

ROWAN UNIVERSITY CURRICULUM PROPOSAL

0909-351

(2)

PROPOSAL TITLE: DIGITAL SIGNAL PROCESSING

CHECK APPROPRIATE: UNDERGRADUATE GRADUATE SEMESTER HOURS

SPONSOR(S): RAVI P. RAMACHANDRAN
JOHN L. SCHMALZEL

DEPARTMENT/TELEPHONE # ELECTRICAL ENGINEERING / x 4643

CHECK ONE: COURSE MINOR PROGRAM CONCENTRATION SPECIALIZATION
 ACHIEVEMENT CERTIFICATE CERTIFICATION PROGRAM MAJOR PROGRAM

<p style="text-align: center;">Step #1 (Department)</p> <p><u>22005 97</u> Approved (Date) <input type="checkbox"/> Not Approved (Date)</p> <p style="text-align: center;"><u>John Sull</u> Dept. Curriculum Chr.</p> <p style="text-align: center;"><u>22005 97</u> Reviewed (Date)</p> <p style="text-align: center;"><u>John Sull</u> Dept. Chr.</p>	<p style="text-align: center;">Step #2 (Receipt)</p> <p style="text-align: center;">SCC# <u>97-98-175</u></p> <p style="text-align: center;"><u>10-25-97</u> Date Received Senate</p> <p style="text-align: center;">_____ Senate Curriculum Chr.</p>	<p style="text-align: center;">Step #3 (School)</p> <p style="text-align: right;">Reviewed Date: <u>22 Oct 97</u></p> <p><input checked="" type="checkbox"/> Recommend to Approved <input type="checkbox"/> Recommend NOT to Approve</p> <p>Forward for Open Hearing: <input checked="" type="checkbox"/> WITHOUT Reservations <input type="checkbox"/> WITH Reservations:</p> <p>Comments:</p> <p style="text-align: center;"><u>Robert P. Heakelt</u> School Committee Chr.</p>
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Step #4 (Academic Dean): Recommended NOT Recommended Conditionally Recommended (See Comments)

Comments:

Dean Signature/Date: [Signature] 10/28/97

Step #5 (Senate Curriculum Committee): Open Hearing Date: _____ Approved by Curriculum Committee Date: 4/7/98

Returned to Sponsor(s) for the following reason: consult w/ computer science

Step #6 (Senate) Date announced/voted on at Senate 12-16-97 voted on: Approved NOT Approved

Date forwarded to Executive Vice President/Provost _____

Senate Curriculum Committee chair Signature/Date: [Signature] 4/7/98

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 C. H. O. O.

Registrar

Date Approved Course Description Received 5-12-98

Legis Taxonomy and Course Number Assigned 722-100

Date/Signature of Registrar [Signature]

Notification Forward:

___ Senate Curriculum Committee Chairperson

___ Department Chairpersons

___ 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:

A. V. Oppenheim and R. W. Schaffer, *Discrete-Time Signal Processing*. Prentice-Hall: New Jersey, 1989.

S. Orfanidis, *Introduction to Signal Processing*. Prentice-Hall: New Jersey, 1995.

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