Course Number: MATH 4500/6500
Course Title: Introduction to Numerical Analysis
Text Book: Numerical Analysis R. Burden&D. Faires
Instructor: Ming-Jun Lai **Phone Number:** (706)542-2065
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Office: Grad. Study 540 **Office Hour:** 2:00–3:00 MWF or by Appointment

This is the first one of two courses on numerical analysis. We plan to cover the material in the text as much as possible. Graduate Students with math. major in this class are strongly suggested to read related chapters in a more advanced text book: "An Introduction to Numerical Analysis" written by K. Atkinson. We will use MATLAB to do programs to implement the algorithms we learn in this course.

The prerequisite of this course is MATH2500. In addition, students are expected to be taking or have taken a course on advanced calculus and elementary differential equation.

We will have three midterm in-class tests and one final in-class test, in addition to eight computer projects assigned below. Problems in the tests and computer projects are based on exercises in the text. So after each section is lectured, do the exercises in the section, even though they are not required to turn in.

Tentative Schedule

Date	Topics	Sections	Project Assignment and Due
8/18M	Review on Calculus	§1.1	
8/20W	Round-off Error	§1.2	
8/22F	Computer Arithmetics	§1.3	
8/25M	Introduction to Matlab		
8/27W	The Bisection Method	§2.1	
8/29F	Fixed Point Iteration	§2.2	Project #1 Assignment
9/1M	Labor Day (no class)		
9/3W	Newton's Method	§2.3	
9/5F	Error Analysis	§2.4	
9/8M	Accelerating Convergence	§2.5	Project#1 Due
9/10W	Müller Method	§2.6	Project# 2 Assignment
9/12F	TEST 1		
9/15M	Lagrange Interpolation I	§3.1	
9/17W	Lagrange Interpolation II	§3.1	Project #2 Due
9/19F	Iterative Interpolation	§3.2	
9/22M	Divided Differences	§3.2	
9/24W	Newton's Interpolation	§3.3	Project # 3 Assignment
9/26F	Hermite's Interpolation	§3.3	
9/29M	Natural Cubic Splines	§3.4	
10/1W	Clamped Cubic Splines	§3.4	Project #3 Due
10/3F	Parametric Curves	§3.5	Project #4 Assignment
10/6M	Review		
10/8W	TEST 2		
10/10F	Numerical Differentiation	§4.1	
10/13M	Rechardson's Extrapolation	§4.2	Project #4 Due

10/15W	Numerical Integration I	§4.3	
10/17F	Numerical Integration II	§4.3	
10/20M	Composite Numerical Interpolation	§4.4	Project #5 Assigment
10/22W	Romberg Interpolation	§4.5	
10/24F	Review		
10/27M	TEST 3		
10/29W	Elmentary Theory of Initial Value Problem	§5.1	Project #5 Due
10/31F	Euler's Method	§5.2	
11/3M	Taylor's Method	§5.3	
11/5W	Runge-Kutta's Method	§5.4	Project #6 Assignment
11/7F	Runge-Kutta's Method II	§5.4	
11/10M	Runge-Kutta-Fehlberg Method	§5.5	
11/12W	Multistep Methods	§5.6	Project #6 Due
11/14F	Multistep Methods II	§5.6	Project #7 Assignment
11/17M	Variable Step-Size Multistep Method	§5.7	
11/19W	Systems of Differential Equations	§5.9	
11/21F	Systems of Differential Equations	§5.9	Project #7 Due
11/24	Thanksgiving Holiday		
11/26	Thanksgiving Holiday		
11/28	Thanksgiving Holiday		
12/1	Extrapolation Methods	§5.8	
12/3	Stability	§5.10	
12/5	Stability	§5.10	
12/8	Stiff Differential Equations	§5.11	Project #8 Assignment
12/9	Review for Final		
12/10	Reading Day		
12/12F	**Final Examination**		TEST 4 Project #8 Due

Grading Policy:

Three Tests	(100pts each)	300pts
FINAL TEST		100pts
Eight Projects	(50pts each)	400pts
Total		**800pts**

	Group I*	Group II**
A	80%+	90%+
B	70%+	80%+
C	60%+	70%+
D	50%+	60%+
F	50%-	60% -

* Group I: MATH4500 Students; MAT6500 Graduate Students with applied sciences and education majors;

** Group II: MATH6500 Graduate Students with Math. major.