-Hill companies, Inc. (2007).

- Calculus, Schaum's out line series
- Any other books about Calculus.

Course program

<u>Week 1:</u> Introduction to Set of Numbers; Natural Number, Integer Number, Rational Number and Irrational Number, Real Number, Complex Number, Absolute value (Definition, Examples, Properties), Intervals.

<u>Week 2</u>: Functions(Definition, Examples), Type of Functions; Constant Function, Identity Function, Polynomial function, Fraction function.

<u>Week 3,4</u>: One- to-one function, onto function, Bijective function, Even function, Odd function, The Domain of a Function, The Range of a Function, The Graph of a Function, Inverse function, Greatest Integer function.

<u>Week 5, 6, 7</u>: Limit of function (Definition, Examples, Theorems), The Uniqueness Theorem of the Limit, Properties of Limits, Existence or Nonexistence of the Limit, One-Sided Limits, Special Limits, Continuous function (Definition, Examples), The Derivative (Definition, Examples), The Rule of Derivative, Chain Rule, Higher Derivative, Implicit Differentiation.

Week 8, 9, 10: Trigonometric Function, Periodic Function, Derivatives of Trigonometric Function, Differentiation of Inverse Trigonometric Function, Rules of Differentiation, Differentiation of Exponential and Logarithmic Function, The Natural Logarithmic Function (Definition, Examples, Properties), Exponential Function (Definition, Examples, Properties), The Function *a*^{*}, The Derivative of *a*^{*}, Differentiation of Hyperbolic Function Derivatives of Hyperbolic Function, Inverse of Hyperbolic Function, Differentiation Formula. <u>Week 11,12, 13, 14, 15</u>: Indefinite Integral, Integration of Trigonometric Function, Integration of Exponential Function, Integration of a^x , a > 0, Integration of Hyperbolic Function, Integration of Inverse Hyperbolic Function, Methods of Integration; Integration by Parts, Integration by Partial Function.

Note: The course program dose not includes the examination days, which needs at least 2 weeks during the course, thus the total number of weeks in the course will be (14).