

**Math 321 Syllabus (991)**  
**Department of Mathematical Sciences**

**Title:** Introduction to Numerical Computing

**Prerequisite:** Math 202, ICS 101

**Textbook:** Numerical Mathematics & Computing, Cheney & Kincaid, 3ed edition

**Objectives:**

- 1-To acquaint students with the potentialities of the modern computer for solving the numerical problems that will arise in their professions.
- 2-To give students an opportunity to honor their skills in programming and problem solving.
- 3-To help students arrive at an understanding of the important subject of errors.

Week	Section	Section Title	Chapter Title
1-2	1.1	Programming Suggestions	1-Introduction
	1.2	Review of Taylor Series	
	2.2	Floating Point Representation	2-Number Representation and Errors
3-4	3.1	Bisection Method	3-Locating Roots of Equations
	3.2	Newton's Method	
	3.3	Secant Method	
5-6	4.1	Polynomial Interpolation	4-Interpolation and Numerical Differentiation
	4.2	Errors in Polynomial Interpolation	
	4.3	Estimating Derivatives and Richardson Extrapolation	
	Exam I		
7-8	5.1	Definite Integral	5-Numerical Integration
	5.2	Trapezoid Rule	
	5.4	An Adaptive Simpson's Scheme	
	5.5	Gaussian Quadrature Formulas	
9-10	6.1	N Gaussian Elimination	6-Systems of Linear Equations
	6.2	Gaussian Elimination with Scaled Partial Pivoting	
	6.3	Tridiagonal and Banded Systems	
	6.4	LU Factorization	
11	7.1	First-degree and Second-Degree Splines	7-Approximation by Spline Functions
	7.2	Natural Cubic Splines	
	Exam II		
12-13	8.1	Taylor Series Methods	8-Ordinary Differential Equations
	8.2	Runge-Kutta Methods	10-Smoothing of Data and the Method of Least Squares
	8.3	Stability and Adaptive Runge-Kutta Methods	
	10.1	The Methods of Least Squares	
14-15	12.1	Shooting Method	12-Boundary Value Problems for Ordinary Differential Equations
	12.2	A Discretization Method	

**Grading Policy**

Exam I	15%
Exam II	15%
Final Exam	30%
Computer Assignment & Homework	40%

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**office hours:** 3:20- 4:00 Mon    OAB  
 10:15-10:55 Wed.    5-416  
 Also by appointment