GEORGIA PERIMETER COLLEGE
COMMON COURSE OUTLINE
MATH 2652

COURSE ABBREVIATION MATH 2652
CREDIT HOURS 4
COURSE TITLE ORDINARY DIFFERENTIAL EQUATIONS
PREREQUISITE OR COREQUISITE MATH 2633

CATALOG DESCRIPTION
This course is an introduction to the basic ideas of ordinary differential equations. Topics include linear differential equations, series solutions, simple non-linear equations, systems of differential equations, and applications.

EXPECTED EDUCATIONAL RESULTS
As a result of completing this course, the student will be able to do the following:

1. Analyze problems using critical thinking skills.
2. Use functions and their derivatives to construct mathematical models.
3. Solve application problems for which differential equations are mathematical
4. Solve the following kinds of first order, ordinary differential equations:
   a. separable
   b. homogeneous
   c. exact
   d. linear, and
   e. Bernoulli.
5. Solve second order linear ordinary differential equations:
   a. Homogeneous and non-homogeneous equations with constant coefficient
   b. Power series solutions about ordinary and regular singular

7. Solve systems of linear differential equations.

8. Approximate a solution to a differential equation with a numerical method
9. Use some basic commands of a computer algebra system, and solve differential equations with them.
10. Determine the stability of linear systems.
11. Analyze almost linear systems.
12. Use the Energy Method to describe nonlinear systems.
13. Be able to identify the basic forms of bifurcation.

GENERAL EDUCATION OUTCOMES

I. This course addresses the general education outcome relating to communication by additional support as follows:

   A. Students develop their listening and speaking skills through participation and through group problem solving.
   B. Students develop their reading comprehension skills by reading the text and the instructions for text exercises, problems on tests, or on projects. Reading mathematics text requires recognizing symbolic notation as well as problems written in prose.
   C. Students develop their writing skills through the use of problems requiring written explanations of concepts.

I. This course addresses the general education outcome of demonstrating effective individual and group problem-solving and critical thinking skills as follows:

   A. Students must apply mathematical concepts previously mastered to new problems and situations.
   B. In applications, students must analyze problems and describe problems with their pictures, or diagrams, or graphs, then determine the appropriate strategy for solving the problem.

I. This course addresses the general education outcome of using mathematical concepts to interpret, understand, and communicate quantitative data as follows:

   A. Students must demonstrate proficiency in problem-solving skills including applications of differential equations and systems of differential equations.
   B. Students must write differential equations to describe real-world situations and interpret information from the solution of differential equations and systems of differential equations.
   C. Students must solve equations and systems of equations (both linear and which often arise in modeling numerical relationships.
COURSE CONTENT

1. First Order Differential Equations (Exact Solutions)
2. Application of First Order Differential Equations
3. Linear Differential Equations of Higher Order
4. Applications of 2nd Order Differential Equations with Constant Coefficient
5. Laplace transforms: partial fractions, convolution, piecewise
6. Differential Equations with Variable Coefficients, Series Solutions
7. Systems of Linear Differential Equations
8. Numerical Methods of Approximating Solutions
9. Stability of Systems
10. Almost Linear Systems
11. Bifurcation

ENTRY LEVEL COMPETENCIES

Upon entering this course the student should be able to do the following:

1. Analyze problems using critical thinking skills.
2. Construct mathematical models of simple physical systems.
3. Perform ordinary algebraic manipulation with skill and dispatch.
4. Differentiate and integrate elementary functions and standard forms.
5. Perform the basic algebra of matrices.
6. Be able to evaluate a determinant.
7. Recognize a power series and determine the interval of convergence in simple cases.

ASSESSMENT OF EXPECTED EDUCATIONAL RESULTS

I. COURSE GRADE

Exams, assignments, and final exam prepared by individual instructors will be used to determine the course grade.

II. DEPARTMENTAL ASSESSMENT

This course will be assessed every three years. The assessment instrument will consist of a set of open-ended questions, which will be included as portion of the final exam for all students taking the course.

A committee appointed by the Academic Group will grade the assessment material.

III. USE OF ASSESSMENT FINDINGS
The MATH 2652 committee, or a special assessment committee appointed by the Academic Group will analyze the results of the assessment and determine implications for curriculum changes. The committee will prepare a report for the Academic Group summarizing its finding.

Effective date of offering: Summer 2002

CCO completed 12/06/01

Reviewed by committee April 2006