

Course alpha, number, title	MTH 235 Differential Equations
Required or elective	Required
Course (catalog) description	Separable and exact equations. Linear equations and variation of parameters. Higher order linear equations. Laplace transforms. Systems of first-order linear equations. Introduction to partial differential equations and Fourier series.
Prerequisite(s)	MTH 234
Textbook(s) and/or other required material	<i>Elementary Differential Equations and Boundary Value Problems</i> , 6 th ed., W. E. Boyce and R. C. DiPrima, J. Wiley and Sons, NY, 2000.
Class/Lab schedule:	3 credit hours [3 lectures/week (50 minutes each)]
Topics covered	<ol style="list-style-type: none"> 1. First order equations: linear equations and integrating factors; separable equations; modeling of population dynamics, mechanics, radioactive decay; exact equations and integrating factors; Picard's existence and uniqueness 2. Second-order homogeneous equations with constant coefficients, complex and repeated roots, undetermined coefficients, variation of parameters, vibrations 3. Laplace transforms: initial value problems, step functions, impulses, convolutions and transfer functions, electrical and mechanical vibrations 4. Systems: eigenvalue method, complex and repeated eigenvalues, defective matrices, transition matrices 5. Partial differential equations: separation of variables, heat equation, Fourier series, even/odd functions, convergence
Course learning objectives	<p>For the student to be able to:</p> <ol style="list-style-type: none"> 1. Solve the standard engineering differential equations 2. Become comfortable with the modeling of physical processes with differential equations 3. Recognize the inherent limitations of the existence and uniqueness theorems
Relationship of course to Mechanical Engineering program outcomes	<p>The following measurement standard is used to evaluate the relationship between the course outcomes and the educational-program outcomes: 3 = Strong Emphasis, 2 = Some Emphasis, 1 = Little or No Emphasis.</p> <ol style="list-style-type: none"> (a) an ability to apply knowledge of mathematics, science, and engineering—3 (b) an ability to design and conduct experiments, as well as to analyze and interpret data—1 (c) an ability to design a system, component, or process to meet desired needs—1 (d) an ability to function on multi-disciplinary teams—1 (e) an ability to identify, formulate, and solve engineering problems—1 (f) an understanding of professional and ethical responsibility—1 (g) an ability to communicate effectively—1 (h) the broad education necessary to understand the impact of engineering solutions in a global/societal context—1 (i) a recognition of the need for and the ability to engage in life-long learning—1 (j) a knowledge of contemporary issues—1 (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice—1 (l) design, build, and test in mechanical systems area—1 (m) design, build, and test in thermal/fluids area—1 (n) application of advanced mathematics—3 (o) capstone design experience—1

Contribution to professional component:

100% Mathematics and Basic Science

Person(s) who prepared this description

Charles R. MacCluer, Professor of Mathematics

Date of Preparation

January 23, 2004