

K O W A N C O L L E G E  
C U R R I C U L U M C O M M I T T E E

(A)

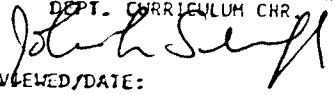
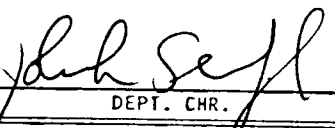
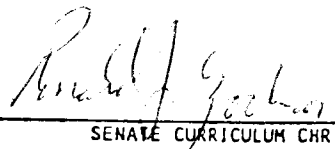
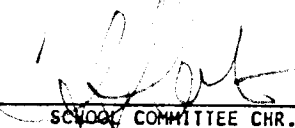
PROPOSAL TITLE: Network I 0909.201

UNDERGRADUATE       GRADUATE      2 CREDIT HOURS

SPONSOR(S): School of Engineering Curriculum Committee

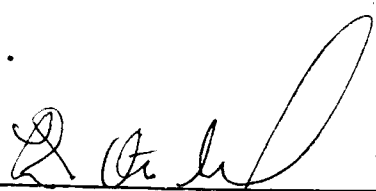
DEPARTMENT & TELEPHONE# Dr, John L. Schmalzel (Electrical Engineering -4629)

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

| STEP #1 (DEPARTMENT)   | STEP #2 (RECEIPT)   | STEP #3 (SCHOOL)   |
|--|---|--|
| <input checked="" type="checkbox"/> APPROVED/DATE: <u>14 MAR 97</u><br><input type="checkbox"/> NOT APPROVED/DATE:<br><u>JOHN L. SCHMALZEL</u><br><small>DEPT. CURRICULUM CHR.</small><br><br>REVIEWED/DATE:<br><br><small>DEPT. CHR.</small> | SCC# <u>96-97-110</u><br>DATE RECEIVED: <u>3-14-97</u><br><br><br><small>SENATE CURRICULUM CHR.</small> | REVIEWED DATE: <u>3-14-97</u><br><input checked="" type="checkbox"/> RECOMMEND TO APPROVE<br><input type="checkbox"/> RECOMMEND NOT TO APPROVE<br>FORWARD FOR OPEN HEARING<br><input checked="" type="checkbox"/> WITHOUT RESERVATIONS<br><input type="checkbox"/> WITH RESERVATIONS<br>COMMENTS: <span style="float: right;"><u>TRC</u><br/><u>RAD</u></span><br><br><small>SCHOOL COMMITTEE CHR.</small> |

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

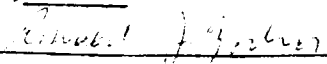
APPROVED BY SENATE CURRICULUM COMMITTEE (DATE) \_\_\_\_\_

RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:  
 \_\_\_\_\_  
 \_\_\_\_\_

STEP #6 (SENATE)

DATE PRESENTED TO SENATE 5-14-97       APPROVED       NOT APPROVED

NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST (DATE) \_\_\_\_\_

SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE  5/22/97

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED 4 June 77

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 

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED 4 June 77

HEGIS TAXONOMY AND COURSE NUMBER ASSIGNED 0909.201

DATE/SIGNATURE OF REGISTRAR B. J. 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*<sup>1</sup>) 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

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<sup>1</sup> 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.