ROWAN COLLEGE
CURRICULUM COMMITTEE

PROPOSAL TITLE: Network II 0909-212

x UNDERGRADUATE ___ GRADUATE 2 CREDIT HOURS

SPONSOR(S): School of Engineering Curriculum Committee

DEPARTMENT & TELEPHONE# Dr. John L. Schmalzel (Electrical Engineering -4629)

CHECK ONE: x COURSE ___ MINOR PROGRAM ___ CONCENTRATION ___ SPECIALIZATION

___ ACHIEVEMENT CERTIFICATE ___ CERTIFICATION PROGRAM X MAJOR PROGRAM

STEP #1 (DEPARTMENT)	STEP #2 (RECEIPT)	STEP #3 (SCHOOL)
✓ APPROVED/DATE: 14 MAR 97	SCC# 00-97-109	REVIEWED DATE: 3-14-97
___ NOT APPROVED/DATE:	DATE RECEIVED: 3-14-97	✓ RECOMMEND TO APPROVE
JOHN L. SCHMALZEL DEPT. CURRICULUM CHR.		___ RECOMMEND NOT TO APPROVE
✓ REVIEWED/DATE: 14 MAR 97		FORWARD FOR OPEN HEARING
		✓ WITHOUT RESERVATIONS TRC RAD
		___ WITH RESERVATIONS COMMENTS:
DEPT. CHR.	SENATE CURRICULUM CHR.	SCHOOL COMMITTEE CHR.

STEP #4 (ACADEMIC DEAN)

COMMENTS:

✓ RECOMMEND

___ NOT RECOMMEND

___ CONDITIONALLY RECOMMEND (SEE COMMENTS)

DATE & SIGNATURE, DEAN OF SCHOOL ___ 3/14/97

STEP #5 (SENATE CURRICULUM COMMITTEE)

DATE OF OPEN HEARING 4-24-97

APPROVED BY SENATE CURRICULUM COMMITTEE (DATE) ___

___ RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:

STEP #6 (SENATE)

DATE PRESENTED TO SENATE ___ ✓ APPROVED ___ NOT APPROVED

NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST (DATE) ___

SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE ___ 5/2/97

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED MAY 2 [illegible]

APPROVED: ____YES ____NO

IF NO, REASONS ARE AS FOLLOWS:

STUDENT CREDIT HOURS ________

FACULTY LOAD HOURS ________

EQUALIZED CREDIT HOURS ________

OFFICIAL COPY & APPROVAL SHEET FILED (DATE) ________

SIGNATURE, EXECUTIVE VICE PRESIDENT/PROVOST [signature]

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED 4 June 97

HEGIS TAXONOMY AND COURSE NUMBER ASSIGNED 0919.202

DATE/SIGNATURE OF REGISTRAR [signature]

NOTIFICATION FORWARD:

___SENATE CURRICULUM COMMITTEE CHAIRPERSON

___DEPARTMENT CHAIRPERSON(S)

___ACADEMIC DEAN(S)

___REGISTRAR

___SPONSOR(S)

Course Proposal

1. Details:

a) Course Title:	Network II
b) Sponsors:	Dr. J.L. Schmalzel and School of Engineering Curriculum Committee
c) Credit Hours:	2 credit hours
d) Course Level:	Sophomore (0909.202)
e) Curricular Effect:	Required course for electrical engineering majors
f) Prerequisites:	Prerequisites: Physics II, Math for Engineering Analysis I, Network I; Concurrent enrollment in Math for Engineering Analysis II
g) Suggested Time/ Scale of Implementation	Spring 1998 One section
h) Resources	Faculty will be hired and laboratory equipment (analysis, simulation software) obtained consistent with approved Engineering School multi-year budgets.

2. Rationale:

The proposed course is a component of the Engineering Curriculum Proposal approved by the College Senate in December 1994, and is consistent with the establishment of the School of Engineering approved by the Board of Trustees in February 1995. The proposed course is a core requirement for the Electrical Engineering discipline, contributing to the Engineering Topics requirements as defined by the Accreditation Board for Engineering and Technology (ABET).

The study of networks (also termed "circuit theory") lays the foundation for major areas of Electrical Engineering including electronics and power. Students develop the tools needed to analyze network topologies composed of basic electrical elements (resistors, capacitors, inductors) and sources (independent, dependent). In addition, the material is ideally suited for concurrent introduction to simulation and numerical modeling. A second networks course treats alternating current (ac) and polyphase networks. However, the most important addition is the treatment of transform-domain analysis methods using the Laplace Transform and Fourier Transform.

3. Essence of the Course:

a) Objectives:

Upon completion of the course, students will be able to:

1. Be able to formulate and model simple electrical circuits and determine their forced and natural responses using time-domain, differential equations and using transform-domain techniques. Be able to generate and interpret log-magnitude and phase plots (*Bode* plots).

2. Understand mutual inductance and its application to polyphase (e.g., 3ϕ) networks.

3. Understand the usefulness of network theory by applying it to solve representative electronic and power applications for both analytic and open-ended design problems.

4. Understand and use computer software (e.g., *SPICE*[1]) to simulate electrical networks including defining the appropriate stimulus, selecting the correct analysis mode, and interpreting graphical output of network response.

5. Develop custom analysis routines in a high-level programming language (e.g., C++), and using symbolic mathematics packages (e.g., *MATLAB*).

6. Be able to conduct network verification experiments in a laboratory.

7. Be able to communicate a network analytic effort effectively using a combination of text (narrative, equations), graphics (topology, results), and oral techniques. Develop a course portfolio that presents mastery of key concepts.

8. Describe examples of engineering ethics case histories involving network analysis.

b) Topical Outline:

The general topic outline is described below; however, prior to each semester's offering, the instructor will assess any technology advances in the course subject matter or in teaching resources prior to the course and make changes deemed appropriate to maintain appropriate content and currency.

Sinusoidal sources and phasors
Complex sources
Current-voltage laws for phasors
Impedance, admittance
Phasor circuits

Ac steady-state analysis
Nodal and mesh analysis
Phasor diagrams
Ac network simulation

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[1] Simulation Program with Integrated Circuit Emphasis.

Ac power
Root-mean-square power
Maximum power transfer
Reactive power, power factor

Mutual inductance and transformers
Ideal transformers
Single-phase, three-phase systems
Delta, Wye connections, transformations

Laplace transform (LT)
Forward and inverse transforms, pairs
Partial-fraction expansion
Network analysis using LTs
Transfer functions
Poles and zeros
Stability
Initial, final value theorems
Impulse response, convolution

Frequency response
Decibel
Bode plots (log-magnitude, phase)
Response of typical networks (filters, op amps)

Fourier series and Fourier transform (FT)
Periodic functions
Discrete spectra and phase plots
FT properties
FT network analysis
Computer-based (discrete) FT

Analogous systems (hydraulic, suspension)
Ethics
Technical network communication
Portfolio

c) Evaluation and Grading Procedure of Students:

Student grades will be determined on the basis of examinations, homework and/or projects, laboratory projects and reports. A course syllabus with stated method of arriving at the final grade, e.g., number of exams, projects homework, percentage of grade, will be distributed to the students during the first week of classes.

d) Course Evaluation:

The proposed course will be evaluated on the basis of student evaluations and curriculum review by appropriate faculty. Of particular importance is assessing how well the course meets the objectives outlined in "b)" above. In addition to traditional written and oral exam instruments, student performance in follow-on courses that require Network I as a prerequisite will be tracked to ensure that adequate student development is achieved.

4. Results of Consultations:

a) Consulted Departments: (None applicable.)

b) Consultants and Consultant Statements: (None applicable.)

c) Written Consultations: (None applicable.)

5. Additional Supporting Information:

Example texts that could serve as primary or supplemental references for this course:

[1] D.E. Johnson, J.R. Johnson, J.L. Hilburn, and P.D. Scott, *Electric Circuit Analysis*. Third ed., Prentice-Hall: New York, 1997.

[2] J.W. Nilsson and S.A. Riedel, *Electric Circuits*. Fifth ed., Addison-Wesley: New York, 1996.

[3] J.W. Nilsson and S.A. Riedel, *Using Computer Tools for Electric Circuits*. Fifth ed., Addison-Wesley: New York, 1996.

[4] J. Gottling, *Introduction to PSpice*. Second ed., J. Wiley & Sons: New York, 1995.

Catalog Description:

Network II (0909.202)
Prerequisites: Physics II, Math for Engineering Analysis I, Network I; Concurrent enrollment in Math for Engineering Analysis II.

Extends network analysis principles including ac sources, transformers, and polyphase networks. The Laplace transform is developed as a method for obtaining the transient and steady-state response of a network. The frequency response of a transfer function is analyzed using Bode plots. The Fourier transform technique is used to determine the response of networks to periodic inputs. Computer-aided analysis and simulation tools are presented as methods to augment network analysis and design.