# AC and DC Circuits

## EET - 1140 501

## Course Description

Introduction to AC and DC circuit fundamentals, analysis, theorems, laws, components, measuring devices, and equipment. The introduction and use of measuring instruments, power supplies, and signal generators. Lecture and lab combination with simulation emphasis. Laboratory activities to include circuit design, construction, and analysis of AC/DC circuits.

Pre-Requisite: STEM 1010 or appropriate placement.

Semester: Spring

## Course Student Learning Outcomes

- Demonstrate the ability to perform DC circuit analysis using current and voltage laws by formative and summative assessment.
- Demonstrate understanding of the behavior of resistors, capacitors and inductors by formative and summative assessment.
- Demonstrate understanding of component behavior in DC circuits by formative and summative assessment.
- Demonstrate understanding of component behavior in AC circuits by formative and summative assessment.
- Demonstrate mastery and ability to communicate with the mathematics required for AC & DC circuit analysis by formative and summative assessment.
- Use PC software to synthesize simple circuits by formative and summative assessment.

- Use modern tools to support circuit simulation by formative and summative assessment.

## Course Prerequisites

STEM 1010 or appropriate placement.

## Engagement Plan

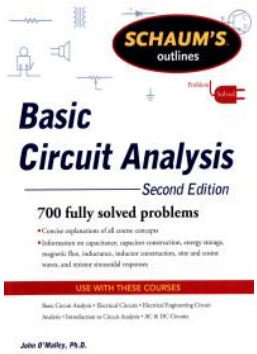
- The best way to reach me is through the Canvas Inbox. I'll respond within 24 hours on weekdays and am happy to help whenever questions come up.  If you need help over the weekend, contact me on my cell.
- I am generally on campus during the workweek but, life happens. To ensure the lab spaces are open and that I am here to help you if you need it, please contact me before coming in.
- This course is designed for you to work through independently, so there won't be frequent announcements or structured discussions.
- If you need clarification or run into challenges, please don't wait—reach out so we can address it together.

## Keys for Success (how to succeed in the course)

- Consistent effort throughout the semester will help you avoid falling behind.
- Good time management is essential—steady progress makes the material easier to learn and apply.
- When students wait until the end, it creates a rush of questions and lab requests. Working steadily ensures smoother support and a better overall experience.
- Do not wait until the end of the semester to begin scheduling labs.. There are only so many hours in a week, and if many students postpone, I may not be able to accommodate everyone at once.

## Required Text or Materials


**Title: TI-36X Pro Calculator**




**Title: Schaum's Outline of Basic Circuit Analysis, Second Edition**
**Subtitle:** (Free Online Link: https://ebookcentral.proquest.com/lib/slcc/detail.action?docID=6403936 )
**ISBN:** 9780071820554
**Authors:** John O'Malley
**Publisher:** McGraw-Hill Education
**Publication Date:** 2011-02-17
**Edition:** 2

For more information on textbook accessibility, contact Accessibility & Disability Services at ads@slcc.edu.

## Additional Materials

- A laptop computer for running the various software tools for in-person labs (Mac or Windows). Note that the simulation software LTSpice is easier to use on a Windows machine.

## Brief Description of Assignments/Exams

- Follow the Canvas modules. As we go through the class things will change and these changes will always be reflected in the Canvas modules and assignments.
- Assignments will be submitted on Canvas.  Students generally scan or take pictures of their work on their phones for submission.
- One Midterm Exam midway through the course.
- One Final Exam at the end of the course.

## Assignment Schedule

| Due Date | Assignment Name | Assignment Type | Points |
|---|---|---|---|
| | HW04 Parallel Resistors | Assignment | 10 |
| | HW05 Parallel Table | Assignment | 10 |
| | HW06 Linear Systems | Assignment | 10 |
| | HW06A Mesh Circuits | Assignment | 10 |
| | HW07 Thevenin | Assignment | 10 |
| | HW09 Capacitors | Assignment | 10 |
| | HW10 Inductors | Assignment | 10 |
| | Introduce Yourself | Discussion | 0 |
| | Introduce Yourself | Discussion | 0 |
| | Introduce Yourself | Discussion | 0 |
| | L05 Transformers | Assignment | 20 |

| Due Date | Assignment Name | Assignment Type | Points |
|---|---|---|---|
| | Lab 01 Resistors, Parallel & Series, Using meters to measure voltage and current | Assignment | 20 |
| | Lecture 01 & HW01 | Assignment | 10 |
| | Lecture 02 & HW02 | Assignment | 10 |
| | Lecture 03 Review of CH1 problems & HW03 | Assignment | 10 |
| | Lecture 04 LTSpice Introduction and Lab 1 Demonstration | Assignment | 10 |
| | Lecture 05 Rocky Mountain Power Lecture & CH3 Homework Help | Assignment | 10 |
| | Lecture 06 Parallel Table - Forward and Backward | Assignment | 10 |
| | Lecture 07 Mesh Circuits - Linear Algebra - Matrix Methods | Assignment | 10 |
| | Lecture 08 - Review of mesh circuits - Matrix methods - Mesh Simulation - Intro to Thevenin | Assignment | 10 |

| Due Date | Assignment Name | Assignment Type | Points |
| --- | --- | --- | --- |
| | Lecture 09 Thevenin Review & Thevenin Simulation with LTSpice | Assignment | 10 |
| | Lecture 10 Resistance Review | Assignment | 10 |
| | Lecture 11 Introduction to Calculus - The Derivative & HW08 Calculus ProblemsHW08 Calculus Problems | Assignment | 10 |
| | Lecture 12 Introduction to Capacitors & Inductors | Assignment | 10 |
| | Lecture 13 Detailed Look at Capacitors & Inductors. Charge, Energy & Stuff Equation | Assignment | 10 |
| | Lecture 14 Voltage and Current in Capacitors & Inductors. Going forward and backward with the Stuff Equations. | Assignment | 10 |
| | Lecture 15 Lab 02 RC and RL circuits. Measuring both voltage and current | Assignment | 40 |

| Due Date | Assignment Name | Assignment Type | Points |
|---|---|---|---|
| | Lecture 17 Introduction to AC Power | Assignment | 10 |
| | Lecture 18 AC Details Impedance, RMS, CIVIL, AC Voltage & Current | Assignment | 10 |
| | Lecture 19 - Homework Preparation & HW12 | Assignment | 10 |
| | Lecture 20 Lab 03 Magnitude and Phase relationships for voltage and current in RC, RL and RLC circuits. | Assignment | 20 |
| | Lecture 21 OPAMPS & HW13 | Assignment | 20 |
| | Lecture 22 & Lab 04 OPAMP Lab | Assignment | 20 |
| | Lecture 23 Power & Power Factor & HW14 | Assignment | 10 |
| | Lecture 24 Transformers & HW15 | Assignment | 10 |
| | Lecture 25 Three Phase Power & HW16 | Assignment | 10 |
| | Lecture 26 Final Review | Assignment | 100 |
| | T01 LTSpice | Assignment | 10 |

| Due Date | Assignment Name | Assignment Type | Points |
|---|---|---|---|
| | T03 | Assignment | 100 |
| | T04 Final | Assignment | 300 |
| | Test 01 | Assignment | 30 |
| | Test 02 | Assignment | 30 |

## Grading Scale

SCALE:

A 93 – 100 % C 73 – 76 %

A- 90 – 92 % C- 70 – 72 %

B+ 87 – 89 % D+ 67 – 69 %

B 83 – 86 % D 63 – 66 %

B- 80 – 82 % D- 60 – 62 %

C+ 77 – 79 % E 0 – 59 %

WEIGHTS:

Homework/labs 65% of final grade

Midterm Exam 10% of final grade

Final Exam 25% of final grade

## How to Navigate to Canvas

## Online Tutoring

Students at SLCC have access to online tutoring through Canvas. From your Canvas course click Online Tutoring in the course navigation and follow the steps to set up an appointment. If this is your first time using the Online Tutoring we recommend you click "Take a Tour" to familiarize yourself with the service.

Note that students only receive 480 minutes of tutoring time each semester. After that we encourage you to use the resources found through this link: https://www.slcc.edu/tutoring/index.aspx

If you have any additional questions reach out to elearningsupport@slcc.edu.

## Institutional Policies

As members of our academic community, we would like to invite you to review the Institutional Syllabus which covers important policies and procedures. This document contains important links for students on the code of student rights and responsibilities, academic integrity, and grading policies, Title IX and other important acknowledgements. By familiarizing yourself with this information, you can help us create a safe and respectful environment for everyone.

For more information, navigate to the Institutional Policies tab on the Institutional Syllabus page.

## Learning Support and Tutoring Services

We are pleased to offer a range of tutoring and learning support services to help you achieve your academic goals. Whether you need assistance with a specific subject or want to improve your study skills, you have many options for tutoring or other support.

To learn more about the services we offer and how to access them, visit the Institutional Syllabus page under the Tutoring and Learning Support tab. We encourage you to take advantage of these resources to help you succeed in your studies. If you have any questions or would like to schedule a tutoring session, please don't hesitate to reach out to us. We are here to support you in any way we can.

## Advising and Counseling Support Services

At our institution, we are committed to supporting your academic and personal growth. That's why we offer a range of advising and counseling services to help you navigate the challenges of college life. To learn more about the resources available to you and how to access them, visit the Institutional Syllabus page under the Advising and Counseling Support Services tab. Our advising team and the support centers across campus are here to support you in achieving your goals and overcoming any obstacles you may face.

## Student Academic Calendar

As students you should be aware of all important dates in the semester, such as the day that courses begin and end, as well as the drop date and the last day to withdraw. To learn more about those dates, navigate to the Student Academic Calendar below:

SLCC Student Academic Calendar