Department of Mathematics

College of Basic Education

Salahaddin University-Erbil

Subject: Application of Differential equations

Course Book – *2ed* Stage

Lecturer's name:.Hemin Qassim Rahman

Academic Year: 2022-2023-Second Course

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: 3 hours in week Practical: 0
6. Office hours	3 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	solution of differential equations Application Ordinary differential equations. Find the general solution ofdifferential equations Application Pffafian differential equations....etc

10. Course overview:

Applications of ordinary differential equations of first order and first degree, Applications of first order and higher degree, Pfaffian differential equations, Integrable of differential equations of three variables, Solution of Pfaffian differential equations, separable, Exact,and Homogenous equation Pffafian differential equations, Applications of Pfaffian differential equations, Orthogonal trajectories of a system of curves of a surface

11. Course objective:

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: (30+10)% 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)

- Construct the applications of second order differential equations and different vibration models.

- Evaluate the differential equations of higher orders with variable coefficients
- Solution of Pfaffian differential equations, separable, Exact,and Homogenous equation Pffafian differential equations, Applications of Pfaffian differential equations

16. Course Reading List and References:

1) Hari Kishan   Differential Equations by

2) R. Bronson) Differential Equations Crash Course

3) Ordinary Differential Equations   سلسلة شوم
4) خالید أحمد السامرائي   د.خالید أحمد السامرائي   طرق حل المعادلات التفاضلية
5) RICHARD BRONSON & GABRIEL B. COSTA   Differential Equations Third Edition

17. The Topics:	
Subject	Week
Chapter One: Solution higher order differential equation	1
Solution higher degree differential equation	2
Chapter Two: Applications of ordinary differential equations of first order and first degree	3
Applications in Mathematics	4
Simultaneous differential equations	5
Orthogonal trajectories of a curves of a surface	6
Applications in Mathematics	7
Autonomous differential equation	8
Chapter Three :Pfaffian differential equations	9
Integrable of differential equations of three variables	10
Equations with one variable separable+ Homogenous equation	11
Equation is Exact	12
Application of the Pfaffian differential equations	13

19. Examinations:

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

Q2) What constant interest rate is required if an initial deposit placed into an account that accrues interest compounded continuously is to double its value in six years?

Q3) Solve the pfaffian equation

$$3y^2 sinxdx + ycosxdy - 2y^2 cosxdz = 0$$

Q4) Find the orthogonal trajectories of the family of curve

$$y^2 = ae^{-3x} \quad , \text{ where } a \text{ is parameter .}$$

20. Extra notes:

Good Luck for Student

21. Peer review

Professor Dr.Azad Ibrahim Ameen

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