

1. Department, Course Number, and Course Title:

MATHEMATICS AND COMPUTER SCIENCE

MATH 215 DIFFERENTIAL EQUATIONS (4)

2. Designation: Required Elective
Lower Division Upper Division

3. Course Description: Ordinary differential equations with concentration on methods of finding solutions; applications in science and engineering

4. Prerequisites: MATH 209

5. Text and Materials: Fundamentals of Differential Equations, 6th ed., Nagle

6. Course Objectives: This course is designed to teach students techniques for analyzing problems in terms of ordinary differential equation and techniques of solution for important classes of such equations.

Course Outcomes

- The student should have a qualitative understanding of the nature of a differential equation and of modeling various situations involving smoothly changing quantities sing them
- The student should have a familiarity with first order ordinary differential equations and various interpretations of them as well as computational facility in the solution of important classes of them.
- The student should be familiar with the modeling of important classes of problems by second order equations, especially harmonic oscillator equations. The student should have familiarity with some of the basic theory, especially a complete set of independent solutions as well as computational facility with methods of solution
- Variable topics may be selected from first order systems, series solutions, Laplace transforms, or basic approximation techniques.

7. Topics Covered: (in Order of Presentation)

- Types of differential equations (Ch. 1)
- What are solutions? (Ch. 1)
- Initial value problems (Ch. 1)
- Existence of solutions (Ch. 1)
- Exact First order equations (Ch. 2)
- Integrating factors (Ch. 2)
- Separable equations (Ch. 2)
- First order applications (Ch. 3)
- Basic theory for higher order (Ch. 4)
- Constant coeff. homogeneous (Ch. 4)
- Undetermined coefficients (Ch. 4)
- Variation of parameters (Ch. 4)
- 2nd order constant coeff. (Ch. 5)
- Harmonic oscillators (Ch. 5)
- Resonance (Ch. 5)
- Variable topics as time allows
- Series solutions (Ch. 6)
- First order systems (Ch. 7)
- Laplace transforms (Ch. 9)
- Approximation techniques (Ch. 8)

8. Class Schedule: Number of Sessions per week: 2 lectures
Duration of each session: Lectures 1 hour and 40 minutes

9. Contribution of course to meeting the professional component:

This course is part of the one year (48 quarter units) of Basic Mathematics and Science.
Mathematics 4 units

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)

Skill outcomes:

- an ability to communicate effectively (abet g)
- an ability to think in a logical sequential process

Attitudes Outcome:

11. Prepared by: Maj Mirmirani,

12/2005