COURSE INFORMATION

MATH 422/522 SEC. 1

Spring 2009

Time and Place: TuTr 8:00 - 9:15am in PAS 304

Instructor: Jerry Moloney, Meinel Rm. 536

T.A. John Pate – jpate@math.arizona.edu
Garrett Hardesty - hardesty@physics.arizona.edu

Office Hours (Dr. Moloney): Meinel 536, Tu Th, 2.00 p.m - 3.00 p.m.

Textbook: Francis B. Hildebrand, Advanced Calculus for Applications [Second Edition] (Prentice Hall 1976)

Prerequisites: Math 223, Math 254 or Math 250A or Math 355

Syllabus: See attached sheet.

Final Examination: Tuesday, May 12, 2009, 8:00 a.m. – 10:00 a.m.

Withdrawal: Students may withdraw from this course, or change to ``audit'' until **Tuesday, February 10** if they desire complete deletion of the course enrollment from their records. After **February 10** but before **Tuesday, March 10**, withdrawal is possible with the consent of the instructor. In this case the grade of W is given if the student is passing, the grade of E is given if the student is failing at the time of withdrawal. Also, a change to ``audit'' is possible in this time interval if the student is passing. After **Tuesday, March 10** withdrawal is only possible in the most extraordinary circumstances. Approval of the Dean is required, and the same regulations as for withdrawal after **Tuesday, February 10** apply with regard to the grades of W and E.

Homework: Homework problems will be assigned once a week.

Examinations: Two one and a quarter hour tests will be given and there will be a two-hour final examination. The final examination will be based upon the entire course. No books or notes are allowed for these examinations. The use of electronic calculators is permitted. Your final grade for this course will be determined by the scores of all examinations and the homework grades. The date of the first test will announced at least one week before it is scheduled. The final exam counts twice as much as each one-hour test, the homework will contribute about 10-15% to the total score. No make-up examinations will be given. If you have missed one or several one-hour tests
the final grade for this course will be determined by replacing the missing test scores with the score of the final examination. If you miss the final examination and if you have a well-documented excuse showing that for reasons beyond your control it has been absolutely impossible for you to take the final examination, and if you had a passing grade at the time of the final examination, a grade of I will be given for the course. In all other cases a score of zero will be assigned for the final examination and the course grade evaluated accordingly. The dates for each one and a quarter hour examination will be announced at least one week in advance.

SYLLABUS FOR MATH 422

Textbook: Advance Calculus with Application, Edition 2 Author: Hildebrand

Week 1	Multivariable Calculus	
	6.1 – 6.4	Elementary Properties of Vectors, Scalar, Vector & Multiple Products
Week 2	6.5 –	Differentiation of Vectors
	6.6 –	Geometry of a Space Curve
	6.7 –	The Gradient Vector
Week 3	6.8 – 6.9	Div, Curl, Laplacian, differentiation formulas
	6.10 -	Line Integrals
	6.11 -	The Potential Function
Week 4	6.12 -	Surface Integrals
	6.13 -	Interpretation of Divergence. The Divergence Theorem
	6.14 -	Green's Theorem
Week 5	6.15 -	Interpretation of Curl. Laplace's Equation
	6.16 -	Stoke's Theorem
Week 6	Ordinary Differential Equations – Review of Elementary Theory	
	1.1 – 1.2	Introduction, Linear Dependence
	1.3 -	Complete Solutions of Linear Equations
Week 7	1.4 -	Linear Differential Equation of First Order
	1.5 -	Linear Differential Equation with Constant Coefficients
	1.8 -	Simultaneous Linear Differential Equations
Week 8	Series Solutions: Philosophy and basic strategy of power series solutions, Singular points, Frobenius, logarithms. Draw from 4.1 – 4.8, 4.12 – 4.14	
Week 9	Laplace Transforms.	
	2.1 –	An Introductory Example.
	2.2 -	Definition and Existence of Laplace Transforms
	2.3 -	Properties of Laplace Transforms
	2.4 -	The Inverse Transform
Week 10	2.5 -	The Convolution
	2.7 -	Use of Table of Transforms
	2.8 -	Applications to Linear Differential Equations with Constant Coefficients
Week 11	Fourier Series	
	5.1 -	Introduction
	5.2 -	The Rotating String
	5.3 -	The Rotating Shaft
	5.4 -	Buckling of Long Columns Under Axial Loads
	5.10-	Fourier Sine Series and Cosine Series.
Week 12	5.11-	Complete Fourier Series
	5.12-	Term-by-Term Differentiation of Fourier Series
	5.15-	The Fourier Integral
Week 13	Applications (subject to choice of instructor) e.g. Analog and digital filtering and convolution. Image processing and deconvolution.	
Week 14	Introduction of Partial Differential Equations	
	9.1 -	Introduction
	9.2 -	Heat Flow
	9.10-	The Heat Flow Equation. Heat Flow in a Rod
	9.14-	Examples of the Use of Fourier Integrals
Week 15	9.9 -	The Wave of Equation. Vibration of a Circular Membrane
	9.12-	Traveling Waves
Week 16	Introduction to modeling (subject to choice of instructor) Review	