# Virginia Western Community College
# ETR-114
# D.C. & A.C. Fundamentals II

## Prerequisites

Prerequisite: ETR 113. Prerequisite or co-requisite: MTH 115.

## Course Description

Studies DC and AC circuits, basic electrical components, instruments, network theorems, and techniques used to predict, analyze and measure electrical quantities Also included: basic electrical components, measuring instruments, network theorems, and techniques used to predict analyze and measure electrical quantities.

**Semester Credits: 4** **Lecture Hours: 3** **Lab/Recitation Hours: 3**

## Required Materials

### Textbook:

Circuit Analysis Theory and Practice, 5th Edition, Author: Allen H. Robbins and Wilhelm C. Miller, Thomson, Publisher: Delmar Learning, ISBN# 9781133281009.

### Other Required Materials:

1. Scientific Calculator (Will be discussed during first class period.)
2. Safety Glasses. Safety glasses must be worn in the laboratory when constructing circuits or taking measurements.
3. Electronic Kit and personal soldering equipment.

**Supplementary Materials (Provided to Student):**

1. Various handouts and other references will be used—make sure you attend class and get handouts.
2. Software: 1) MicroSim Pspice with Schematic Capture 2) ETCAI Circuits Challenge

## Course Outcomes

**At the completion of this course, the student should be able to:**

1. Define electrical quantities including current, voltage, resistance, power, energy, efficiency, capacitance, inductance, reactance, impedance
2. Explain and use Ohm's Law, Kirchoff's voltage and current Laws, voltage divider rule, current divider rule, Faraday's law, and Lenz's law
3. Analyze series, parallel and series-parallel circuits and complex (multiple source circuits with interdependency), both DC and AC.
4. Measure electrical quantities.
5. Demonstrate proficiency and teamwork skills in the laboratory.
6. Acquire basic soldering and

## Topical Description

| Week | Topic | Text Reference |
|---|---|---|
| 1. 1/7-11 | Course Introduction, Policies, Rules, Safety, Evacuation, etc.<br>Superposition Theorem, DC Circuits<br>Lab: Superposition | Chapter 9 |
| 2. 1/14-18 | Thevenin and Norton Theorems, DC Circuits<br>Lab: Thevenin and Norton Theorem Problem | Chapter 9 |
| 3. 1/21-25 | Thevenin, Norton, and Maximum Power Transfer Theorem, DC<br>Lab: Thevenin and Norton | Chapter 9 |

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| 4. 1/28-2/1 | Mesh and Nodal, DC Circuits<br>Lab: Mesh, DC Circuits | Chap. 8 and Mesh-Nodal Handout |
| 5. 2/4-2/8 | Mesh and Nodal, DC Circuits<br>Lab: Nodal, DC Circuits | Chapter 8 |
| 6. 2/11-15 | **Test#1 (Chapters 8 and 9)**<br>Capacitive Transients | Chapter 11 (Partial) |
| 7. 2/18-22 | Inductive Transients<br>Lab: Capacitive and Inductive Transient Lab | Chapter 14 (Partial) |
| 8. 2/25-3/1 | RLC Elements and Impedance Concepts, Phasors, and j Operator<br>Lab: Problem Lab | Chapter 16 |
| 9. 3/4 – 3/8 | **Spring Break** | |
| 10. 3/11-15 | AC Series-Parallel Circuits<br>Lab: Series RC and RL Problem Labs | Chapter 18 |
| 11. 3/218-3/22 | **Test#2 (Chapters 11, 14, and 16)**<br>AC Series-Parallel Circuits<br>Lab: RCL PSpice Analysis of AC circuits Lab | Chapter 18 |
| 12. 3/25-3/29 | AC Power – Real, Reactive, and Apparent Power<br>Lab: AC Power Problem Lab | Chapter 17 |
| 13. 4/1-4/5 | AC Power – Real, Reactive, and Apparent Power<br>Lab: Power Factor Correction Problem Lab | Chapter 17 |
| 14. 4/8-4/12 | Introduce Student Projects<br>Soldering | Project Handouts |
| 15. 4/15-4/19 | **Test#3 (Chapters 17 and 18)**<br>Individual Student Project | Project Handouts |
| 16. 4/22-4/26 | Individual Student Project<br>Exam Review | |
| 17. 4/30 | **Final Exam: 10 a.m. Tuesday, April 30** | |

## Notes to Instructors

1. A comprehensive final should be give worth 20% of the course grade.

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