

**COURSE TITLE: ENGR 202 Electrical Fundamentals II: AC Circuits**

**CREDITS: 4**

**ROOM: (Online)**

**CRN: 42892**

**LECTURE/RECITATION: (Pre Recorded Lectures Online)**

**LABS: (Pre Recorded Labs Online)**

**INSTRUCTOR: Craig Munsee**

**EMAIL: [munseec@linnbenton.edu](mailto:munseec@linnbenton.edu)**

**OFFICE: IA-206**

**OFFICE HOURS: (Zoom Meeting)**

**Monday 1:00 pm - 1:50 pm**

**Tuesday 1:00 pm - 1:50 pm**

**Wednesday 1:00 pm - 1:50 pm**

**Thursday 1:00 pm - 1:50 pm**

**Friday 1:00 pm - 1:50 pm**

**Others by Appointment**

**Course Description:**

Covers AC circuit analysis techniques; covers sinusoidal steady state and analysis of three-phase circuits; introduces mutual inductance and transformers; looks at resonant circuits; investigates filters and continues to look at op-amp circuits.

**Prerequisite(s):**

Prerequisite: ENGR 201 Electrical Fundamentals: DC Circuits with a grade of C or better.

**Course Outcomes:**

Upon successful completion of this course, students will be able to:

1. State how Ohm's law, Kirchhoff's laws, Thevenin's theorem and Norton's theorem as modified for the analysis of ac circuits.
2. Apply the concepts of frequency-dependent impedance to solve problems involving inductive and capacitive components and the relationships between voltage, current, power and power factor in ac circuits.
3. State and apply circuit analysis laws and theorems to single-phase ac circuits using phasors to calculate power, apparent power and reactive power.
4. Apply circuit analysis laws and theorems to both balanced and unbalanced three-phase circuits to calculate line- and phase-voltage, line- and phase-current, power and energy.
5. State and apply Faraday's law to both single-phase and three-phase circuits.
6. Solve problems involving self- and mutual- inductance, inductive voltage division and multiplication, and the principle of transformers.
7. Apply the principles of frequency dependence of inductive and capacitive components to analyze passive and active filters.

### Text Book:

Alexander, Charles. K., Fundamentals of Electric Circuits, (3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, or 6<sup>th</sup> Edition), McGraw-Hill. **This same text will be used for ENGR 203.** Copies of the text are on reserve in the library and can be checked out for two hours at a time.

### Course Topics:

- Chapter 9: Sinusoids and Phasors
- Chapter 10: Sinusoidal Stead-State Analysis
- Chapter 11: AC Power Analysis
- Chapter 12: Three-Phase Circuits
- Chapter 13: Magnetically Coupled Circuits
- Chapter 14: Frequency Response

### Grading:

Assignment:	Number:	Percentage:
Homework	10	20%
Labs	6	20%
Midterms	2	40%
Final Exam	1	20%
<b>Total</b>		<b>100%</b>

- 90-100% A, 80-89% B, 70-79% C, 60-69% D, < 59% F
- The class is designed to go over the material in the lectures and work through the example problems. After completing the weeks' worth of lectures, you should be ready to work on the homework. You are given one additional week to complete the homework and turn it in. This is also the case for the labs. This gives you the opportunity to work on the assignment over the weekend and be able to ask question before the assignment is due. If you wait till the day the assignment is due, you run the risk of not being able to get answers to questions and possibly not completing the assignment on time.
- There will not be any extra assignments given beyond those listed, so please **do not** email the instructor to ask if there is anything extra you can do to improve your grade.

### Homework:

- Homework problem sets are linked in Moodle and are to be turned in to Moodle by 11:55 PM on the day they are due. If there is a problem with Moodle, you may email the assignment to the instructor.
- Homework is to be scanned to a PDF and turned in to Moodle for grading.
- The lowest homework grade will be dropped.
- Late homework will not be accepted unless an extension has been requested prior to the due date. A student is allowed **only one** two-day extension for a homework assignment.
- Each problem will be checked for a reasonable attempt at solving.
- Solutions to the homework problems will be posted in Moodle after the homework is due.
- The Student is responsible for turning the homework in on time and in the recommended format. They are also responsible for turning in the correct homework. If the homework is not turned in on time or the wrong assignment has been submitted a score of zero will be given for that assignment.

### Labs:

- The labs are to be done on the week that the lab is made available, and the reports are due the next week unless it is an exam week. If it is an exam week, the lab will be due the next week.
- Each lab report will be graded on conformance with specific criteria indicated with in the rubric at the end of the lab document.
- A starting video is provided for each lab that will discuss what is expected for the lab and how to use the software needed for the simulations.
- **A student is allowed only one two-day extension for a lab report.**
- **No lab grades will be dropped.**

### Exams:

- The exams will be online timed tests and will only be given on the day indicated below. Because the exams will be online, you may take it any time during the day it is offered. The exam will close at midnight even if you started it a 11:00 pm.
- If you have a time conflict for the test, you will need to contact your instructor before the exam to arrange for a different day.
- **If you miss the exam on the day it has been offered and prior arrangements have not been made, there will be a 10% grade penalty to make up the exam.**
- No exam grades will be dropped.
- Dates of the exams are listed below:
  - Midterm #1: **Tuesday Apr 20, 2021**
  - Midterm #2: **Tuesday May 18, 2021**
  - Final Exam: **Tuesday Jun 8, 2021**

<https://www.linnbenton.edu/current-students/schedule-and-learn/finals-schedule/>

- **Respondus LockDown Browser + Webcam Requirement**
  - This course requires the use of LockDown Browser and a webcam for online exams. The webcam can be the type that's built into your computer or one that plugs in with a USB cable.
  - Watch this brief video to get a basic understanding of LockDown Browser and the webcam feature.
  - <https://web.respondus.com/lockdownbrowser-student-video/>

### Holidays:

- Memorial Day: LBCC will be closed (**Monday, May 31, 2021**)

### Class Climate Survey:

- Student feedback is important to improve this course and to help the instructor know how to adjust teaching methods. Your feedback is taken seriously and does influence future versions of the course. The evaluations are anonymous, and links to the evaluations will be emailed to your student LBCC email account after the 5<sup>th</sup> week of the term. I encourage you take this opportunity to provide constructive feedback on the class. Thank you in advance for your input!
- **Extra Credit will be given for those who completing the Class Climate Survey.** Since the survey is anonymous you are asked to attach a screen shot showing that you completed the survey (Not a screen shot of your answers). A place to turn this in can be found on week 7 of Moodle.

### Academic Integrity:

- You are expected to turn in your own work and not take credit for the work of others.
- For Homework and Lab assignments, you may work together and discuss the problems with your classmates, but you are expected to turn in your own work. If you turn in something that is not your work, it is considered cheating (This includes copying and sharing computer files).
- **No collaboration or any outside assistance is allowed for Exams. This includes the use of the internet and sites like Chegg.**
- **Depending on the severity of the incident, Those caught cheating and those who aid them will receive a score of zero for that assignment or fail the class and will be reported to Jill Childress, Ed. D. | Manager, Student Conduct and Retention.**

### Computer & Software Requirements:

- You will need a computer capable of running LTspice for the labs. There is a Windows and Mac version for this available, but the Mac version can be difficult to work with.
- If you wish to use the Mac version, you will need to use the internet to learn how to use the features we will be using in the labs. The windows version will be shown in the help videos.
- If you would like to use the Windows version on your Mac, a windows environment would need to be installed on the computer to run the software (VMware Fusion).
  - <https://www.vmware.com/products/fusion.html>
- You should install LTspice the first week to determine if your computer can run the program correctly.
  - <https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html>
- If you are considering purchasing a new computer, I would recommend a Windows-based Laptop with an Intel i7 processor, 16 GB of RAM, and at least a 500 GB hard drive. MacOS computers are good computers too but are limited when it comes to compatibility for Engineering software.
- Computer with Webcam for Respondus LockDown Browser + Webcam
  - This course requires the use of LockDown Browser and a webcam for online exams. The webcam can be the type that's built into your computer or one that plugs in with a USB cable.
  - Watch this brief video to get a basic understanding of LockDown Browser and the webcam feature.
  - <https://web.respondus.com/lockdownbrowser-student-video/>

## College Policies

### Drop/Withdraw Policy:

If you are withdrawing from the class, you must file a Schedule Change Form with Registration or use WebRunner. If you formally drop the class **before Monday of the second week of the term**, you will receive a tuition refund. If you withdraw after the Monday of the second week of instruction through the seventh week a 'W' will show up on your transcript. **No withdrawals are allowed after the end of the seventh week**. An instructor may not assign a "W" grade.

If you received financial aid or veteran's benefits, PLEASE talk with associates at the appropriate office to determine what effects on eligibility dropping a course will have. Don't jeopardize your eligibility!! You can contact the Financial Aid Office by calling (541) 917-4850 or by visiting the Financial Aid Office in Takena Hall.

If you stop attending the course without formally withdrawing you will continue to accumulate grades

(zeroes for all assignments not turned in) and will receive the grade assigned by the instructor. You will also be held accountable for all charges on your account.

### **Center for Accessibility Resources (CFAR):**

You should meet with your instructor during the first week of class if:

1. You have a documented disability and need accommodations.
2. Your instructor needs to know medical information about you.
3. You need special arrangements in the event of an emergency.

If you have documented your disability, remember that you must make your request for accommodations through the Center for Accessibility Resources Online Services web page every term in order to receive accommodations. If you believe you may need accommodations but are not yet registered with CFAR, please visit the CFAR website at <http://www.linnbenton.edu/cfar> for steps on how to apply for services or call 541-917-4789.

### **LBCC Comprehensive Statement of Nondiscrimination**

LBCC prohibits unlawful discrimination based on race, color, religion, ethnicity, use of native language, national origin, sex, sexual orientation, gender, gender identity, marital status, disability, veteran status, age, or any other status protected under applicable federal, state, or local laws. For further information see Board Policy P1015 in our Board Policies and Administrative Rules. Title II, IX, & Section 504: Scott Rolen, CC-108, 541-917-4425; Lynne Cox, T-107B, 541-917-4806, LBCC, Albany, Oregon. To report: [linnbenton-advocate.symplicity.com/public report](http://linnbenton-advocate.symplicity.com/public-report).

### **Know your rights and responsibilities:**

LBCC students have rights: the right to free speech, the right to assemble, the right of a free press, etc. LBCC students also have responsibilities to their community: the responsibility to participate and engage in class, the responsibility to advocate for their needs (ask for help), the responsibility to support a respectful teaching and learning environment, the responsibility to treat all persons with respect, the responsibility to be truthful and honest in all work and communications, and the responsibility to follow staff directions, local, state, and federal laws.

Rights and responsibilities balance together to create the best learning environment. For example, while you have free speech in the café or courtyard, in class the instructor decides whose turn it is to talk and what the topics for conversation will be. Students are free to believe what they believe, but instructors may require students to learn and recite concepts, principles, or theories for a class even if the student does not believe those concepts. You play a role in creating a positive community at LBCC.

Please review your rights and responsibilities (<http://linnbenton.edu/go/studentrights>).

If you believe a student is violating your rights, ask to be treated with respect. If that does not cure the situation, report to Associate Dean Dr. Lynne Cox, Takena Hall Rm. 107. If you believe a faculty member or LBCC employee is violating your rights, please report to Human Resources, Scott Rolen, Calapooia Center Rm. 108.

### **Changes to the Syllabus**

I reserve the right to change the contents of this syllabus due to unforeseen circumstances. You will be given notice of relevant changes in class, or through LBCC e-mail.

**ENGR 202 Class Schedule:**

Week:	Topics Covered:	Assignments Due:
1 <b>Mar 29</b>	<ul style="list-style-type: none"> <li>Syllabus</li> <li>CH 9: Sinusoids, Phasors, &amp; Impedance</li> </ul>	<ul style="list-style-type: none"> <li>Syllabus Quiz (<b>Take by Sunday Apr 4</b>)</li> </ul>
2 <b>Apr 5</b>	<ul style="list-style-type: none"> <li>CH 9: Impedance, Voltage &amp; Current Division</li> <li>CH 10 Node Voltage, and Mesh Current</li> <li>ENGR202 ICA 2</li> <li>ENGR202 LAB 1</li> </ul>	<ul style="list-style-type: none"> <li>Homework #1 (<b>Due on Friday Apr 9</b>)</li> </ul>
3 <b>Apr 12</b>	<ul style="list-style-type: none"> <li>CH 10: Superposition, Source Transformations, Thevenin and Norton</li> <li>ENGR202 ICA 3</li> <li>ENGR202 Midterm 1 Review</li> <li>ENGR202 LAB 2</li> </ul>	<ul style="list-style-type: none"> <li>Lab #1 (<b>Report Due Thursday Apr 15</b>)</li> <li>Homework #2 (<b>Due on Friday Apr 16</b>)</li> </ul>
4 <b>Apr 19</b>	<ul style="list-style-type: none"> <li>CH 10: Thevenin and Norton, Operational Amplifiers</li> <li>CH 11: Instantaneous and Avg Power</li> <li>ENGR202 ICA 4</li> </ul>	<ul style="list-style-type: none"> <li><b>Midterm #1 (Tuesday Apr 20)</b></li> <li>Homework #3 (<b>Due on Friday Apr 23</b>)</li> </ul>
5 <b>Apr 26</b>	<ul style="list-style-type: none"> <li>CH 11: Max Avg Power Transfer, Effective or RMS Value, Apparent and Reactive Power, PF Correction</li> <li>ENGR202 LAB 3</li> </ul>	<ul style="list-style-type: none"> <li>Lab #2 (<b>Report Due Thursday Apr 29</b>)</li> <li>Homework #4 (<b>Due on Friday Apr 30</b>)</li> </ul>
6 <b>May 3</b>	<ul style="list-style-type: none"> <li>CH 12: 3 Phase Wye-Wye, Wye-Delta, Delta-Delta, and Delta-Wye Circuits</li> <li>ENGR202 LAB 4</li> </ul>	<ul style="list-style-type: none"> <li>Lab #3 (<b>Report Due Thursday May 6</b>)</li> <li>Homework #5 (<b>Due on Friday May 7</b>)</li> </ul>
7 <b>May 10</b>	<ul style="list-style-type: none"> <li>CH 13: Mutual Inductance</li> <li>ENGR202 ICA 7</li> <li>ENGR202 LAB 5</li> <li>ENGR202 Midterm 2 Review</li> </ul>	<ul style="list-style-type: none"> <li>Lab #4 (<b>Report Due Thursday May 13</b>)</li> <li>Homework #6 (<b>Due on Friday May 14</b>)</li> </ul>
8 <b>May 17</b>	<ul style="list-style-type: none"> <li>CH 13: Mutual Inductance, Transformer Impedance, Ideal Transformers</li> <li>CH 14: Transfer Functions</li> </ul>	<ul style="list-style-type: none"> <li><b>Midterm #2 (Tuesday May 18)</b></li> <li>Homework #7 (<b>Due on Friday May 21</b>)</li> </ul>
9 <b>May 24</b>	<ul style="list-style-type: none"> <li>CH 14: Bode Plots, and Complex Pairs</li> <li>ENGR202 LAB 6</li> </ul>	<ul style="list-style-type: none"> <li>Lab #5 (<b>Report Due Thursday May 27</b>)</li> <li>Homework #8 (<b>Due on Friday May 28</b>)</li> </ul>
10 <b>May 31</b>	<ul style="list-style-type: none"> <li>CH 14: Bode Plots with Scilab</li> <li>CH 14: Resonance</li> <li>ENGR202 Final Review</li> </ul>	<ul style="list-style-type: none"> <li>Lab #6 (<b>Report Due Thursday Jun 3</b>)</li> <li>Homework #9 (<b>Due on Friday Jun 4</b>)</li> </ul>
Finals <b>Jun 7</b>		<ul style="list-style-type: none"> <li><b>Final Exam (Tuesday Jun 8)</b></li> </ul>