MINNESOTA WEST COMMUNITY & TECHNICAL COLLEGE
COURSE OUTLINE

Faculty are required to have the outline submitted to the Academic Affairs Office. The course outline is the form used for approval of new courses by the Collegewide Curriculum Committee.

DEPT. **ENGR** COURSE NO. **2240**

NUMBER OF CREDITS: **3**

COURSE TITLE **Special Topics--Circuits Analysis I**

CATALOG DESCRIPTION **This course is an introduction to electrical circuit theory, circuit variables, circuit elements, simple resistive circuits, Ohm's and Kirchoff's Laws, mesh and node circuit analysis, the use of circuit theorems, and the operational amplifier. Also emphasized are the topics of inductance, capacitance, mutual inductance, response of first-order RC and RL circuits and natural step responses to RLC circuits. The computer program PSPICE will be used for circuit simulation**.

AUDIENCE **This course is intended for students interested in transferring to a computer or electrical engineering program.**

FULFILLS MN TRANSFER CURRICULUM AREA(S) ***(Leave blank if not applicable)***
Area 3(Natural Sciences) will have already been satisfied by the prerequisites for this course.

PREREQUISITES OR NECESSARY ENTRY SKILLS/KNOWLEDGE: **PHYSICS 2122 and MATH 1122 or consent of the instructor**

LENGTH OF COURSE **One Semester**

THIS COURSE IS USUALLY OFFERED:
Every other year ☐ fall ☐ spring ☐ summer ☐ undetermined (ON DEMAND)☒

Four goals are emphasized in course at Minnesota West Community & Technical College:

1) ACADEMIC CONTENT:
    a. To introduce circuit analysis techniques for direct current (DC) and alternating current(AC) circuits.
    b. To develop problem solving skills in the solution of various simple and complex circuits.
    c. To study the theory of simple and complex circuit design and various applications.

2) THINKING SKILLS:
    a. To develop the use of mathematical models to solve circuit problems.
    b. To develop problem solving strategies from theoretical concepts.

3) COMMUNICATIONS SKILLS:

a. To write concise solutions to circuit problems.
b. To improve the oral interpretation of circuit analysis applications.
c. To improve cooperative group problem solving techniques.

4) HUMAN DIVERSITY:

To work in small groups to discover the different ways other persons approach problem solving.

TOPICS TO BE COVERED:

1. Circuit variables of voltage, current, power and energy.
2. Circuit elements of voltage, current, and resistance using Ohm's and Kirchoff's Laws.
3. Dependent sources and electrical safety.
4. Simple parallel and series resistive circuits.
5. Voltage-Divider and Current-Divider circuits.
6. Wheatstone Bridge and Delta-to-Wye (Pi-to-Tee) Equivalent circuits.
7. The Node-Voltage method of circuit analysis.
8. The Mesh-Current method of circuit analysis.
9. Source transformations.
10. Th'evenin and Norton Equivalent circuits.
11. Maximum power transfer and superposition.
12. Introduction to the Operational Amplifier.
13. Inductance and Capacitance with series-parallel combinations.
14. Mutual inductance.
15. Natural response of RL and RC circuits and various applications.
16. Natural response of series and parallel RLC circuits and applications.

LIST OF EXPECTED COURSE OUTCOMES:

1. To enable the student to interpret the relationship between conceptual understanding of simple and complex circuit analysis and the problem solving approaches.
2. To provide students with a strong foundation in engineering practices.
3. To encourage the student to think through problems before attacking them by developing problem solving strategies based upon concepts instead of rote procedures.
4. To emphasize real world application problems that help to stimulate students' interest in engineering.
5. To develop the use of the simulation computer software PSPICE.

LEARNING/TEACHING TECHNIQUES used in the course are:

☒ Collaborative Learning ☒ Problem Solving
☒ Student Presentations ☒ Interactive Lectures

☐ Creative Projects
☒ Lecture
☒ Demonstrations
☐ Lab
☒ Individual Coaching
☐ Films/Videos/Slides
☐ Other (describe below)

ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

☒ Reading
☒ Oral Presentations
☒ Textbook Problems
☒ Group Problems
☐ Other (describe below)
☒ Tests
☐ Worksheets
☐ Papers
☐ Term Paper
☐ Individual Projects
☐ Collaborative Projects
☐ Portfolio

EXPECTED STUDENT LEARNING OUTCOMES**:** **See above under ACADEMIC CONTENT and EXPECTED COURSE OUTCOMES.**

The information in this course outline is subject to revision

Veteran Services: Minnesota West is dedicated to assisting veterans and eligible family members in achieving their educational goals efficiently. Active duty and reserve/guard military members should advise their instructor of all regularly scheduled military appointments and duties that conflict with scheduled course requirements. Instructors will make every effort to work with the student to identify adjusted timelines. If you are a veteran, please contact the Minnesota West Veterans Service Office.

To receive reasonable accommodations for a documented disability, please contact the campus Student Services Advisor or campus Disability Coordinator as arrangements must be made in advance. In addition, students are encouraged to notify their instructor.

This document is available in alternative formats to individuals with disabilities by contacting the Student Services Advisor or by calling 800-658-2330 or Minnesota Relay Service at 800-627-3529 or by using your preferred relay service.

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