Instructor: Dr. Luchen Azrar, Adjunct Professor, Aerospace Engineering, Old Dominion University; Norfolk, VA 23529
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Lecture 3 hours; 3 Credits;

Textbook: Advanced Calculus For Applications by F. B. Hildebrand.

Grading: Homework: 30%
Mid-Term: 35%
Final Exam: 35%

Course Contents:

1. Ordinary Differential Equations
   (a) Complete Solutions of Liner Equations.
   (b) Linear Differential Equations with Constant Coefficients.
   (c) Simultaneous Linear Differential Equations.
   (d) Particular Solutions by Variation of Parameters.
   (e) Reduction of Order.
   (f) Nonlinear Equations.

   Homework 1

2. Laplace Transform
   (a) Definition and Properties of Laplace Transforms,
   (b) Inverse Transforms and use of Tables,
   (c) Convolution.
   (d) Application to Linear Differential Equations with Constant Coefficients,
   (e) The Gamma Function.

   (a) Singular Points of Linear Second-Order Differential Equations.
   (b) The Method of Frobenius,
   (c) Treatment of Exceptional Cases
   (d) Bessel Functions.
   (e) Properties of Bessel Functions,
   (f) Legendre Functions.

   Homework 2

   (a) Introduction and Examples. Routing String, Buckling of Long Columns.
   (b) Orthogonality of Characteristic Functions.
   (c) Expansion of Arbitrary FunCtions in Series of Orthogonal Functions.
   (d) Fourier Series.
   (e) Fourier Integrals.
   (f) Fourier Bessel and Legendre Series.

   Homework 3
Midterm Exam March 1st. 2000

5. Complex variables.
   (a) Complex Numbers, Vectors and Polar Forms. Powers and Roots.
   (b) Analytic Functions. The Cauchy-Riemann Equations. Harmonic Functions.
   (c) Elementary Functions. The Exponential, Trigonometric, and Hyperbolic Functions.
       Logarithmic Functions, Complex Powers.
   (d) Complex Integration. Contour Integrals. Independence of Path. Theorem. Application
       Cauchy's Integral Formula.
   (e) Series Representations for Analytic Functions. Taylor Series. Laurent Series. Zeros and
       Singularities.
   (f) Residue Theory, Trigonometric Integrals, Improper Integrals. Indented Contours. Integrals
       Involving: Multiple.-Valued Functions.

Homework 4

   (a) Matrices, Determinants.,
   (b) Systems of Linear Equation:
   (c) Eigenvalues and Eigen Vectors,
   (d) Orthogonal Decomposition, hr Matrices. Homework 5

Final Exam May 3rd 2000:3:45 . 6:45 p.m.