

PROGRAMME NAME: : B.Sc (H) Mathematics

COURSE NAME : Differential Equations

SEMESTER DURATION: January to May

Week	Topic(s)	Teaching Methodology Adopted/ Continuous Internal Evaluation
1	Differential equations and mathematical models, Order and degree of a differential equation,	Lectures
2	Exact differential equations and integrating factors of first order differential equations, Reducible second order differential equations.	Lectures/Discussion
3	Application of first order differential equations to equations to acceleration-velocity model, Growth and decay model.	Assignments/Quizzes
4	Introduction to compartmental models, Lake pollution model (with case study of Lake Burley Griffin).	Presentations
5	Drug assimilation into the blood (case of a single cold pill, case of a course of cold pills, Case study of alcohol in the bloodstream).	Case Study
6	Exponential growth of population, Density dependent growth, Limited growth with harvesting.	Demonstartion
7	General solution of homogeneous equation of second order, Principle of superposition for a homogeneous equation	Lectures
8	Wronskian, its properties and applications; Linear homogeneous and non-homogeneous equations of higher order with constant coefficients	Discussion/Seminars
9	Euler's equation	Tutorials
10	Method of undetermined coefficients, Method of variation of parameters;	Discussion
11	Applications of second order differential equations to mechanical vibrations	Lectures/Practicals

12	Interacting population models, Epidemic model of influenza and its analysis	Practicals
13	Predator-prey model and its analysis, Equilibrium points, Interpretation of the phase plane,	Case Study
14	Battle model and its analysis.	Case Study

Course Objectives: The main objectives of this course are to introduce the students to the exciting world of Differential Equations, Mathematical Modeling and their applications.

Course Learning Outcomes: The course will enable the students to:

- i) Formulate Differential Equations for various Mathematical models.
- ii) Solve first order non-linear differential equation and linear differential equations of higher order using various techniques.
- iii) Apply these techniques to solve and analyze various mathematical models.