

University of Guelph
School of Engineering

ELECTRIC CIRCUITS

ENGG*2450
Winter 2008

1 Instructor

Dr. Stefano Gregori.

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Office hours posted on the course web page, other times by appointment.

2 Teaching assistants

Mr. Ayaz Hasan.

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Mr. Matthew James.

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Mr. Jiawei Ren.

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Office hours posted on the course web page, other times by appointment.

3 Meetings

Lectures.

Tuesdays and Thursdays, 11:30 to 12:50, ROZH 102.

Tutorials and laboratories.

1. Tuesdays, 13:00 to 13:50, MACK 318; Tuesdays, 14:30 to 16:30, THRN 2307
2. Wednesdays, 10:30 to 11:20, MACK 308; Wednesdays, 13:30 to 15:30, THRN 2307
3. Wednesdays, 12:30 to 13:20, MACK 313; Wednesdays, 15:30 to 17:30, THRN 2307
4. Thursdays, 13:00 to 13:50, MINS B37; Thursdays, 14:30 to 16:30, THRN 2307

4 Materials

Textbook.

C. K. Alexander, M. N. O. Sadiku, *Fundamentals of electric circuits*, 3rd ed., McGraw-Hill 2007.

References.

The textbook and other reference books are available on Course Reserve in the library. Additional references are indexed by library call numbers TK452 to TK454.4. As a reference manual for circuit analysis with PSpice you may use: J. G. Tront, *PSpice for basic circuit analysis with CD*, 2nd ed., McGraw-Hill 2007.

Web.

The course has a web page on Courselink (Blackboard). To access Courselink simply go to <http://www.uoguelph.ca/courselink/> and follow the login instructions.

5 Prerequisites

Topics.

Success in this course requires a good understanding of the fundamentals of electromagnetism (electromagnetic quantities and units of measurement, electrostatics, electric field and potential, conservation laws) and of the fundamentals of engineering mathematics (linear algebra, trigonometry, complex numbers, infinite series, calculus, and differential equations). If you do not have this background, you will have to bring yourself up to speed. Please contact me, I will be happy to talk to you about your prospects.

Courses.

As stated in the Undergraduate Calendar.

6 Description

This course explores the fundamentals of electric circuit analysis, which are the foundation of modern communication, control, and power systems and micro and nano-scale electronics. The course begins with a discussion of lumped circuit abstraction and simple resistive circuits, followed by a study of the analysis techniques under direct-current conditions. The concept of ideal operational amplifier is presented next. Then the course continues with the dynamics of circuits with energy-storage elements. The course concludes with the study of alternate currents, leading to the reconnaissance of magnetically coupled circuits.

7 Learning objectives

After successfully completing the course you will be able to **analyze and model electric circuits** and to apply the studied concepts to **obtain numerical solutions to engineering problems involving electric circuits**. To this purpose you will learn to:

- Identify terms, quantities, and models used by engineers for describing electric circuits.
- Analyze the energetic properties of electric and magnetically-coupled circuits.
- Determine the dynamics of linear circuits in transient and at low and high frequency.
- Analyze alternate-current circuits using the phasor method for sinusoidal steady-state.
- Apply fundamental principles to simplify and solve problems.

8 Evaluation

The breakdown for grading the whole course is as follows:

Final exam 50%

Midterm exam 30%

Laboratory reports 20%

9 Approach

Problem solving is an essential part of the learning process and **studying the textbook** is an effective way to acquire information. I encourage you to solve as many problems as you can and to study the textbook as you review the lecture material.

Lecture sessions focus on important points and relationships, clarify concepts, and present examples.

Tutorial

periods concentrate on problems to enhance your understanding of the subject matter. They are a useful practice in preparation for the exams. I encourage you to discuss with the teaching assistants the difficulties that you may find in solving problems.

Two laboratory sessions

give you exposure to computer-aided design software for electric circuits and help you assimilate and put into practice the subject matter. There are two laboratory reports to be completed individually or in small groups. To ensure your safety and the safety of others, please conform to the laboratory safety regulations.

Any student not handing in a report receives a grade of zero. There are **no makeup** reports and late submissions are not accepted for marking.

There are two exams

used to determine the extent to which the course learning objectives have been achieved. The final exam is comprehensive. The use of notes, books, and programmable or graphic calculators is not permitted at exams.

Any student not taking an exam receives a grade of zero for that exam. In case you have a legitimate reason for missing an exam session, I may consider an accommodation upon presentation of a written request and suitable documentation before the time of the exam.

10 Obtaining help

You can obtain help from me during my office hours and after lectures and from the teaching assistants during their office hours and after tutorials and laboratories.

Please come and talk to us if you need help or you have fallen behind in your work. **We are willing to put in as much effort to help you**

as you are willing to put in to help yourself. We are happy to work with you on difficult concepts and hear your suggestions for ways to make the course better. If you are not free during our office hours, then email us with some days and times you are available, and we will schedule an appointment that works for both you and us.

You will also benefit greatly from getting together regularly with your classmates to **study and work together on problems.** Talking about the material with other students is a great way to understand it and to develop confidence about your understanding. You may make use of the resources available through the Learning Commons as well.

Help is available, please be informed about the following services. If you are ill, call the Student Health Services or a medical doctor. If you have emotional, family, or living environment problems that affect your ability to study, visit the Counselling Services or your academic advisor. For disabilities or temporary disabilities contact the Centre for Students with Disabilities. I have made every effort to avoid conflicts with religious obligations. If there is a discrepancy, please contact me as soon as possible.

11 Scholastic integrity

The value of an academic degree depends on the integrity of the work done by you to earn that degree. **It is imperative that you keep a high level of honor in your work.** The policies on scholastic dishonesty reported in the Undergraduate Calendar will be enforced.

I invite you to familiarize yourself with your responsibilities outlined in the Undergraduate Calendar and with the School of Engineering Code of Ethics. I recommend that you review the tutorial available on <http://www.academicintegrity.uoguelph.ca/> and that you discuss any question you may have with me or the teaching assistants.

12 Communications and accuracy of records

Communication is through announcements in class. Some information will be posted on the course website, on the board in the front hall of the Engineering Building, and sent through email messages. It is your responsibility to keep yourself informed about the course. Please make sure that your marks are reported correctly on Courselink and report to me any discrepancy. Please do not expect immediate reply to your emails. Because of the large class enrollment, we usually go through students' messages twice a week.

13 Disclaimer

I reserve the right to change any or all of the above in the event of appropriate circumstances, subject to the University of Guelph academic regulations.