ENGR 326 Topics

Numerical Integration
 Newton-Cotes Integration
 Romberg Integration
 Guassian Quadrature
Analytical Solution of Ordinary Differential Equations
 Basic Definitions
  Ordinary vs. Partial Differential
  Linear vs. Nonlinear
  Order of Equation
 Explicit and Implicit Solutions
 Initial Value Problems
 Existence and Uniqueness of Solutions
 Separable Differential Equations
 Exact Differential Equations
 Transformation to Separable Form
  Homogeneous Differential Equations
  Equations of the Form $y' = G(ax + by)$
 Transformation to Exact Form
  Linear First Order Differential Equations
  Bernoulli Differential Equations
  Special Integrating Factors
 Higher Order Initial Value Problems
Numerical Solution of Ordinary Differential Equations
 Initial Value Problems
  Euler's Method
  Runge-Kutta style methods
   Adaptive Stepsize Control
  Multipoint Methods
  Stiff ODEs
 Two Point Boundary Value Problems
  Shooting Method
  Finite Difference Method
Partial Differential Equations
 Basic Definitions
  Types of Partial Differential Equations
  Types of Boundary Conditions
  Solution Methodologies
 Elliptic Partial Differential Equations
  Laplace and Poisson Equations
   Implicit vs. Explicit Formulation
   Incorporating Dirichlet and Neumann Boundary Conditions
   Direct vs. Iterative Solution Schemes
    Liebmann's Method
    Successive Over-Relation Method
 Parabolic Partial Differential Equations
  Implicit vs. Explicit Formulation
  Incorporating Dirichlet and Neumann Boundary Conditions
  Direct vs. Iterative Solution Schemes