Salisbury University Department of Mathematical Sciences

MATH 311 : Differential Equations I
Syllabus (Tentative)

Description: Solutions of first and second order equations and their applications: separable, exact, homogeneous, linear. Numerical and series solutions of ordinary and partial differential equations. 4 Hours Credit: Meets four hours per week.

Prerequisites: C or better in MATH 202.

Intended Audience: Majors in Mathematical or Physical Sciences and students in the Dual-Degree Engineering Program.

Objective: To study differential equations and their applications.

Textbooks: *Fundamentals of Differential Equations*, by R. Kent Nagle, Edward B. Staff, Arthur David Snider; Addison-Wesley, 9th Edition.

Technology: MyMathLab may be required.

Topic	Weeks
Introduction to Differential Equations	1.5
Basic Definitions and Terminology, Directed Fields, Phase Portraits.	
First-Order Differential Equations	2
Preliminary Theory (initial value problems), Separable Equations, Exact Equations, Linear Equations, Applications (linear and nonlinear).	
Mathematical Models and Numerical Methods	1.5
Population Models, Improved Euler' s Method, Runge-Kutta Methods	
Higher-Order Equations	3
Linear Differential Operators, Fundamental Solutions of Homogeneous Equations, Homogeneous Linear Equations with Constant Coefficients, Auxiliary Equations with Complex Roots, Superposition, Nonhomogeneous Equations, Undetermined Coefficients, Variation of Parameters.	
Applications	1
Mechanical Vibrations, Harmonic Motion, Damped and Forced Vibrations.	
Series Solutions	1
Analytic Functions, Taylor Series Method, Method of Frobenius, Finding a Second Linearly Independent Solution.	
Systems of Differential Equations	1
Elimination Method for Linear Systems, Higher-Order Differential Equations.	
Selected Topics	2
Tests	2
Total	**14**

Evaluation

Examinations	$35 - 60\%$
Assignments/Quizzes	$20 - 40\%$
Comprehensive Final Examination	$20 - 40\%$

- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.

- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help you at any stage of the writing process. In addition to the important writing instruction that occurs in the classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**

- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.