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: MATH 306, MATH/PHYS 309 or MATH 310, and programming (COSC 117, 118, or 120).

Text: "Numerical Methods", by Faires and Burden, Brooks/Cole,.

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

EVALUATION

Assignments and Projects	20-30%
Tests	40-60%
Final Examination	20-30%

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.

M-M/axr 11/2007