ROWAN COLLEGE
CURRICULUM COMMITTEE

PROPOSAL TITLE: Network I E 909.201

X UNDERGRADUATE ___ GRADUATE 2 CREDIT HOURS

SPONSOR(S): School of Engineering Curriculum Committee

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

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

___ ACHIEVEMENT CERTIFICATE ___ CERTIFICATION PROGRAM X MAJOR PROGRAM

STEP #1 (DEPARTMENT)

✓ APPROVED/DATE: 14 MAR 97

___ NOT APPROVED/DATE:

JOHN L. SCHMALZEL
DEPT. CURRICULUM CHR.

___ REVIEWED/DATE:

DEPT. CHR.

STEP #2 (RECEIPT)

SCC# 96-97-100

DATE RECEIVED: 3-14-97

SENATE CURRICULUM CHR.

STEP #3 (SCHOOL)

REVIEWED DATE: 3-14-97

X RECOMMEND TO APPROVE

___ RECOMMEND NOT TO APPROVE

FORWARD FOR OPEN HEARING

X WITHOUT RESERVATIONS

___ WITH RESERVATIONS

COMMENTS: TRC, RAD

SCHOOL COMMITTEE CHR.

STEP #4 (ACADEMIC DEAN)

✓ RECOMMEND

___ NOT RECOMMEND

___ CONDITIONALLY RECOMMEND (SEE COMMENTS)

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

COMMENTS:

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 5-14-97 X APPROVED ___ NOT APPROVED

NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST (DATE) _____

SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE _____

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED [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 0909.201

DATE/SIGNATURE OF REGISTRAR B. L. Kelsey

NOTIFICATION FORWARD:

___SENATE CURRICULUM COMMITTEE CHAIRPERSON

___DEPARTMENT CHAIRPERSON(S)

___ACADEMIC DEAN(S)

___REGISTRAR

___SPONSOR(S)

Course Proposal

1. Details:

a) Course Title:	Network I
b) Sponsors:	Dr. J.L. Schmalzel and School of Engineering Curriculum Committee
c) Credit Hours:	2 credit hours
d) Course Level:	Sophomore (0909.201)
e) Curricular Effect:	Required course for electrical engineering majors
f) Prerequisites:	Prerequisites: Physics I, Calculus II, and Computer Science and Programming; Concurrent enrollment in Math for Engineering Analysis I
g) Suggested Time/ Scale of Implementation	Fall 1997 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.

3. Essence of the Course:

a) Objectives:

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

1. Understand the basic, lumped-parameter models for passive circuit elements.

2. Be able to formulate and model simple electrical circuits and determine their forced and natural responses.

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. Understand the application of network theory techniques to interdisciplinary engineering applications through analogous systems.

9. 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.

Introduction to network analysis
Definitions, units, voltage, energy, power
Passive *vs.* active elements
Relationship between analysis and design

Resistive circuits
Fundamental laws (Kirchhoff's, Ohm's)
Series, parallel equivalent networks
Thevenin and Norton equivalents
Sources
Basic measuring instruments

[1] Simulation Program with Integrated Circuit Emphasis.

Operational amplifiers (op amps)
Dependent source model
Op amp model
Op amp network analysis
Practical op amps
Op amp circuit design

Network analysis methods
Linearity and superposition
Duality
Matrix techniques
Circuit simulation and modeling

Energy-storage networks
Capacitors in series and parallel
Inductors in series and parallel

First-order networks
R-C, R-L networks
Time constants
Forced *vs.* natural responses
Step response
Filters
Network design

Second-order networks
Second-order equations
Forced *vs.* natural responses
Total response
Step response

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 I (0909.201)
Prerequisites: Physics I, Calculus II, and Computer Science and Programming; Concurrent enrollment in Math for Engineering Analysis I.

Covers basic network principles, network laws and analysis methods, including steady-state and transient responses of passive networks, with independent and dependent sources. Op amps are covered as examples of active electronic networks. Computer-aided analysis and simulation tools are presented as methods to augment network analysis and design.