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

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TOTAL HOURS 37

See accompanying page for a detailed breakdown of instructional hours.

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VS.jthom
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