ENGG*2450 Electric Circuits
Winter 2017

UNIVERSITY of GUELPH

School of Engineering

(Revision 0, January 7, 2017)

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1 INSTRUCTIONAL SUPPORT

1.1 Instructors

Instructor: Dr. Christopher Collier, Ph.D.
Office: THRN 2405
Email: ccollier@uoguelph.ca
Office hours: Fri. 14:00 – 15:30

InstruSctor: Dr. Rafik Guindi, Ph.D.
Office: RICH 3525
Email: rguindi@uoguelph.ca
Office hours: Mon. 15:00 – 16:00 & Wed. 15:00 – 16:00

1.2 Lab Technician

Technician: Hong Ma
Office: THRN 1506
Email: hongma@uoguelph.ca

1.3 Teaching Assistants

GTA	Role	Email	Office Hours
Bimal Acharya	Tutorial	bacharya@uoguelph.ca	by appointment
Faisal Shahin	Tutorial	fshahin@uoguelph.ca	by appointment
Heather Milukow	Tutorial	milukowh@uoguelph.ca	by appointment
Taranjit Cheema	Lab	taranjit@uoguelph.ca	by appointment
Tianxiang Jia	Lab	tjia@uoguelph.ca	by appointment
You Lyu	Lab	ylyu@uoguelph.ca	by appointment
Shravani Prasad	Lab	prasads@uoguelph.ca	by appointment
Li Yang	Lab	lyang09@uoguelph.ca	by appointment
Binbin Zhang	Lab	binbin@uoguelph.ca	by appointment

2 LEARNING RESOURCES

2.1 Course Website

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

2.2 Required Resources

C. Alexander and M. Sadiku, **Fundamentals of Electric Circuits**, **Sixth Edition**, McGraw Hill Education, New York, NY, 2016

2.3 Recommended Resources

J. W. Nilsson and S. Riedel, **Electric Circuits**, **Tenth Edition**, Prentice Hall, New Jersey, NY, 2014

2.4 Additional Resources

Lab Information: 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: There will be problem sets posted in Courselink during the term. These problem sets will not be graded, but it is recommended that you do each problem set, as practice problems are the best way to learn the course.

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

2.5 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 <mail.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.**

3 ASSESSMENT

3.1 Dates and Distribution

Assignments (0%): 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 be provide students with experience solving electric circuit examples.

Quizzes (10%): There will be two quizzes with each worth 5%. The quizzes will take place in class. Dates TBD.

Labs (15%): There is a safety quiz available online in Courselink. This is a pass/fail quiz and does not contribute to your final course grade. You must pass (80% or higher) this quiz before you are allowed to enter the lab. 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. 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 detail schedule will be posted on Courselink. The lab reports will be due one week after completion of the lab experiments. Lab 0 is an introduction 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 Lab 1, Lab 2, and Lab 3 in this situation.

Midterm Exam (25%): The midterm exam will take place on Saturday, February 11, 2017, 13:00-14:30 Rozanski Hall (ROZH). The midterm exam is closed book.

Final Exam (50%): The final exam will take place on Saturday, April 22, 2017, 14:30-16:30. Location TBD. The final exam is closed book.

3.2 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 Midterm Exam: If you miss the midterm due to grounds for granting academic consideration or religious accommodation, the weight of the missed midterm will be added to the final exam. **There will be no makeup midterm tests.**

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%.

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4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

This course explores the fundamentals of electric circuit analysis. Course topics include: lumped circuit abstraction; circuit elements and their characteristics; Ohm's and Kirchhoff's laws; resistive circuits; nodal and mesh analysis; linearity and superposition principles; fundamental circuit theorems; introduction to the ideal operational amplifier model; energy storage elements and dynamics of first and second order circuits including switched circuits; alternate-current circuits and sinusoidal steady-state analysis with phasor methods.

Prerequisites: ENGG*2400, (PHYS*1010 or PHYS*1130)

4.2 Course Aims

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.

4.3 Learning Objectives (LO)

At the successful completion of this course, a student will 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.

4.4 Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1, 2, 3	Quizzes, Exams

2. Problem Analysis	All	Quizzes, Exams, Labs
3. Investigation	4	Labs
4. Design	-	-
5. Use of Engineering Tools	4	Labs
6. Communication	All	Labs
7. Individual and Teamwork	-	-
8. Professionalism	-	-
9. Impact of Engineering on Society and the Environment	-	-
10. Ethics and Equity	-	-
11. Environment, Society, Business, & Project Management	4	Lab Safety Quiz
12. Life-Long Learning	-	-

4.5 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 (and typically partially-completed) lecture notes will be made available to students on Courselink/D2L but these are not intended to be stand-alone course notes. 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 project.

4.6 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. 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.

Students are not permitted to use laptop computers while in lecture. The only exceptions are for students using laptop computers to take notes. Prior permission from the instructor must be given before using the laptop in lecture. Students are not permitted to use phones during lectures.

4.7 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

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures:	**Section:**	**Time:**	**Location:**
Monday	0101-0106	8:30 – 9:20	MACN 105
Wednesday	0101-0106	8:30 – 9:20	MACN 105
Friday	0101-0106	8:30 – 9:20	MACN 105
Monday	0201-0206	11:30 – 12:20	MACN 105
Wednesday	0201-0206	11:30 – 12:20	MACN 105
Friday	0201-0206	11:30 – 12:20	MACN 105
Tutorials/Labs:	**Section:**	**Time:**	**Location:**
Monday	0101	14:30 – 16:20	RICH 1504A/B
Wednesday	0102	14:30 – 16:20	RICH 1504A/B
Tuesday	0103	15:30 – 17:20	RICH 1504A/B
Thursday	0104	13:30 – 15:20	RICH 1504A/B
Thursday	0105	15:30 – 17:20	RICH 1504A/B
Tuesday	0106	13:30 – 15:20	RICH 1504A/B
Monday	0201	14:30 – 16:20	RICH 1504A/B
Wednesday	0202	13:30 – 15:20	RICH 1504A/B
Tuesday	0203	15:30 – 17:20	RICH 1504A/B
Thursday	0204	13:30 – 15:20	RICH 1504A/B
Thursday	0205	15:30 – 17:20	RICH 1504A/B
Tuesday	0206	13:30 – 15:20	RICH 1504A/B

5.2 Lecture Schedule

The following table contains the *tentative* schedule of lecture topics.

Week	**Topic**
1, 2	Basic Concepts, Basic Laws
3, 4	Methods of Analysis, Circuit Theorems
5	Op-Amps
6, 7	Capacitors and Inductors, First-Order Circuits
8, 9	Second-Order Circuits
10, 11	Sinusoids and Phasors, Sinusoidal Steady-State Analysis, AC Power Analysis (time-permitting)
12	Magnetically Coupled Circuits

5.3 Lab Schedule

Week	**Topic**	**Due date**
1	Do online safety quiz (no tutorial or lab)	
2	Lab 0	
3	Tutorial	
4	Lab 1	

5	Tutorial	Lab 1 due
6	Tutorial	
Reading Break		
7	Lab 2	
8	Tutorial	Lab 2 due
9	Tutorial	
10	Lab 3	
11	Tutorial	Lab 3 due
12	Tutorial	

5.4 Other Important Dates

Monday, January 9, 2017: Classes commence
Monday, February 20, 2017: Winter Break begins
Friday, February 24, 2017: Winter Break ends
Monday, February 27, 2017: Classes resume
Friday, March 10, 2017: Fortieth class day, last day to drop one semester courses
Friday, April 7, 2017: Classes conclude

6 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.

If the laboratory rules are not followed, consequences will include removing access to the lab. If this results in lab work not being completed, the student will receive a grade of 0.

A lab safety quiz is available on Courselink. You will not be allowed to enter the lab until you have successfully completed this quiz.

7 ACADEMIC MISCONDUCT

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 discourages misconduct. 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.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:

http://www.academicintegrity.uoguelph.ca/

Please also review the section on Academic Misconduct in your Engineering Program Guide.

The School of Engineering has adopted a Code of Ethics that can be found at:

http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

9 RECORDING OF MATERIALS

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

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:
http://www.uoguelph.ca/registrar/calendars/index.cfm?index