MATH 201: Applied Differential Equations

(Required)

Course Description:

MATH 201: Applied Differential Equations LT: 3 LB: 0 CR: 2

This course deals with advanced topics of calculus, which are useful for applications in different fields of engineering. It includes the study of different types of first order ordinary differential equations of different types, homogeneous and non-homogeneous second order linear differential equations, Laplace transform and its use in solving differential equations, Fourier series, simple partial differential equations, boundary value problems and numerical methods. Application problems will be solved during problem solving sessions (one extra hour per week).

Prerequisite: MATH 102-CALCULUS II

Textbook: Yanbu Industrial College Workbooks

References:

- Elementary Differential Equation and Boundary Value Problems, by W. Boyce & R. Diprima,John Wiley & Sons,Seventh Edition,2003
- A First Course in Differential Equations with Applications, by Dinnes G. Zill,PWS-Kent Publishing Company,Fourth Edition,2005
- Elementary Differential Equations, by Earl D. Rainville, Phillip E. Bedient,MacMillan Publishing Company,Eighth Edition, 2007
- Differential Equations, by C. Ray Wylie,McGraw Hill Kogakusha,First Edition, 2005

Course Learning Objectives:

To enable the students to:

1. Solve first order ordinary differential equations of different types
2. Solve homogeneous and non-homogeneous second order linear differential equations
3. Solve differential equations using Laplace transformations
4. Find Fourier sine and cosine series
5. Solve simple partial differential equations (PDE) and boundary value problems
6. Solve first order differential equations using numerical methods

Course Outline:

[I] Modules:

Module	Topic	Duration
1.	First Order Ordinary Differential Equations	1-2 weeks
2.	Second Order Linear Differential equations	3-5 weeks
3.	Laplace Transform	6-8 weeks
4.	Fourier Series and Partial Differential Equations	9-12 weeks
5.	Numerical Methods	13-14weeks

Evaluation Methods:

1. Major exams and a final exam.
2. Assignments and quizzes

Course Learning Outcomes:

The expected learning outcome is that the students will be able to:

1. Define differential equations of different orders
2. Solve exact differential equations
3. Solve homogeneous and non-homogeneous differential equations with constant coefficients by variation of parameters method
4. Solve differential equations using Laplace transformation
5. Solve the wave partial differential equations
6. Solve the first order initial value problem using the improved Euler formula
7. Apply the Runge-Kutta method for solving first order initial value problems

Prepared by:

GS curriculum committee Feb . 2009