Date:

Date: 4/20/

Department: Mathematics

College Curriculum Committee

College Dean

Director of Liberal Studies

Provost

to ESC: Implemented: published

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CURRICULUM PROPOSAL COVER SHEET
University–Wide Undergraduate Curriculum Committee

I. Title/Author of Change

CONTENT AND FORMAT CRITERIA FOR NEW COURSE PROPOSALS
AND MAJOR COURSE REVISIONS

New course proposals and major course revisions must be submitted in the form described below. This form applies to the submission of a single course or to a series of new courses tied to a new or revised graduate program proposal. If the course(s) is part of a new or revised graduate program proposal, the

[redacted]

Department: Mathematics

Course Number and Title: MA 551 Numerical Methods for Supercomputers

Person to Contact for Further Information: Dr. H. E. Donley

Course Descriptions

MA 451 Numerical Methods for Supercomputers 3c-0l-3sh

Prerequisites: MA 121 and MA 122, or MA 123 or MA 127, MA 171, CO 250

Supercomputers make use of special computer architectures— vector and parallel processors—in order to achieve the fastest processing speed currently available. Students will be introduced to these features and will learn how numerical algorithms can be constructed to exploit supercomputers' capabilities. Students will gain practical experience in programming for the Cray YMP, in incorporating existing scientific software packages

Course Syllabus

Course Objectives:
Students will

- understand the principles of vector and parallel computer architectures

Required Textbook(s):
Golub, G., and J. Ortega, *Scientific Computing: an introduction with parallel programming*, Academic Press, 1993.

Resource Requirements:
There are no special materials required of the student.

Bibliography:

Levesque, John M., and Joel Williamson, *A Guidebook to Fortran on Supercomputers*, Academic Press, 1989.

An introduction to supercomputer architectures (requires a basic knowledge of architecture terms), writing Fortran code for vector processors.

Brawer, Steven, *Introduction to Parallel Programming*, Academic Press, 1989.

Basic description of parallel architectures, principles for parallel programming with examples given in Fortran, some applications, parallel C under Unix.

Krishnamurthy, E. V., *Parallel Processing: Principles and Practice*, Addison-Wesley Publishing Co., 1989.

Somewhat advanced. Theoretical introduction to parallel processes (requires some knowledge of computer architecture and programming languages), principles of parallel programming, applications to databases.

Akl, Selim G., *The Design and Analysis of Parallel Algorithms*, Prentice-Hall, 1989.

Requires some knowledge of the analysis of algorithms. Types of parallel computers, many applications—searching, sorting, numerical methods, operations research.

Bertsekas, Dimitri P., and John N. Tsitsiklis, *Parallel and Distributed Computation: Numerical Methods*, Prentice-Hall, 1989.

Somewhat advanced. Introduction to parallel processes; synchronous and asynchronous algorithms for numerical methods and operations research.

K. A. Galligan, Heath, Ng, Ortega, Peyton, Plemmons, Romine, Sameh, and Voigt, *Parallel Algorithms for Matrix Computations*, SIAM, 1990.

Advanced. Parallel algorithms for dense linear systems and sparse linear systems, extensive bibliography of 2016 references.

Course Analysis Questionnaire

Section A: Details of the course

Computer Science Department are jointly proposing this course, with the intention of

programming assignments, theoretical homework assignments, and reports of presentations on reading assignments. Since Numerical Methods