

**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. **2241**

NUMBER OF CREDITS: **1**

COURSE TITLE **Circuits Analysis I-LAB**

CATALOG DESCRIPTION **Laboratory to accompany Circuits Analysis I. Circuit analysis concepts are reinforced by laboratory experiments in which the theories are verified.**

AUDIENCE **For students in Circuits Analysis I.**

FULFILLS MN TRANSFER CURRICULUM AREA(S) *(Leave blank if not applicable)*

PREREQUISITES OR NECESSARY ENTRY SKILLS/KNOWLEDGE: **Concurrent with Circuits Analysis I**

LENGTH OF COURSE **One Semester**

THIS COURSE IS USUALLY OFFERED:

Every other year ☐ fall ☐ spring ☐ summer ☐ undetermined ☒

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

1) **ACADEMIC CONTENT:** See course Outline for Circuits Analysis

- 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:

Laboratory activities will include:

1. Basics of Digital and Analog Multimeters for measuring resistance, voltage and current.
2. Direct Series and Parallel circuits and Power calculations: Ohm's Law.
3. Kirchhoff's Laws and the characteristics of a Light Emitting Diode(LED).
4. PSPICE Software Introduction and Circuit Analysis-Independent and Dependent Sources..
5. Thevenin's and Norton's Equivalent circuits.
6. Wheatstone Bridge Method of Measuring Resistance.
7. Evaluation of a Circuit using Superposition Theorem and Maximum Power Transfer.
8. Basic Introduction to the Digital Signal Generator and the Oscilloscope—Measurement of Time Varying Signals.
9. Evaluation of the DC Characteristics of the Operational Amplifiers.
10. Resistive-Capacitive (RC) Circuits including the Time Constant and Step Response..
11. Resistive-Inductive (RL) Circuits including the Time Constant
12. Combination Resistive-Capacitive-Inductive Circuits (RCL networks)
13. Lab Project using an integrated circuit such as a 555-timer

LIST OF EXPECTED COURSE OUTCOMES:

The objective of the laboratory experience is to provide experimental verification of the theoretical concepts covered in the course Circuits Analysis I.

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:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Collaborative Learning | <input type="checkbox"/> Problem Solving |
| <input checked="" type="checkbox"/> Student Presentations | <input type="checkbox"/> Interactive Lectures |
| <input checked="" type="checkbox"/> Creative Projects | <input type="checkbox"/> Individual Coaching |
| <input type="checkbox"/> Lecture | <input type="checkbox"/> Films/Videos/Slides |
| <input checked="" type="checkbox"/> Demonstrations | <input type="checkbox"/> Other (describe below) |
| <input checked="" type="checkbox"/> Lab | |

ASSIGNMENTS AND ASSESSMENTS FOR THIS CLASS INCLUDE:

- | | | |
|--|-------------------------------------|--|
| <input checked="" type="checkbox"/> Reading | <input type="checkbox"/> Tests | <input checked="" type="checkbox"/> Individual Projects |
| <input checked="" type="checkbox"/> Oral Presentations | <input type="checkbox"/> Worksheets | <input checked="" type="checkbox"/> Collaborative Projects |
| <input type="checkbox"/> Textbook Problems | <input type="checkbox"/> Papers | <input type="checkbox"/> Portfolio |
| <input type="checkbox"/> Group Problems | <input type="checkbox"/> Term Paper | |
| <input type="checkbox"/> Other (describe below) | | |

EXPECTED STUDENT LEARNING OUTCOMES:

. The student will be able to accomplish the expected course outcomes; see above.

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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