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PROPOSAL NUMBER: 99-470

CURRICULUM PROPOSAL FORM

***DEADLINES:**

REGULAR COURSE PROPOSALS: OCTOBER 23, 1998 FOR FALL, 1999 AND FEBRUARY 19, 1999 FOR SPRING, 2000
SHORT-TERM COURSE PROPOSALS: DECEMBER 11, 1998 FOR FALL, 1999 AND MARCH 26, 1998 FOR SPRING 2000

PROPOSAL TITLE: Architectures for Digital Signal Processing

SPONSOR/S: Ravi P. Ramachandran, John L. Schmalzel

DEPARTMENT: ENGINEERING

6909.451

CHECK ALL THAT APPLY:

UNDERGRADUATE GRADUATE

COLLEGE: ENGINEERING

If LAS: History/Humanities

Math/Sciences

Social/Behavioral Sciences

TYPE OF PROPOSAL (Check ALL that Apply)

General Education

New Course (NOT Gen. Ed.)

New Course in Bank

Name Change (Dept., School, Major)

Existing course, Add To Bank

Changes in Degree Requirements

Multicultural/Global Designation

Changes Involve Gen. Ed. requirements

Writing Intensive Designation

Minor Changes to Existing Courses

New Minor/Concentration/Specialization

Course is NOT General Education

New Major/Degree Program

Course IS General Education

Short Term Course Proposal

DEPARTMENT

(SIGNATURE INDICATES APPROVAL)

Ravi P. Ramachandran 03/04/99

John L. Schmalzel 03/04/99

DEPT. CURRICULUM CHAIR / DATE

DEPT. CHAIRPERSON / DATE

COLLEGE CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 4/20/99

APPROVED

NOT APPROVED

Comments:

Robert P. Heppath 4/20/99

SIGNATURE DATE

ACADEMIC DEAN (& GRADUATE DEAN, for New Graduate Programs Only)

APPROVED

NOT APPROVED

Comments:

James R. May 3/9/99

SIGNATURE (Academic Dean)

DATE

SIGNATURE (Graduate Dean)

DATE

UNIVERSITY CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 4/26/99 (College Council)

APPROVED
 NOT APPROVED

Comments:

Finance Decree - 5/7/99

SIGNATURE DATE

SENATE

Date announced at Senate 4/30/99

Voted upon at Senate: _____ Approved _____ Not Approved _____ Date: _____

EXECUTIVE VICE PRESIDENT/PROVOST

APPROVED

NOT APPROVED If no, reasons are as follows:

STUDENT CREDIT HOURS _____ FACULTY LOAD HOURS _____ EQUALIZED CREDIT HOURS _____

OFFICIAL COPY & APPROVAL SHEET FILED (DATE): _____

DATE/SIGNATURE EXECUTIVE VICE PRESIDENT/PROVOST C. J. Mott 4/30/99

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED _____

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED 0909.451

DATE/SIGNATURE OF REGISTRAR Robert C. Kulak 6/16/99

NOTIFICATION FORWARD:

SENATE CURRICULUM COMMITTEE CHAIRPERSON

DEPARTMENT CHAIRPERSONS

ACADEMIC DEAN(S)

REGISTRAR

SPONSOR(S)

Course Proposal

1. Details:

- | | |
|---|--|
| a) Course Title: | Architectures for Digital Signal Processing (0909451) |
| b) Sponsor: | Dr. Ravi P. Ramachandran, Dr. John L. Schmalzel and Electrical Engineering Curriculum Committee |
| c) Credit Hours: | 3 credit hours |
| d) Course Level: | Senior |
| e) Curricular Effect: | Elective course for electrical engineering majors |
| f) Prerequisites: | Digital Signal Processing (0909351) |
| g) Suggested Time/
Scale of Implementation | Fall 1999
One section |
| h) Resources | Faculty will be hired and laboratory equipment obtained consistent with Engineering School multi-year budget. Library acquisitions will be required. |

2. Rationale:

The proposed course is a revision to part of the Engineering Curriculum Proposal approved by the College Senate in December, 1994. The proposed course is consistent with the establishment of the School of Engineering approved by the Board of Trustees in February, 1995.

The impact of digital information technology in the world market has been rather awesome. The word 'digital' has become a common word in today's marketplace. Examples include digital audio, digital television, digital video and digital communications. This course provides the fundamental framework to allow the student to design digital signal processing systems for applications in the above areas using state of the art chips that are used in the marketplace. A design perspective using special purpose hardware and software are emphasized.

3. Essence of the Course:

a) Objectives:

The proposed course has a number of objectives:

- (i) Provide an overview of assembly language programming using specialized processors (fixed and floating point).

- (ii) Implementation of signal processing algorithms using special purpose hardware.
- (iii) Application of signal processing algorithms to communications, speech and image processing.

b) Topical Outline:

- Fixed and floating point arithmetic.
- Assembly programming with Analog Devices, Texas Instruments and the Motorola processors.
- Sampling and waveform generation, analog to digital and digital to analog conversion.
- Fixed and adaptive filter (finite and infinite impulse response) implementation, study of quantization noise and finite wordlength effects.
- Fast Fourier transform implementation.
- Applications to communications, speech and image processing: pulse code modulation with adaptation; linear predictive coding; multitone and multirate techniques; speech and image processing systems.

c) Evaluation and Grading Procedures:

Student grades will be based on projects, examinations, homework, laboratory reports and written and oral technical communication.

d) Course Evaluation:

The proposed course will be evaluated based on student evaluations and critical review by engineering faculty.

e) Texts:

V. K. Ingle and J. G. Proakis, *Digital Signal Processing Laboratory Using the ADSP-2101 Microcomputer*. Prentice-Hall: New Jersey, 1991.

H. V. Sorenson, *A Digital Signal Processing Laboratory Using the TMS320C30*. Prentice-Hall: New Jersey, 1997.

M. El-Sharkawy, *Digital Signal Processing Applications With Motorola's DSP56002 Processor*. Prentice-Hall: New Jersey, 1996.

4. Results of Consultations:

a) Consulted Departments: Computer Science

b) Consultants and Consultant Statements: N/A

c) Written Consultations: N/A

5. Additional Supporting Information: N/A

6. Catalog Description:

Architectures for Digital Signal Processing (0909451)

This is a senior level undergraduate elective course that covers the fundamentals of the implementation of digital signal processing algorithms using special purpose hardware. Topics include fixed and floating point arithmetic, assembly language programming, sampling, digital filter implementation, finite wordlength effects, quantization noise and fast Fourier transform implementation. The student is exposed to application designs in communications, speech and image processing.

Prerequisite: Digital Signal Processing (0909351)