

Mathematics 375

Differential Equations For Engineers and Scientists

Calendar Description: H(3-1.5T)

Definition, existence and uniqueness of solutions; first order and higher order equations and applications; Homogeneous systems; Laplace transform; partial differential equations of mathematical physics.

Prerequisite(s): Applied Mathematics 219 or Mathematics 277; or both Mathematics 267 and 177; or both Mathematics 253 and 114.

Antirequisite(s): Credit for more than one of Mathematics 375 or Applied Mathematics 307 or 311 will not be allowed.

Syllabus

<u>Topics</u>	<u>Number of Hours</u>
First order differential equations	7
Higher order differential equations	7
Laplace transform	9
System of first order equations	6
Boundary value problems of mathematical physics	8
TOTAL HOURS	37

See accompanying page for a detailed breakdown of instructional hours.

MATH 375 Differential Equations for Engineers and Scientists

1. First Order Differential Equations :	
Linear Equations; Method of integrating Factors.	1 Hour
Separable Equations.	1 Hour
Modeling with First Order Equations.	3 Hours
Exact Equations and Integrating Factors.	2 Hours
2. The nth Order Linear Equations:	
Homogeneous Equations with Constant Coefficients.	2 Hours
Nonhomogeneous Equations; Undetermined Coefficients / Variation of parameters	2.5 Hours
Generalization to differential Equations of order n	2.5 Hours
3.The Laplace Transform :	
Definition of the Laplace Transform , properties	3 Hours
Solution of Initial Value Problems.	2 Hours
Differential Equations with Discontinuous Forcing Functions.	2 Hours
Applications	2 Hours
4. Systems of First Order Linear Equations :	
Basic Theory of systems of first order linear equations	1.5 Hours
Review of systems of linear equation , eigenvalues and eigenvectors	1.5 Hours
Homogeneous linear systems with constant coefficients (only distinct eigenvalues case)	2 Hours
Applications	1 Hour
5. Boundary value problems of Mathematical Physics:	
Introduction to Diffusion, wave, and Laplace equation. Boundary and initial conditions	1 Hour
Fourier Series	2 Hours
The method of separation of variables	1 Hour
Solution to the one dimensional Heat equation	1 Hour
Solution to the one dimensional wave equation	1.5 Hours
Solution to the two dimensional Laplace equation	1.5 Hours
	Total: 37 Hours