

# ECE 220/221 Network Analysis I/Lab

## Fall 2020 Syllabus

### ECE 220

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Course ID: ECE 220

Title: Network Analysis I

Career: Undergraduate

Credit  
Hours: 3

Description: Corequisite: ECE 221 (Network Analysis I Lab). Prerequisite (or concurrent): ENGR 205 (Differential Equations for Engineering). Prerequisite: PHYS 299 (Introductory Electricity, Magnetism and Light). Enrollment restricted to Electrical and Computer Engineering students only, or with permission of the Electrical and Computer Engineering Department Chair. Topics include basic circuit laws, circuit solving methods, independent and dependent sources, resistance, inductance, capacitance, introduction to operational amplifiers, Thevenin's Theorem, superposition, first and second order circuits, power, energy, AC circuit analysis using impedance, phasors, and the power triangle, and balanced three-phase power, and critical thinking.

Note: Tablet PC Required

Location: BAB (Belknap Academic Building), Room 131  
Entire class can fit with distance in BAB 131. No subgroups for ECE 220.  
Hybrid, meeting via Teams.

Time: Monday, Wednesday, and Friday at 9:00 AM

**Instructor:** [Dr. Karla C. Welch](#)  
Lutz Hall 448  
852-3622  
karla(dot)welch(at)louisville(dot)edu

**Required Text:** *Coursepack for ECE 220/221 Network Analysis I & Lab*, University of Louisville (Coursepack), Fall 2020, Available once printed, most likely at the Campus Bookstore (2100 South Floyd Street). Any change of vendor will be posted on Blackboard asap.

**Suggested Text:** J.W. Nilsson and S.A. Riedel, *Electric Circuits*, Any (8th, 9th, 10th, etc.) edition, Pearson

**Web Sites:** Content & Tutorials: <http://raise.spd.louisville.edu/EE220/220home.htm>  
Grades, Files, Announcements, & E-mail: <http://blackboard.louisville.edu>

<b>Grades:</b>	Quizzes (8 @ 40-50 minutes)	60%
	Online Tutorials (21)	15%
	Final Exam	<u>25%</u>
	Total	100%

Make-up assignments will *only* be arranged in the case of documentable excused absences (e.g., illness with a doctor's note, university-sanctioned event).

Bonus points may be awarded from time to time for various activities.

**Grades will not be curved and will be assigned according to the following chart:**

Net %	Grade
96 - 100	A+
93 - 95.99	A
90 - 92.99	A-
86 - 89.99	B+
83 - 85.99	B
80 - 82.99	B-
76 - 79.99	C+
73 - 75.99	C
70 - 72.99	C-
66 - 69.99	D+
63 - 65.99	D
60 - 62.99	D-
00 - 59.99	F

**Samples for Assessment:** Copies of selected papers will be made and kept in departmental files for the purpose of accreditation-related assessment.

**Objectives/Outcomes:** This course will give the student basic knowledge in circuit analysis that will be the foundation of all future courses in the department. Students who complete this course will show competence and knowledge in the analysis of elementary linear circuits and will be able to:

- Practice ethics in personal and professional behavior.
- Demonstrate a basic understanding of the concepts of charge, current, voltage, energy, and power in circuit analysis.
- Use derivatives and integrals to solve for voltages and currents in circuits with inductors and capacitors.
- Use Kirchhoff's laws, mesh current techniques, and node voltage methodology to develop mathematical equations and solve for unknowns in simple DC circuits (e.g., constant 5V, 2A, etc.).
- Use Kirchhoff's laws, mesh current techniques, and node voltage methodology to develop mathematical equations and solve for unknowns in simple AC circuits (e.g., sinusoids,  $5\cos(30t+27)V$ ,  $2\cos(400t-52)A$ , etc.).

- Understand the use of Thevenin's theorem and superposition techniques to solve circuits.
- Solve time boundary problems for 1st order transient circuits (e.g., one inductor or one capacitor).
- Analyze 2nd order transient circuits (e.g., both an inductor and a capacitor) for damping conditions and unknown voltage or current functions.
- Demonstrate a basic understanding of phasors for AC circuit analysis.
- Perform power calculations using the power triangle.
- Apply capacitors to correct power factor.
- Analyze balanced three-phase power systems.
- Analyze simple circuits containing ideal operational amplifiers.
- Demonstrate critical thinking skills.

<b>Course Revisions:</b>	The instructor reserves the right to revise this syllabus at any point during the semester. If such a revision occurs, students will be notified, either by e-mail, on Blackboard, or during a scheduled class session.
<b>Coverage:</b>	The entire Coursepack will be covered. Reference material from Nilsson and Riedel's textbook covers chapters 1-11.
<b>Office hours:</b>	MW: 2:00-3:00pm (tentative; poll to be taken during semester); online via Teams My regular office hours will start on Monday and Wednesday afternoons. A poll will be taken during the semester to vet other time slots. However, you can call my office or e-mail me a time that works for you to discuss the class.
<b>Honesty:</b>	Students are expected to maintain high standards of integrity. Submitting assignments that are not your original work, because of copying or plagiarizing, and all other forms of academic dishonesty are forbidden and will incur harsh penalties. If you use a calculator that has alphanumeric and/or formulaic storage, it may contain no ECE 220 related materials during quizzes and exams.
<b>Practice Homework:</b>	Students should complete all homework problems for practice with the material. Homework problems and solutions are posted under the "Practice Homework" section of Blackboard. Homework problems can be solved at the discretion of the student; these assignments will be neither graded nor collected; they exist solely for the purpose of practice. However, completion of these assignments by each student is highly encouraged, as the problem sets will closely mimic topics and problems on graded assignments.
<b>Tutorials:</b>	Online tutorials are assigned for each lesson. <b>You may repeat a tutorial as often as you like (before the deadline for full credit; late penalties of 20 points/day apply after the deadline) to improve your grade.</b> The tutorials use pop-up windows. If your browser uses a pop-up blocker, the blocker must be disabled. Furthermore, the tutorials use Javascript; you must "allow blocked content" in your browser or the tutorials will not work.
<b>Computer Use:</b>	Downloading OrCAD is required; see Lab Rooms below.

**Calculators:** You are encouraged to **obtain a high quality scientific calculator for this course**. The calculator should have complex number manipulation capability (rectangular to polar conversion alone is not sufficient). The TI-83 and Casio fx-991ES meet this requirement, but the TI-89 has an additional useful feature of solving simultaneous complex equations. You may not use a laptop, cell phone, or similar device as a calculator during quizzes and exams. For reference, the organization that runs PE licensure, NCEES, allows the following calculators:  
<https://ncees.org/exams/calculator/>  
ECE 220 allows for a wider list, but the above link includes good examples.

**Religious Holidays and Approved Absences:** The class schedule may, in some instances, conflict with work-restricted religious holidays of some students. There are other approved activities that may take place off-campus and keep you from attending class. You are encouraged to meet with your instructor early in the term to resolve any such conflicts. Give notice to your instructor as soon as possible so temporary alternative schedules can be resolved.

**Title IX/Clery Act Notification:** Sexual misconduct (including sexual harassment, sexual assault, and any other nonconsensual behavior of a sexual nature) and sex discrimination violate University policies. Students experiencing such behavior may obtain **confidential** support from the PEACC Program (852-2663), Counseling Center (852-6585), and Campus Health Services (852-6479). To report sexual misconduct or sex discrimination, contact the Dean of Students (852-5787) or University of Louisville Police (852-6111).

**Disclosure to University faculty or instructors** of sexual misconduct, domestic violence, dating violence, or sex discrimination occurring on campus, in a University-sponsored program, or involving a campus visitor or University student or employee (whether current or former) is **not confidential** under Title IX. Faculty and instructors must forward such reports, including names and circumstances, to the University's Title IX officer.

For more information, see <http://louisville.edu/hr/employeerelations/sexual-misconduct-brochure>.

**Disabilities:** Any student who has a disability that may prevent him/her from fully demonstrating his/her abilities should contact the instructor during the first or second week of classes to discuss accommodations necessary to ensure and facilitate the student's full participation in the course. Students are asked to supply a letter from the Disability Resource Center, certifying their eligibility, and other documentation, as needed, which will assist in planning of modifications. The Disability Resource Center (DRC) may be reached at the following web address: <http://louisville.edu/disability/>. Students are also able to contact the DRC by telephone: (502) 852-6938.

**Computer Issues and IT Support:** Speed IT staff are available by appointment from 9 am to 4 pm to assist you with your technology needs. You may schedule an appointment by sending a detailed email including any relevant error codes and screen snips at [SPDHelp@Louisville.edu](mailto:SPDHelp@Louisville.edu) (preferred) or 502-852-7620.

**Tutoring:** Extra help in this class may be obtained from the REACH (Resources for Academic Achievement) center, <http://www.reach.louisville.edu/>.

**Assignments:** If you have taken this course previously, note the assignments given to you are not guaranteed to be the same as in previous attempts of the course.

**COVID Items:** As a Community of Care, all Cardinals are expected to abide by public health guidelines and regulations as published by the University. For Fall 2020, this includes:

- 1) wearing of cloth/paper masks (covering nose and mouth) when in shared indoor spaces like classrooms, or when appropriate physical distancing cannot be maintained. (Per the code of student conduct -- a student who refuses to follow these guidelines may be asked to leave a classroom)
- 2) staying home when sick -- any UofL community member experiencing fever, consistent dry cough, or other symptoms of contagious disease should remain at home until symptoms subside or advised that it is safe to return by a medical professional.
- 3) practicing good hygiene and responsibility for one's own surrounding.
  - a. Cover sneezes and coughs
  - b. Wash hands frequently with soap and water when possible, use hand sanitizer when soap and water are not available
  - c. Wipe down frequently touched surfaces
  - d. Maintain 6 feet physical distancing when possible

**Hybrid Class:** You can complete this entire course as a synchronous, remote option. At least 25% of this course will provide the opportunity for you to participate in face-to-face instruction, with distancing and masks. Microsoft Teams will be used for all class meetings 9-9:50am MWF. Quizzes and exams will happen on their scheduled days, during class time in a synchronous manner, with face-to-face and remote options. As with pre-COVID non-hybrid delivery of this course, if you request changes to the schedule, such as a make-up assignment, those changes will **only** be arranged in the case of documentable excused absences (e.g., illness with a doctor's note, university-sanctioned event).

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# ECE 221

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Course ID: ECE 221

Title: Network Analysis I Laboratory

Career: Undergraduate

Credit  
Hours: 1

Description: Corequisite: ECE 220. Corequisite or Prerequisite: ENGR 205. Prerequisite: PHYS 299. Enrollment restricted to Electrical and Computer Engineering students only, or with permission of the Electrical and Computer Engineering Department Chair. An introductory laboratory with experiments in the use of measurement instruments and the measurement of network characteristics.

Location: WS Speed 204

Entire class CANNOT fit with distance in WS 204.

Subgroups via Doodle will be used for ECE 221.

Hybrid, meeting via Teams.

**Instructors:** [Dr. Karla C. Welch](#)  
Lutz Hall 448  
852-3622  
karla(dot)welch(at)louisville(dot)edu

**Teaching  
Assistant:** TBA

**Textbooks:** 1) Boylestad and Kousourou, *Laboratory Manual for Introductory Circuit Analysis*, 12th or 13th Edition, Pearson, 2010 or 2015  
ISBN-13: 978-0135060148 (12<sup>th</sup> ed.) or 978-0133923780 (13<sup>th</sup> ed.)

2) Coursepack: Additional experiments, including software-based experiments using OrCAD, are printed as part of the Coursepack.

**Lab Rooms:** WS Speed 204 for **Hardware Labs**  
Work on Personal Tablet, meet in WS 204, for **Software Labs**  
Download a free version of OrCAD.  
<https://www.orcad.com/orcad-free-trial>  
Click "Free OrCAD Lite Download"  
Fill in the "Start Your OrCAD Free Trial" boxes, Step 1 and Step 2 (Sign-up).  
Click Select Trial. You will be emailed additional instructions to download OrCAD.  
[https://trial.cadence.com/orcad/signup/?\\_ga=2.267582854.967108250.1596390622-9413037.1596390622](https://trial.cadence.com/orcad/signup/?_ga=2.267582854.967108250.1596390622-9413037.1596390622)

**Course  
Revisions:** The instructor reserves the right to revise this syllabus at any point during the semester. If such a revision occurs, students will be notified, either by e-mail, on Blackboard, or during a scheduled class session.

**Hybrid  
Class:**

Up to 4 students and the 1 TA can meet face-to-face in WS 204, with distancing and masks. Microsoft Teams will be used for all labs meetings:

- 01 – 1-3:30pm T
- 02 – 10am-12:30pm F
- 03 – 2:30-5pm Th

You can complete this entire course as a synchronous, remote option. At least 25% of this course will provide the opportunity for you to participate in face-to-face instruction, with distancing and masks. Microsoft Teams will be used for all lab meetings. Lab meetings will happen on their scheduled days, during class time in a synchronous manner, with face-to-face and remote options. As with pre-COVID non-hybrid delivery of this course, if you request changes to the schedule, such as a make-up experiment, those changes will *only* be arranged in the case of documentable excused absences (e.g., illness with a doctor's note, university-sanctioned event).

**Grades:**

14 Lab Experiments (equally weighted), occasional quizzes possible.

**Grades will not be curved and will be assigned according to the following chart:**

Net %	Grade
96 - 100	A+
93 - 95.99	A
90 - 92.99	A-
86 - 89.99	B+
83 - 85.99	B
80 - 82.99	B-
76 - 79.99	C+
73 - 75.99	C
70 - 72.99	C-
66 - 69.99	D+
63 - 65.99	D
60 - 62.99	D-
00 - 59.99	F

**Objectives/  
Outcomes:**

This course will give the student practice in applying knowledge of circuits by wiring and testing various circuits and measuring their properties. Students who complete this course will be able to:

- Use laboratory instruments for circuit measurement.
- Demonstrate basic proficiency in building circuit experiments, gathering data, and interpreting data.
- Use OrCAD to draw circuits, simulate them, and interpret the results of those simulations.
- Work successfully in engineering teams.

**Missed  
Experiments:**

Make-up experiments will *only* be arranged in the case of documentable excused absences (e.g., illness with a doctor's note, university-sanctioned event).