I. **Course Title**: Differential Equations

II. **Course Prefix/Number**: MATH 327

III. **Credit Hours**: 3

IV. **Prerequisites**: MATH 121 minimum grade: C

V. **Catalog Description**
An introduction to the study and application of ordinary differential equations. Typical topics include first order differential equations, linear differential equations, systems of equations, existence and uniqueness of solutions, bifurcations, the Laplace transform, matrix methods, and stability theorems.

VI. **Curricular Relationships**
This course is required of the BA – Mathematics major. It is also required for students majoring in physics or chemistry, or in the pre-engineering program.

VII. **Student Learning Outcomes**
- Students will be able to solve several kinds of ordinary differential equations, both in closed form and numerically.
- Students will be able to differentiate between certain kinds of differential equations and compare their solutions.
- Students will be able to use Laplace transform and matrix methods to solve higher order differential equations and systems of differential equations.
- Students will be able to sketch solution curves and direction fields for first order differential equations and to organize information about the solutions from their graphs.
- Students will be able to apply the techniques and theory of ordinary differential equations to the physical, social, and life sciences.

VIII. **Content Outline**
- Preliminaries: Definitions, classifications of differential equations, direction fields, integral curves and verification of solutions.
- Equations of order one: Existence and uniqueness of solutions, solution methods (separation of variables, exact equations, integrating factors), applications of first order equations.
- Linear differential equations: Linear independence, the Wronskian, existence and uniqueness, differential operators, solving constant coefficients equations, non-homogeneous equations and undetermined coefficients, variation of parameters, solution
by inspection, reduction of order, Laplace transforms, inverse transforms, applications of higher order linear ordinary differential equations.

- Systems of equations including homogeneous and non-homogeneous systems.

IX. Course Procedures/Policies/Grading Scale:
- Homework assignments will comprise some portion of the course grade. Assignments are designed to develop a student's reading, writing, synthesis, and critical thinking skills.
- At least three examinations are given each term.
- A comprehensive final examination is given during finals week.
- Computer software may be used to solve realistic problems.

X. Required/Recommended Readings
The course uses a beginning ordinary differential equations text such as

XI. Issues Unique to this Course: None

XII. Additional Departmental Issues: None