EGM 4313-INTERMEDIATE ENGINEERING ANALYSIS

Fall Semester2005, Instructor-Dr. U. H. Kurzweg, Classes meet M,W,Th,F 2nd period (8:30-9:20am) in FAB103, or T,TH 7th& 8th period(1:55-3:50pm) in MAE-A 301. Office Hours Th 10-noon, F 10-noon.

Catalog Description: EGM 4313 Intermediate Engineering Analysis Credits: 4; Prereq: MAP 2302.Vector differential calculus, including the concepts of gradient, divergence and curl. Divergence and Stokes theorems. Introduction to partial differential equations and Fourier series. Equations of heat conduction, wave propagation and Laplace. Complex variables and the Cauchy-Riemann conditions. Cauchy theorem and conformal mapping.

PART I-VECTOR FIELDS

1-Review of Vectors, Dot and Cross Product, Scalar and Vector Triple
2-Scalar and Vector Fields, Directional Derivative and Gradient
3-Line Integrals in Space, Independence of Path
4-Divergence of a Vector Field, Divergence(or Gauss) Theorem
5-Curl of a Vector Field, Stokes Theorem and its Application
6-Grad, Div, and Curl in Orthogonal Coordinates
7-Application of Vector Theorems to Fluid Flow and Heat Conduction

PART II-SOLUTION OF FIRST ORDER ODES BY MATRIX METHODS

9-Matrix Manipulations including Multiplication and Inversion
10- Solution of Algebraic Equations, Eigenvalues and Eigenvectors
11-Solution of Simultaneous first Order ODEs via Matrix Methods
12-Case of Complex Eigenvalues and Identical Roots
13-Review followed by FIRST HOUR EXAM

PART III-FOURIER SERIES, FOURIER TRANSFORMS, AND PARTIAL DIFF. EQS.

14-Expansion of a Periodic Function as a Fourier Series
15-Fourier Series for Even and Odd Periodic Functions
16-Parseval's Identity, Fourier Transform as a limit of a Periodic Function of Infinite Period.
17-Introduction to PDEs
18-Derivation and Solution of the Wave Eq., D'Alembert's Solution
19-Wave Equation Solutions in 2D and 3D
20-Solution of the Heat Conduction Equation by Variable Separation
21-Derivation, Solution and Application of the Laplace Equation
22-Review followed by SECOND HOUR EXAM

PART IV-FUNCTIONS OF A COMPLEX VARIABLE

23-Introduction to Complex Numbers. Argand Diagram, DeMoivre's Formula
24-Cauchy-Riemann Conditions for an Analytic Function. Cauchy Integral Theorem
25-Cauchy Integral Formula. Harmonic Functions
26-Taylor and Laurent Expansions for Complex Functions
27-Residues and Residue Theorem and their use in evaluation Integrals
28-Contour Integrations
29-Complex Function Application to Inviscid Flow Problems
30-Review followed by THIRD HOUR EXAM

Text: Advanced Engineering Mathematics by E. Kreyszig , J .Wiley & Co, 8th Ed.
Grade Determination: Wkly HW 10% plus 3 Class Exams(30% each), no Final.
Web Page: http://aemes.mae.ufl.edu/~uhk/ANALYSIS.html