Math 275 Course Content and Objectives

COURSE CONTENT AND SCOPE - **Lecture:** Outline the topics included in the lecture portion of the course *(Outline reflects course description, all topics covered in class).*	Hours Per Topic	COURSE OBJECTIVES - **Lecture:** Upon successful completion of this course, the student will be able to...*(Use action verbs - see Bloom's Taxonomy for 'action verbs requiring cognitive outcomes.')*
Preliminary concepts and existence and uniqueness theorems.	6	Explain what a solution to an ordinary differential equation is and to decide the existence and uniqueness of solutions of an ordinary differential equation. Graph solutions to initial value problems using direction fields and the approximation method of Euler.
First-order differential equations.	9	Identify the type of a given differential equation. Apply the appropriate analytical technique for finding the solution of first-order ordinary differential equations. Solve first order differential equations by separation of variables, and integrating factors. Solve exact equations and solve homogeneous equations, Bernoulli equations and equations with linear coefficients by substitutions and transformations.
Applications of first-order equations.	3	Develop mathematical models using compartmental analysis to solve mixing problems, population models, Newton's law of cooling, Newtonian mechanics, and/or electrical circuits.
Linear second-order equations. Linear independence of two functions and Wronskian.	9	Calculate the general solution of homogeneous linear equations. Compute the Wronskian of two differentiable functions. Solve non-homogeneous equations by the method of undetermined coefficients and variation of parameters. Solve the mass-spring oscillator equations.
Systems of linear differential equations.	6	Apply the elimination method. Apply phase plane analysis to systems. Solve coupled mass-spring systems.
Higher-order differential equations.	3	Apply the appropriate analytical technique for finding the solution of higher-order ordinary differential equations. Solve higher-order differential equations with linear coefficients by the method of undetermined coefficients, the annihilator method, and variation of parameters.
Laplace transforms.	6	Compute the Laplace transform of a differential equation using tables and properties of the Laplace transform. Solve initial value problems using the Laplace transform and the inverse

		Laplace transform. Compute the convolution of two functions. Solve equations involving periodic and discontinuous functions. Solve equations with impulses.
Series solutions of differential equations.	4	Solve a second-order equation with constant or analytic coefficients about ordinary and singular points. Solve the Cauchy-Euler equation. Use the method of Frobenius to solve an equation at a regular singular point.
Matrix methods.	3	Rewrite a scalar equation as a first-order linear system in normal form. Find a fundamental solution set for a system with constant coefficients by the method of characteristic values and characteristic vectors.
Numerical methods.	3	Find a numerical solution to a differential equation by the methods of Euler, Taylor, and Runge-Kutta.
Final examination.	2	Final examination.
Total: Total Lecture Hours In Section I Class Hours:	54 54	