Department of physics

College of Science

University of Salahaddin-Erbil

Subject: calculus

Course Book: First Year -First Semester

Lecturer's name: Sebar Haje Jumha

Academic Year: 2022-2023

Course Book

1. Course name	Calculus
2. Lecturer in charge	Sebar Haje Jumha
3. Department/ College	Physic / Science
4. Contact	e-mail:sebar.jumha@su.edu.krd Tel: 07503916373
5. Time (in hours) per week	For example Theory: 2 Practical: 1
6. Office hours	Sunday(10:30 – 12:30) and Monday (10:30 – 12:30)
7. Course code	
8. Teacher's academic profile	Education: M. Sc. Date: 29-10-2015 Title: On Some New Type of Functions in Nonstandard Analysis Place of Attainments: Mathematics Department, College of Science, University of Salahaddin\Erbil, Hawler (Erbil), Kurdistan Region, Iraqi. Supervisor: Assist. Prof. Dr. Ibrahim Othman Hamad Supervisor Address: Mathematics Department, College of Science, University of Salahaddin\Erbil, Hawler (Erbil), Kurdistan Region, Iraq. B. Sc Date: 27-6-2010 Place of Attainments: Math. Dept.-College of Science,University of Salahaddin\Erbil-Iraq. 2013 – 2015: M.Sc student, 2015 – 2020: Researcher in Math.Dept. 2011 – 2013: Assistant Researcher in Math. Dept.
9. Keywords	The Inequality, Function, Limit of function, Differentiation, Integration.

10. Course overview:

Calculus is one of the most important parts of mathematics. It is fundamental to all of modern science. How could one part of mathematics be of such central importance? It is because calculus gives us the tools to study rates of change and motion. All analytical subjects, from biology to physics to chemistry to engineering to mathematics, involve studying quantities that are growing or shrinking or moving---in other words, they are changing. Astronomers study the motions of the planets, chemists study the interaction of substances, and physicists study the interactions of physical objects. All of these involve change and motion.

The study of calculus has been of central importance to all college students. Modern calculus

was developed in order to solve problems in physics and chemistry. Many important laws were formulated in the language of calculus. In addition, calculus is also used to describe the natural and social phenomena. For environment field, calculus is a basic tool to learn how to solve environmental problems.

My main objective is to teach the course including the topics of the basic terminology of Calculus. These include Elementary Functions, Differentiation and Integral Calculus Techniques and their applications. Other objectives include preparing students for higher level math classes in college and to help students get a strong foundation that will give them the tools to succeed in future mathematics courses.

11. Course objective:

Calculus was first invented to meet the mathematical needs of scientists of the sixteenth and seventeenth centuries, needs that mainly mechanical in nature. Nowadays it is a tool used almost everywhere in the modern world to describe change and motion. Its use is widespread in science, engineering, medicine, business, industry, and many other fields. The objective of this course is to introduce the fundamental ideas of the differential and integral calculus of functions of one variable. Important objectives of the calculus sequence are to develop and strengthen the students' problem-solving skills and to teach them to read, write, speak, and think in the language of mathematics. In particular, students learn how to apply the tools of calculus to a variety of problem situations. One of the primary objectives of any mathematics course is to help students learn to think about problems mathematically and to solve problems independently. Working in small groups, doing the lab activities, and talking about problems with other students are all strategies to assist the student in achieving these objectives.

12. Student's obligation

Students and their obligations throughout the academic year, is the attendance and completion of all tests, exams, assignments.

13. Forms of teaching

Magic board and discussion and allow leg students to write some problems on the board and assignments and   I give hard copy of my lecture notes to students before coming lecturer time.

14. Assessment scheme

The students are required to do two closed book exams 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.

15. Student learning outcome:

On succesful completion of the course, the students should be able to:

- recognise properties of functions and their inverses;
- recall and use properties of polynomials, rational functions, exponential, logarithmic, trigonometric and inverse-trigonometric functions;
- understand the terms domain and range;
- sketch graphs, using function, its first derivative, and the second derivative;

- apply the procedures of differentiation accurately, including implicit and logarithmic differentiation;
- perform accurately definite and indefinite integration, using parts, substitution, inverse substitution;
- understand and apply the procedures for integrating rational functions.

16. Course Reading List and References:

- ***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).
- ***Stewart, James***. Calculus: Early Transcendentals. 8th ed. Brooks/Cole, Cengage Learning 2012. TI-83/84 Graphing Calculator
- Calculas, Schaum's out line series
- Any other books about Calculas.

17. The Topics:	**Lecturer's name**
Week 1,2,3: Introduction to Set of Numbers; Absolute value (Definition, Examples, Properties), Intervals. **Week4,5,6:** The Inequality (Definition, Examples, Properties), Functions(Definition, Examples), Type of Functions; Constant Function. **Week 7,8,9:** The Domain of a Function, The Range of a Function, The Graph of a Function. **Week10,11,12,13** : Limit of function (Definition, Examples, Theorems), Continuous function (Definition, Examples), The Derivative (Definition, Examples), The Rule of Derivative, Chain Rule, Higher Derivative, Implicit Differentiation.	
18. Practical Topics (If there is any)	

19. Examinations:
1. Compositional: In this type of exam the questions usually starts with Explain how, What are the reasons for…?, Why…?, How….?
With their typical answers.Examples should be provided

2. True or false type of exams:

In this type of exam a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence. Examples should be provided

3. Multiple choices:

In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase. Examples should be provided.

20. Extra notes:

Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks.

21. Peer review   پێداچوونەوەی هاوەڵ