ROWAN UNIVERSITY CURRICULUM PROPOSAL

PROPOSAL TITLE: DIGITAL SIGNAL PROCESSING

CHECK APPROPRIATE: __ UNDERGRADUATE  __ GRADUATE  __ SEMESTER HOURS

SPONSOR(S): SURESH P. RAMACHANDRAN  JOHN L. SCHMALTER

DEPARTMENT/TELEPHONE #: ELECTRICAL ENGINEERING / x + 43

CHECK ONE:  V COURSE  _ MINOR PROGRAM  _ CONCENTRATION  _ SPECIALIZATION

__ ACHIEVEMENT CERTIFICATE  _ CERTIFICATION PROGRAM  _ MAJOR PROGRAM

Step #1 (Department)
2/20/97 Approved (Date)
__ Not Approved (Date)

John Smith
Dept. Curriculum Chair.

2/20/97
Reviewed (Date)

John Smith
Dept. Chair.

Step #2 (Receipt)

SCC# 97-98-175

10/25/97
Date Received Senate

Step #3 (School)

Reviewed Date: 2/20/97

_ Recommend to Approved

_ Recommend NOT to Approve

Forward for Open Hearing:

_ WITHOUT Reservations

_ WITH Reservations:

Comments:

Robert P. Hescott
School Committee Chair.

Step #4 (Academic Dean):  _ Recommended  __ NOT Recommended  ___ Conditionally Recommended (See Comments)

Comments:

Dean Signature/Date: 2/28/97

Step #5 (Senate Curriculum Committee):  Open Hearing Date: __________  Approved by Curriculum Committee Date 1/1/98

Returned to Sponsor(s) for the following reason:

Step #6 (Senate) Date announced/voted on at Senate 2/16/97 voted on:  _ Approved  __ NOT Approved

Date forwarded to Executive Vice President/Provost: __________

Senate Curriculum Committee chair Signature/Date:  __________  6/17/98
Step #7 (Executive Vice President/Provost): Date Received __________

Approved

NOT Approved If no, reasons are as follows:

Student Credit Hours _______

Faculty Load Hours _______

Equalized Credit Hours _______

Official Copy & Approval Sheet Filed (Date) ________________

Executive Vice President/Provost Signature ________________

Registrar

Date Approved Course Description Received 5/12/____

Legis Taxonomy and Course Number Assigned ________________

Date/Signature of Registrar ________________

Notification Forward:

____ Senate Curriculum Committee Chairperson ____________

____ Department Chairperson(s) ____________

____ Academic Dean(s) ____________

____ Registrar ____________

____ Sponsor(s) ____________
Course Proposal

1. Details:

a) Course Title: Digital Signal Processing
b) Sponsor: Dr. Ravi P. Ramachandran, Dr. John L. Schmalzel and Electrical Engineering Curriculum Committee
c) Credit Hours: 3 credit hours
d) Course Level: Graduate
e) Curricular Effect: First level course for Masters students
f) Prerequisites: Background in basic signal theory
g) Suggested Time/
   Scale of Implementation: Spring 1998
   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 further expand into one or more of these ‘digital’ areas by introducing the basic concepts of digital signal processing. Both a mathematical problem-solving perspective and a software simulation perspective are provided for.

3. Essence of the Course:

a) Objectives:

The proposed course has a number of objectives:

(i) Provide an overview of the basic concepts of digital signal processing and signal theory.
(ii) Provide a working knowledge of the structures and design of digital filters.

(iii) Provide an understanding of deterministic and random digital signals.

(iv) Develop the ability to simulate digital signal processing operations using C and MATLAB.

b) Topical Outline:

- Discrete time signals and systems: linearity; time-invariance; stability; causality; difference equation representation; impulse response; frequency response; sampling, convolution.

- The z-transform: properties; calculation of; inverse z-transform; relationship to convolution; analysis of digital systems.

- Structures and design of digital filters: signal flow graph; canonical, cascade and parallel structures; finite impulse response design methods; infinite impulse response design methods.

- Discrete Fourier Transform: properties; computation using Fast Fourier Transform methods; relationship to z-transform and frequency response.

- Discrete-time random signals and random processes: properties; correlation and covariance functions; power spectral density.

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:


4. Results of Consultations:
a) Consulted Departments: None

b) Consultants and Consultant Statements: N/A

c) Written Consultations: N/A

5. Additional Supporting Information: N/A
6. Catalog Description:

This is a first level graduate course that covers the fundamentals of digital signals, systems, transforms and filters. Systems concepts taught include linearity, time-invariance, stability, causality, difference equation representation, impulse response and convolution. The issue of frequency response and sampling is covered. The z-transform is introduced. Design methods and structures of digital filters are discussed with the exposure to do software design. Random digital signals are also covered.

Prerequisite: Background in basic signal theory