

MATH 285 OUTLINE

LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS

TEXT: Differential Equations and Linear Algebra, 3rd Edition, Goode

Approved: JUNE 2007

Effective: FALL 2007

MATERIAL TO BE COVERED	SECTIONS FROM TEXT	TIME LINE
First-Order Differential Equations: 1st order ordinary differential equations (ODE's) with App's: Separable, homogeneous of degree zero, 1st order linear, Bernoulli and exact. Applications: orthogonal trajectories, exponential growth & decay, Newton's Law of Cooling, mixing problems & electric circuits. Numerical solutions: Euler's method and 4th order Runge-Kutta (using Maple). Reducing 2nd order to 1st order by substitution.	1.1 - 1.11	6 Hours
Matrices & Systems of Linear Equations: Definitions, notation, matrix algebra, special matrices, elementary operations, row echelon form, Gaussian elimination, Gauss-Jordan elimination, homogeneous systems, inverse matrices.	2.1 - 2.8	6.5 Hours
Determinants: definition, properties, minors and cofactors, determinants and A^{-1} , determinants and $n \times n$ linear systems.	3.1 - 3.3	4 Hours
Vector Spaces: vectors in R^n , vector space, subspace, linear combination & span, linear independence, Wronskians, basis & dimension, Change of basis, inner product spaces, Gram-Schmidt orthogonalization.	4.1 - 4.12	8 Hours
Linear Transformations: definition, kernel, range, Eigenvalues & Eigenvectors, diagonalization, orthogonal diagonalization of symmetric matrices.	5.1 - 5.6, 5.9, 5.10	8 Hours
Linear Differential Equations of Order n : n th order linear ordinary differential equations: linear differential operators, polynomial differential operators, linear ODE's with constant coefficients, the method of undetermined coefficients with annihilators, variation of parameters.	6.1 - 6.7	10 Hours
Systems of Differential Equations: matrix formulation & solving using Eigenvalues & Eigenvectors. Phase plane for linear autonomous systems (using Maple), non-linear systems: stability, equilibrium, Predator-Prey problem, the Van Der Pol Equation.	7.1 - 7.4 & 7.9 - 7.10	6 Hours
The Laplace Transform: definition, inverse transform, transform of derivatives and solving initial value equations and systems, the first shifting theorem.	8.1, 8.2, 8.4, 8.5	4 Hours
Series Solutions to linear ODE's	9.1, 9.2, 9.5	2 Hours

*** One hour = 1 hour of face time. ****This outline allows for 7 hours of exams.

16 Week Term: 1 week = 4.6667 hours (face time) 6 Week Term: 1 week = 12.5 hours (face time)

NOTES:

1. At least two projects involving a computer algebra system should be assigned.
2. See attached Maple 9 Interface Notes.

**** See reverse side for important Department Policy****

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