DEPARTMENT OF MATHEMATICAL SCIENCES
U.S.M.A.

3 January 2005

INSTRUCTIONAL MEMORANDUM
NUMBER 396-1

LESSON ASSIGNMENTS IN MATHEMATICS
MA 396 - NUMERICAL SOLUTIONS TO DIFFERENTIAL EQUATIONS
10 January 2005 - 21 May 2005

1. Purpose: This memorandum announces lesson assignments in MA 396 for the second term, AY 05.

2. Texts Used:

a. Numerical Analysis, 7th Edition -- Burden and Faires
b. Calculus -- Stewart
g. Differential Equations -- Blanchard, Devaney, and Hall

3. General Instructions:

a. Policies and procedures of the Department of Mathematical Sciences published and followed during Third and Fourth Class Mathematics will continue in effect for elective courses, except when amended by the instructor or when obviously not applicable.

b. There will be one Written Partial Review given this semester. Course grades will be comprised solely of the Written Partial Review, projects and the term end examination given on Lesson 41.

c. There will be 6 graded special projects throughout the semester. These projects will be due for submission on Lessons 6, 11, 18, 27, 33, and 39. Student understanding of the special projects will be testable.

4. Lesson Assignments: Abbreviations

R = Classroom Review
SP = Special Project
RAN = Review as Necessary

5. Lesson Attendance and Assignment Schedule is at Enclosure 1.

6. Grading Summary:

Exercise	**Number**	**Points Each**	**Total**
WPRs	1	200	200
Projects	6	100	600
TEE	1	200	200
Total			1000

TYGE RUGENSTEIN
LTC(P), EN
Course Director

DISTRIBUTION:

1 each Prof, D/Math
1 each Student, MA 396

Date	Lesson	Subject	Assignment
1/10	1	Course Introduction, Calculus	Sec 1.1, pgs 1-17
1/12	2	Round off Errors, Algorithm and Convergence	Sec 1.2-1.3, pgs 18-39
1/14	3	Differential Equation Models	BDH: Sec 1.1, pgs 1-19
1/19	4	Introduction to *Mathematica*	Handout
1/21	5	Project 1 (Class Drop)	
1/25	6	Numerical Differentiation	Sec 4.1, pgs 166-178 **Project 1 Due**
1/27	7	Richardson's Extrapolation	4.2 pp. 178-186
1/31	8	Numerical Integration	Sec 4.3-4.4, pgs 186-207
2/2	9	Project 2 (Class Drop)	
2/4	10	Theory of Initial Value Problems I	Sec 5.1, pgs 249-256
			BDH: Sec 1.2, pgs 19-22
2/8	11	Euler's Method	Sec 5.2, pgs 256-266 **Project 2 Due**
2/10	12	Higher Order Taylor Methods	Sec 5.3, pgs 266-272
2/14	13	Runge-Kutta Methods	Sec 5.4, pgs 272-282
2/16	14	Error Control and the Runge-Kutta-Fehlberg Method	Sec 5.5, pgs 282 – 289
2/22	15	Multistep Methods	Sec 5.6, pgs 289-301
2/24	16	Variable Step Size Multistep Methods	Sec 5.7, pgs 301- 306
2/28	17	Project 3 (Class Drop)	
3/2	18	Extrapolation Methods	Sec 5.8, pgs 307-313 **Project 3 Due**
3/4	19	Theory of Second Order Initial Value Problems	BDH: Sec 3.6, pgs 297-308
3/8	20	Higher-Order Equations and Systems of Differential Equations	Sec 5.9, pgs 313 - 324
3/10	21	Stability	Sec 5.10, pgs 324 - 334

3/22	22	Stiff Differential Equations	Sec 5.11, pgs 334 – 341
3/24	23	Review	
3/28	24	WPR	
3/30	25	Project 4 (Class Drop)	
4/1	26	The Linear Shooting Method	Sec 11.1, pgs 645 - 653
4/5	27	The Shooting Method for Nonlinear Problems	Sec 11.2, pgs 653 – 660 **Project 4 Due**
4/7	28	Matrix Factorization	Sec 6.5, pgs 388 - 398
			RAN: Sec 6.6, pgs 398 - 413
4/11	29	Finite-Difference Method for Linear Problems	Sec 11.3, pgs 660 - 666
4/13	30	Finite-Difference Method for Nonlinear Problems .	Sec 11.4, pgs 667 – 672
			RAN: Sec 10.2, pgs 611 - 620
4/15	31	Rayleigh-Ritz Method	Sec 11.5, pg 672 through Example 1, pg 680
4/19	32	Project 5 (Class Drop)	
4/21	33	Physical Problems Involving Partial Differential Equations	Handout **Project 5 Due**
4/25	34	Elliptic Partial-Differential Equations Parabolic	Sec 12.1, pgs 691 - 704
4/27	35	Parabolic Partial-Differential Equations I	Sec 12.2, pgs 704 through Example 2, pg 710.
4/29	36	Parabolic Partial-Differential Equations II	Sec 12.2, pgs 710 - 718
5/3	37	Hyperbolic Partial-Differential Equations	Sec 12.3, pgs 718 - 726
5/5	38	Project 6 (Class Drop)	
5/9	39	Finite-Element Method	Sec 12.4, pgs 726 – 741 **Project 6 Due**
5/12	40	TEE Review	