وەزارەتی خوێندنی بالآ و تویژینەوەی زانستی

Department of Mathematics

College of Basic Education

Salahaddin University-Erbil

Subject: Introduction of Differential equations

Course Book – *2*ed Stage

Lecturer's name:.Hemin Q. Rahman

Academic Year: 2022-2023 First semester

Course Book

1. Course name	Differential equations
2. Lecturer in charge	Hemin Q. Rahman
3. Department/ College	Mathematics / Basic Education
4. Contact	e-mail: hemin.rahman@su.edu.krd Tel: 0750 479 1291
5. Time (in hours) per week	Theory: 2hours in week Practical: 0
6. Office hours	2 hours in the week
7. Course code	
8. Teacher's academic profile	B. Sc. in Mathematics, Mathematics Department - College of Education – Salahaddin University - Erbil in 2003. M. Sc. In in Mathematical Statistic. Mathematics Department - College of Science Salahaddin University - Erbil in 2009. - Main activities and responsibilities Teaching Experience: Probability & Statistics, Ordinary Differential Equation , Computer, Calculus,finite mathematic
9. Keywords	Ordinary differential equations. solution of differential equations. Find the general solution of differential equation

10. Course overview:

A study of the methods of solution and applications of ordinary differential equations. Topics include: first and second order equations, existence and uniqueness of solutions, separation of variables Differential Equations of ,homogeneous an dnon-homogeneuos Differential Equations, exact Differential Equations, integrating factors, linear equations, Bernoullis equations, Riccatis equations

11. Course objective:

Upon completion of this course, you should be able to
classify and identify different types of differential equations
Demonstrate variable separable, homogeneous, exact, linear, Bernoulli linear and Ricatti linear differential equations, explicitly solve several important classes of ordinary differential equations and interpret their qualitative behavior

12. Student's obligation

1) Schedule changes may occur during the semester any changes will be announced in class.

2) The student is responsible for all assignments, changes in assignments, or other verbal information given in the class, whether in attendance or not..

13. Forms of teaching **White board and Presentation slides in Power point , Lecture notes**	

14. Assessment scheme

The students are required to do two exams before the final exam. There will be final exam on 60 marks . So that the final grade will be based upon the following criteria:

Mid-semester Exam: (20+15+5)% and ,

Final exam 60%

Total: 100%

15. Student learning outcome:

- identify an ordinary differential equation and classify it by order or linearity
- determine whether or not a unique solution to a first-order initial-value problem exists
- understand differences between solutions of linear and non-linear first-order differential equations
- recognize and solve homogeneous first-order differential equations,
- recognize and solve linear, separable and exact first-order differential equations
- use substitutions to solve various first-order differential equations (optional)
- Apply the concept of Fist Order Differential Equations
- recognize and solve autonomous first-order differential equations, analyze trajectories, and comment on the stability of critical points
- solve homogeneous linear differential equations using variation of parameters
- solve nonhomogeneous linear differential equations using Green's functions (optional)

16. Course Reading List and References:

1) Hari Kishan Deferential Equations by

2) R. Bronson) Differential Equations Crash Course

3) Ordinary Deferential Equation   سلسلة شوم
4) طرق حل المعادلات التفاضلية   د.خاليد أحمد السامرائي

17. The Topics:

Subject	Week
Chapter One:Introduction and basic concepts of differential equations.	1
Types of solution of differential equations	2

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Origin of differential equations	3
Existence and uniqueness theorem	4
Chapter Two:Ordinary differential equations of first order and first degree: separable equation	5
Homogenous equations	6
Differential equations with linear coefficient	7
Exact equations	8
Integrating factor	9
Chapter Three: Linear equations	10
Bernoullis equations	11
Equations reducible to linear equation	12

19. Examinations:

Q1/ Solve the Bernoulli's equation is the form $y' + \dfrac{2}{x} y = 4 x y^2$.

Q4) Find the particular solution of equation

$$(y^2 + x^2)dx - 2xydy = 0 \qquad at\ point\ (1,0)$$

$Q5)$ Find the general solutions of two equations:

1) $x^2 p^2 + x y p - 6y^2 = 0$

2) $\dfrac{dy}{dx} = 3(x+y)^2$

3) $x y'' - 3y' = 0$

20. Extra notes:

Good Luck for Student

21. Peer review

Professor Dr.Azad Ibrahim Ameen

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