SYLLABUS FOR “[FALL/SPRING]” SEMESTER, 20xx

Course Title: Elementary Differential Equations
Instructor: “[Instructor Name]”
Credit Hours: 3 Office: “[Office Location]”
Course Number: MATH 2860-00x Hours: “[Office Hours]”
Location and Time: “[Location and Time]” email: “[e-mail address]”

TEXTBOOK: Elementary Differential Equations, Tenth Edition, by Boyce and Deprima

CATALOG DESCRIPTION
An introduction to the analysis and solution of ordinary differential equations with emphasis on the fundamental techniques for solving linear differential equations.

PREREQUISITES
Passing grade in Math 2850 or Math 2950. Students who enroll in Math 2860 but have not passed either prerequisite may be administratively dropped from the class.

LEARNING OBJECTIVES
Below is the list of learning objectives. At least 70% of the course time will be devoted to these essential outcomes. These objectives are listed again in the chronological list of topics at the end of this syllabus.

- **Slope fields:** Understand the relationship between slope fields and solution curves for differential equations. Use a slope field and an initial condition to estimate a solution curve to a differential equation.

- **Standard equations:** Solve first-order differential equations that are separable, linear or exact.

- **Other equations:** Solve first-order differential equations by making the appropriate substitutions, including homogeneous and Bernoulli equations.

- **Applications:** Use linear or non-linear first-order differential equations to solve application problems such as exponential growth and decay, falling objects and solution mixtures.

- **Homogeneous equations:** Solve higher-order homogeneous linear equations with constant coefficients.

- **Undetermined Coefficients:** Solve higher-order nonhomogeneous linear equations with constant coefficients by the method of undetermined coefficients.

- **Variation of parameters:** Solve higher-order nonhomogeneous linear equations by the method of variation of parameters.

- **Applications:** Use linear second-order differential equations to solve application problems such as spring/mass system motion problems and three component series circuits.

- **Laplace transform:** Perform operations with Laplace and inverse Laplace transforms to solve higher-order differential equations.

RESOURCES
Free math tutoring on a walk-in basis is available in the Math Learning and Resources Center located in Rm B0200 in the lower level of Carlson Library (phone ext 2176). The Center operates on a walk-in basis. MLRC hours can be found at [http://www.math.utoledo.edu/mlrc/MLRC.pdf](http://www.math.utoledo.edu/mlrc/MLRC.pdf)

GRADING AND EVALUATION
The syllabus should describe the methods of evaluation whether quizzes, exams, or graded assignments. The usual procedure is to give at least two 1 hour in-class exams and a two hour final exam. If quizzes
are not used as a portion of the grade, then three 1 hour exams are recommended. How each evaluation method is to count toward the class grade should be described and a grading scale or description of a grading procedure should be provided. It should be kept in mind when scheduling quizzes and exams that the last day to add/drop the class is the end of the second week of classes and the last day to withdraw from the class is the end of the tenth week. By these dates, students like to have some measure of their progress in the class.

IMPORTANT DATES
The instructor reserves the right to change the content of the course material if he perceives a need due to postponement of class caused by inclement weather, instructor illness, etc., or due to the pace of the course.

MIDTERM EXAM:
FINAL EXAM:

OTHER DATES
The last day to drop this course is:
The last day to withdraw with a grade of “W” from this course is:

MISSED CLASS POLICY
If circumstances occurring in accordance with The University of Toledo Missed Class Policy (found at http://www.utoledo.edu/facsenate/missed_class_policy.html) result in a student missing a quiz, test, exam or other graded item, the student must contact the instructor in advance by phone, e-mail or in person, provide official documentation to back up his or her absence, and arrange to make up the missed item as soon as possible.

ACADEMIC DISHONESTY
Any act of academic dishonesty as defined by the University of Toledo policy on academic dishonesty (found at http://www.utoledo.edu/dl/students/dishonesty.html) will result in an F in the course or an F on the item in question, subject to the determination of the instructor.

NON-DISCRIMINATION POLICY
The University of Toledo is committed to a policy of equal opportunity in education, affirms the values and goals of diversity.

STUDENT DISABILITY SERVICES
The University will make reasonable academic accommodations for students with documented disabilities. Students should contact the Student Disability Services (Rocket Hall 1820; 419.530.4981; studentdisabilitysvs@utoledo.edu) as soon as possible for more information and/or to initiate the process for accessing academic accommodations. For the full policy see: http://www.utoledo.edu/offices/student-disability-services/sam/index.html

STUDENT PRIVACY
Federal law and university policy prohibits instructors from discussing a student’s grades or class performance with anyone outside of university faculty/staff without the student’s written and signed consent. This includes parents and spouses. For details, see the “Confidentiality of student records (FERPA)” section of the University Policy Page at http://www.utoledo.edu/policies/academic/undergraduate/index.html

CLASS SCHEDULE
Syllabus should provide a list of sections to be covered and it is advisable to give a tentative exam schedule. Also, it is a good idea to give a class calendar that lists important dates such as last day to drop, last day to withdraw, and the time of the final. See the list of suggested time needed for each section.
Suggested Schedule for MATH 2860

Chapter 1  Introduction
1.1 Some Basic Mathematical Models; Direction Fields; Slope Fields 1.5
1.2 Solutions to Some Differential Equations; Standard equations 1
1.3 Classification of Differential Equations 0.5
1.4 (Op.) Historical Remarks

Chapter 2  First Order Differential Equations
2.1 Linear Equations; Method of Integrating Factors; Standard equations 1.5
2.2 Separable Equations; Standard equations 1.5
Problems 30, 31, 32 Other equations 1
2.3 Modeling with First Order Equations; Applications 2
2.4 Differences Between Linear and Nonlinear Equations 0.5
Problems 27, 28, 29 Other equations 1
2.5 (Op.) Autonomous Equations and Population Dynamics;
2.6 Exact Equations and Integrating Factors; Standard equations 1.5
2.7 (Op.) Numerical Approximations: Euler’s Method
2.8 (Op.) The Existence and Uniqueness Theorem
2.9 (Op.) First Order Difference Equations

Chapter 3  Second Order Linear Equations
3.1 Homogeneous Equations with Constant Coefficients; Homogeneous equations 1
3.2 Solutions of Linear Homogeneous Equations; Homogeneous equations 2
3.3 Complex Roots of the Characteristic Equation; Homogeneous equations 1
Problem 34 on Euler Equations 0.5
3.4 Repeated Roots; Reduction of Order; Homogeneous equations 1.5
3.5 Nonhomogeneous Equations; Undetermined Coefficients 2
3.6 Variation of Parameters; Variation 1.5
3.7 Mechanical and Electrical Vibrations; Applications 1.5
3.8 (Op.) Forced Vibrations;

Chapter 4  Higher Order Linear Equations
4.1 General Theory of nth Order Linear Equations; Homogeneous equations 1
4.2 Homogeneous Equations with Constant Coefficients; Homogeneous equations 1.5
4.3 The Method of Undetermined Coefficients; Undetermined Coefficients 1.5
4.4 The Method of Variation of Parameters; Variation 1

Chapter 5  Series Solutions of Second Order Linear Equations
(Optional)
5.1 Review of Power Series
5.2 Series Solutions Near an Ordinary Point, Part I
5.3 Series Solutions Near an Ordinary Point, Part II
5.4 Euler Equations; Regular Singular Points
5.5 Series Solutions Near a Regular Singular Point, Part I
5.6 Series Solutions Near a Regular Singular Point, Part II
5.7 Bessel’s Equation

Chapter 6  The Laplace Transform
(Optional)
6.1 Definition of the Laplace Transform; Laplace transform 1.5
6.2 Solution of Initial Value Problems; Laplace transform 2
6.3 Step Functions; Laplace transform 1.5
6.4 Differential Equations with Discontinuous Forcing Functions; Laplace transform 2
6.5 Impulse Functions; Laplace transform 2
6.6 The Convolution Integral; Laplace transform 1

Chapter 7  Systems of First Order Linear Equations
(Optional)

Total Hours 38