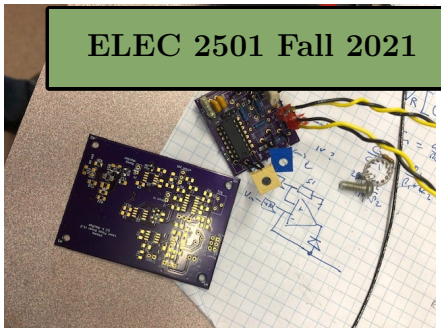
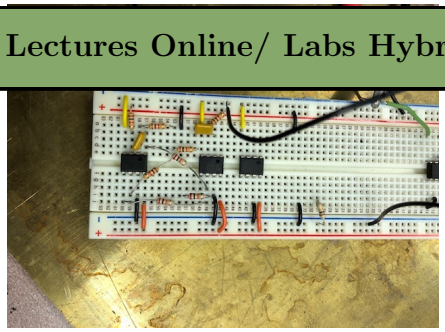
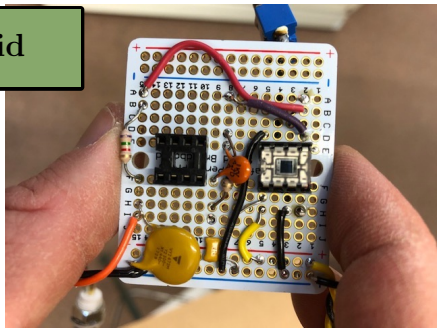
ELEC 2501 Fall 2021 Lectures Online/ Labs Hybrid

Instructors

Connor Kupchak Room: 3032 Minto Case Phone: (613) 520-2600 ext 4092 Email: connor.kupchak@carleton.ca Online Office Hours: Wed 10:30-11:30am EST	Pavan Gunupudi Room: 7072 Minto Case Phone: (613) 520-2600 ext 1181 Email: pavan.gunupudi@carleton.ca Online Office Hours:

Textbook: J. D. Irwin and R. M. Nelms, Basic Engineering Circuit Analysis, 11th Ed., Wiley, 2015

Prerequisites: MATH 1005 and (PHYS 1004 or PHYS 1002) are pre-requisites and students without them will be deregistered.

Course Outline:

Properties of Signals
Basic circuit elements: voltage and current sources Kirchhoff's laws, linearity, superposition.
Thevenin and Norton's theorems.
Circuit simplification.
AC steady-state analysis: impedance, admittance, phasors, frequency response.
Transient response of RL and RC circuits: form of response, initial and final conditions
RLC circuits: resonance

Evaluation Scheme:

Labs 20%
Assignment 5%
Quizzes 25%
Final 50%

- Students need to obtain a minimum of 50% in their combined term mark (labs + quizzes) otherwise a grade of F could be assigned.
- A grade of at least 50% on the final exam is required to be eligible to pass the course.
- Students **must complete all labs** to be eligible to pass otherwise a grade of F can be assigned.

- After the final, students exams will be made available with an answer key. Students are encouraged to verify their answers against the grading and answer keys.

Internet Connections: Lectures for Fall 2021 will be online it is essential that students have a reliable highspeed internet connection for all their course work.

Laboratories:
Laboratories for ELEC2501 are being delivered in a hybrid online/in-person format. The laboratory format you will attend was chosen during your registration period. Regardless of online or in-person, each student is required to independently complete and submit all laboratory reports. Submitted reports will be held to the same standard as the in person labs and they are therefore expected to be of that quality. Lab reports should covey all data, calculations, graphs etc. and contain the necessary conclusions and discussions should be added at the end. Ensure you know how to do this efficiently before your first lab. Students have the choice program to prepare their reports and data but reports must be neat and legible otherwise a discretionary deduction may be applied. Lab reports are due at Midnight on the day of your lab section, please allow yourself enough time to check that you have submitted the correct file.

All submitted reports are to be submitted as single PDF file (No Exceptions!).

You must attend your scheduled lab section whether it be remote or in-person, as this will determine when you can access the lab workstations. Students attending in-person and remotely will be completing the same laboratory. Students who are in-person will be assigned a desktop computer to do the same laboratory as the students logging in remotely. In-person students will be able to see the circuit first-hand and have more direct contact with the TAs. In the event of a documented absence you may attend an alternate lab section with instructor or TA consent. Lab exemptions are not granted under any circumstances for accreditation purposes, students completing the course must complete all labs and prepare original laboratory reports.

PA:
You are expected solve and understand the assigned problem sets. PA sessions will be held remotely with your assigned TA using Big Blue Button or a similar web conferencing services. Try all the problems before the PA session. You will not be able to complete the problems if you have not looked at them before the PA period. The problem analysis period is provided to help you with difficult problems.

When there is 50 minutes remaining in the scheduled PA session, a quiz will become available online through the links on the cuLean page. You will have 50 minutes to complete the quiz and submit documents showing your work and answers. Please familiarize yourself with Brightspace and manage your quiz time accordingly. You must attend your scheduled PA section. You may attend an alternate lab section with instructor or TA consent.

Academic Accommodation:
You may need special arrangements to meet your academic obligations during the term. For more details visit the Equity Services website: http://www.carleton.ca/equity/. For an accommodation

request the processes are as follows:

1. Pregnancy obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.

2. Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist.

3. Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) (https://carleton.ca/pmc for more information) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation as early as possible. Fee free to contact the instructors to to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable) at https://carleton.ca/pmc/registering-with-pmc/.

Learning Outcomes:

- Use appropriate SI units for currents, voltages and circuit elements
- Define voltage, current, power and their relationships
- Define and apply Ohm's law
- Analyze single-loop and single-node-pair circuits
- Determine the equivalent resistance of a network
- Transform wye resistor network into delta resistor network and vice versa
- Apply voltage and current division in circuits
- Analyze electric circuits to determine voltage and currents in the network
- Calculate currents and voltages in a circuit using loop analysis or nodal analysis
- Analyze electrical circuits using the principle of superposition
- Calculate Thvenin and Norton equivalent circuits for linear circuits
- Apply maximum power transfer theorem to determine optimal load
- Use circuit models for inductors and capacitors to calculate voltages, currents and powers
- Calculate voltages and currents in first-order transient circuits
- Perform phasor and inverse phasor transformations Draw phasor diagrams
- Calculate equivalent impedance and admittance for circuits consisting of basic circuit elements
- Apply circuit analysis techniques to frequency-domain circuits
- Calculate instantaneous, average, real, reactive and complex power and power factor in ac circuits
- Calculate average and RMS value for a periodic waveform
- Calculate the maximum average power transfer for a load in an ac circuit
- Sketch Bode plots for a network function
- Analyze series and parallel resonant circuits to determine voltages and currents in circuit

Graduate Attributes: An institution must demonstrate that graduates of its programs possess the attributes described below. In addition, the institution must implement and employ processes to demonstrate that program outcomes are being assessed in the context of these attributes, and that the results of such assessments will be applied to the further development of programs. The graduate attributes are:

1. A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.

2. Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.

3. Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.

4. Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.

5. Use of engineering tools: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.

6. Individual and team work: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.

7. Communication skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.

8. Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.

9. Impact of engineering on society and the environment: An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.

10. Ethics and equity: An ability to apply professional ethics, accountability, and equity.

11. Economics and project management: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.

12. Life-long learning: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.

This course (ELEC 2501) will score attributes 1.4 Discipline Specific concept DOE-1, 2.2 Approach to problem, 2.3 Use of assumptions, 2.4 Interpreting the solution, 7.5 Notetaking skills and listening skills. They are scored through the responses provided in assignments, quizzes, prelab and lab reports, presentations, final exams. The graduate attribute scores may in some cases be derived from graded material, however the graduate attribute scores are not used in determination of the final grade for the course.