

SU DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE  
 SYLLABUS (*Tentative*)  
 MATH 471/571 *Numerical Methods*

- Objectives:** To introduce computational mathematics and basic numerical analysis. To introduce various techniques to solve problems in mathematics, computer science, engineering, and physical science.
- Description:** This is an ideal course for those who wish to solve real-world problems through mathematical techniques, and also learn about various errors which may contaminate numerical results.
- Prerequisites:** Programming experience (COSC 117, 118, or 120) and one of the following: MATH 306, MATH 310, or MATH/PHYS 309.
- Text:** Numerical Analysis, 9th edition by Burden and Faires, Brooks/Cole.

	<b>Weeks</b>
<b><i>Mathematical Preliminaries and Error Analysis</i></b>	2.5
Review of calculus (limits, continuity, differentiability, Riemann integral, Taylor Series), computer arithmetic, errors in scientific computation, computer software.	
<b><i>Solutions of Equations of One Variable</i></b>	2.0
The bisection method, Newton's method, error analysis, Müller's method.	
<b><i>Interpolation and Polynomial Approximation</i></b>	2.0
Lagrange polynomials, divided differences, Hermite interpolation, parametric curves.	
<b><i>Numerical Integration and Differentiation</i></b>	2.5
Basic quadrature rules, Gaussian quadrature, multiple integrals, improper integrals, numerical differentiation.	
<b><i>Numerical Solution of Initial-Value Problems</i></b>	2.0
Taylor methods, Runge-Kutta methods, extrapolation methods.	
<b><i>Approximation Theory</i></b>	1.0
Discrete and continuous least squares approximation, rational function approximation.	
<b><i>Optional Topics</i></b>	.5
<b><i>Tests and Review</i></b>	<u>1.5</u>
	14.0

**EVALUATION**

Assignments and Projects	50%
Tests	25-38%
Final Examination	12-25%

**Graduate students will be assigned special homework/test problems or projects.**

NOTE: ONCE A STUDENT HAS RECEIVED CREDIT, INCLUDING TRANSFER CREDIT, FOR A COURSE, CREDIT MAY NOT BE RECEIVED FOR ANY COURSE WITH MATERIAL THAT IS EQUIVALENT TO IT OR IS A PREREQUISITE FOR IT.