



ENGG*2450 Electric Circuits

01

Winter 2024

Section(s): 01

School of Engineering

Credit Weight: 0.50

Version 1.00 - January 07, 2024

1 Course Details

1.1 Calendar Description

This course explores the fundamentals of electric circuit analysis. Course topics include: lumped circuit abstraction; circuit elements and their characteristics; nodal and mesh analysis; linearity and superposition principles; fundamental circuit theorems; Thevenin and Norton equivalent circuits; introduction to the ideal operational amplifier and operational-amplifier circuits; dynamics of first and second order circuits including switched circuits; coupled inductors and transformers; alternate-current circuits and sinusoidal steady-state analysis with phasor methods.

Pre-Requisites: PHYS*1010

Co-Requisites: MATH*2270

Restrictions: Non-BENG students may take a maximum of 4.00 ENGG credits.

1.2 Course Description

The course will focus on the analysis of circuits and will explore circuit problems. The main goals of this course are to teach students how to analyse circuits with several different methods.

1.3 Timetable

Lectures: (Dr. Mohamad Abou El Nasr first 6 weeks - Dr. Lei Lei Second 6 weeks)

There are two offerings of the course

For Sections (0101, 0102, 0103, 0104, 0105, 0106) Lectures are on M, W, F 10:30 AM - 11:20 AM

Lectures are Face to Face in ROZH 103

For Sections (0201, 0202, 0203, 0204, 0205) Lectures are on M, W, F 12:30 PM - 1:20 PM

Lectures are Face to Face in MACN 105

Tutorial/Lab are carried face-to-face in RICH, Room 1504A / 1504B

Section 0101, 0201 Tues 1:30 PM - 3:20 PM

Section 0102, 0202 Wed 1:30 PM - 3:20 PM

Section 0103, 0203 Mon 1:30 PM - 3:20 PM

Section 0104, 0204 Fri 1:30 PM - 3:20 PM

Section 0105, 0205 Thur 1:30 PM - 3:20 PM

Section 0106, 0206 Tues 9:30 AM - 11:20 AM

Times are also posted on Webadvisor.

1.4 Final Exam

Friday, April 19, 2024, 08:30AM - 10:30AM

Room TBA

2 Instructional Support

2.1 Instructional Support Team

Instructor: Mohamad Abou El Nasr
Email: maboueln@uoguelph.ca
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Instructor: Lei Lei
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Lab Technician: Hong Ma
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2.2 Teaching Assistants

Teaching Assistant (GTA):	Sameeruddin Mohammed
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3 Learning Resources

3.1 Required Resources

Course Website (Website)

<https://courselink.uoguelph.ca/>

Course material, news, announcements, and grades will be regularly posted to the ENGG*2450 Courselink site. You are responsible for checking the site regularly.

Fundamentals of Electric Circuits (Textbook)

C. Alexander and M. Sadiku, Seventh Edition, McGraw Hill Education, New York, NY, 2019

3.2 Recommended Resources

Electric Circuits (Textbook)

W. Nilsson and S. Riedel, Tenth Edition, Prentice Hall, New Jersey, NY, 2014

3.3 Additional Resources

Lab Information (Lab Manual)

The lab information will be posted on Courselink. You are responsible for printing the lab manuals and having them with you during the laboratory sessions.

Home Assignments (Other)

There will be problem sets posted in Courselink during the term. These problem sets will not be graded, but it is highly recommended that you do each problem set. Practice problems solving is the best way to learn the course.

Miscellaneous Information (Other)

Other information related to the ENGG 2450 course will be posted on the Courselink site.

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Predict a circuit's behaviour (for DC, AC, and other inputs) using standard methods.
2. Analyse a circuit using Kirchhoff's laws, Nodal analysis, Mesh analysis, Ohm's law, superposition, Thevenin and Norton equivalent circuits, and source transformations to obtain mathematical descriptions of the circuit.
3. Describe (mathematically and graphically) the current, voltage, power, and energy properties of elements (resistors, capacitors, inductors, operational amplifiers, ideal sources, and dependent sources) that are part of circuits.
4. Demonstrate basic laboratory skills, including proper safety procedures and the use of a DC power supply, digital multimeter, function generator, and oscilloscope.

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
1	Knowledge Base	1, 2, 3
1.2	Recall, describe and apply fundamental principles and concepts in natural science	3
1.3	Recall, describe and apply fundamental engineering principles and concepts	1, 2, 3
2	Problem Analysis	1, 2
2.1	Formulate a problem statement in engineering and non-engineering terminology	2

#	Outcome	Learning Outcome
2.2	Identify, organize and justify appropriate information, including assumptions	1
2.3	Construct a conceptual framework and select an appropriate solution approach	1, 2
5	Use of Engineering Tools	4
5.1	Select appropriate engineering tools from various alternatives	4
5.2	Demonstrate proficiency in the application of selected engineering tools	4
5.3	Recognize limitations of selected engineering tools	4

5 Teaching and Learning Activities

The following contains the tentative schedule of lecture topics as well as labs and tutorials.

Labs are intended to be carried face to face, if unforeseen situation prevent such a delivery method, we will rely on online simulations and demos as substitution.

5.1 Lecture

Topics:	Basic Concepts, Basic Laws
Topics:	Methods of Analysis, Circuit Theorems
Topics:	Op-Amps
Topics:	Capacitors and Inductors
Topics:	First-Order Circuits
Topics:	Second-Order Circuits
Topics:	Sinusoids and Phasors, Sinusoidal Steady-State Analysis

5.2 Lab

Week 1

Topics: Lab 0 - Attend your face-to-face section, get to meet your TAs and they will check you passed the safety lab Quiz.

Start forming your lab group and get introduced to the lab equipments you will be using in the following labs.

Week 2

Topics: Lab 1 Kirchhoff's law

Week 3

Topics: Tutorial

Week 4

Topics: Tutorial

Week 5

Topics: Lab 2 - OpAmp Circuits Part1

Lab 1 due

Week 6

Topics: tutorial

Week 7

Topics: Tutorial

Week 8

Topics: Lab 2 OpAmp Circuits part 2

Week 9

Topics: Lab 3- First Order Circuits

Lab 2 due

Week 10

Topics: Tutorial

Week 11

Topics: Tutorial
Lab 3 due

Week 12

Topics: Tutorial / makeup for missed lab due to acceptable reasons

5.3 Other Important Dates

- **Monday, January 08**
Classes commence
- **Saturday, February 10**
Midterm (12:00PM - 3:00PM) Location G ROZH 101
- **Monday, February 19 -- Friday, February 23**
Winter Break – NO CLASSES SCHEDULED THIS WEEK
- **Thursday, April 11**
Final Examinations commence
- **Friday, April 19**
ENGG2450 Final Exam (08:30AM - 10:30AM) location TBD

6 Assessments

6.1 Marking Schemes & Distributions

If you miss the midterm due to grounds for granting academic consideration or religious accommodation, you should contact your instructor in advance. There will be a makeup for the missed midterm to be determined and written at a time set by the Professor. A tentative date would be **Wednesday Feb. 14th, the week following the midterm @4:00PM.**

All labs must be attended and completed to receive a passing grade in ENGG*2450.

Name	Scheme A (%)
Assignments	0
Labs*	15
Midterm	40

Name	Scheme A (%)
Final Exam	45
Total	100

6.2 Assessment Details

Assignments (0%)

Learning Outcome: 1, 2, 3, 4

There will be several Problem Sets. These are take-home problem sets and will be made available on the Courselink site. Students are encouraged to solve these Problem Sets and practice as much as possible.

Tutorials (0%)

Students should attend all tutorials. Tutorials will provide students with experience solving electric circuit examples.

Labs (15%)

Learning Outcome: 4

The Purpose of performing the Lab in this course is to verify the concepts learned during the lectures. **Several tutorial classes will be reserved for the ENGG*2450 Labs.** The lab reports will be due one week after completion of the lab experiments.

Lab 0 is an introduction and safety lab with no marks formally assigned. However, students will not be permitted to do Lab 1 if they have not fully attended Lab 0 and will therefore receive a grade of zero on following labs. There is a safety quiz. This is a pass/fail quiz and does not contribute to your final course grade. You must pass the safety lab (get 80% or higher) to enter labs following lab 0. If you do not pass this quiz, you will not be allowed to enter the lab and you will not be allowed to submit a lab report.

Students should contact their designated lab TA to arrange completion of any missing lab.

All labs must be attended and completed to receive a passing grade in ENGG 2450.

Midterm (40%)

Date: Sat, Feb 10, 3:00 PM, G ROZH 101

Learning Outcome: 1, 2, 3

Closed Book and is worth 40%.

Final Exam (45%)

Date: Fri, Apr 19, 08:30 AM - 10:30 AM, TBD (Check Webadvisor)

Learning Outcome: 1, 2, 3, 4

6.3 Labs

All labs must be attended and completed to receive a passing grade in ENGG 2450

7 Course Statements

7.1 Communication & Email Policy

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. It is your responsibility to check the course website regularly. As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its student. You are encouraged to use [ENGG*2450] in the subject line while emailing your GTA and instructor.

7.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml>

Missed Test:

If you miss any of the tests due to grounds for granting academic consideration or religious accommodation, There will be a makeup for the missed test at a time set by the instructor. A tentative date is on **Wednesday of the following missed-test week at 4:00PM**. Location to be determined by the instructor.

If this date is inconvenient, another date or suitable remedy action will be set with the instructor. Please communicate with the instructor for this matter.

Lab Work: Lab safety quiz is available on Courselink. You will not be allowed to enter the lab until you have successfully completed this quiz. You must attend and complete all laboratories. If you miss a laboratory due to grounds for granting academic consideration or religious accommodation, arrangements must be made with the teaching assistant to complete a makeup lab. Attendance will be taken in the lab. All students are required to demo their lab during their lab session; this demo is graded. If you are not present for your lab and your demo, you will not be allowed to submit a lab report and you will get a zero on that lab. If you miss more than 25% of a lab period due to lateness or by leaving before you have finished the lab, you will be considered absent. Lab reports are due at 4:30 pm one week after the day that you did the in-lab component.

Late Lab Reports: Late submissions of lab reports that are less than 24 hours late will be penalized 50%. Late submissions of lab reports that are more than 24 hours late will not be accepted.

Passing grade: The passing grade of this course is 50%.

7.3 Relationships with other Courses & Labs

Previous Courses:

ENGG*2400

Follow-on Courses:

ENGG*3280; ENGG*3410; ENGG*3450; ENGG*3510; ENGG*3570; ENGG*3640; ENGG*4550; ENGG*4650

8 School of Engineering Statements

8.1 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. Some written lecture notes will be presented only in class. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and labs.

8.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

8.3 Lab Safety

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website
<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website
<https://www.ridgetownc.com/services/accessibilityservices.cfm>

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community—faculty, staff, and students—to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
<https://www.uoguelph.ca/academics/calendars>

9.9 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).
