ECE 231S Introductory Electronics
Course Outline

This course is an introduction to electronic circuits using operational amplifiers, diodes, and transistors. The course is the third of the three-course sequence, ECE110-ECE212-ECE231, designed to provide ECE students with a foundation for circuit analysis and electronics.

1. Instructors

<table>
<thead>
<tr>
<th>Section</th>
<th>Instructor</th>
<th>Office</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEC01</td>
<td>Olivier Trescases</td>
<td>SF1020A</td>
<td><a href="mailto:olivier.trescases@utoronto.ca">olivier.trescases@utoronto.ca</a></td>
</tr>
<tr>
<td></td>
<td>(course coordinator)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEC02</td>
<td>Khoman Phang</td>
<td>BA5136</td>
<td><a href="mailto:kphang@eecg.toronto.edu">kphang@eecg.toronto.edu</a></td>
</tr>
<tr>
<td>LEC03</td>
<td>Belinda Wang</td>
<td>GB250</td>
<td><a href="mailto:belinda.wang@utoronto.ca">belinda.wang@utoronto.ca</a></td>
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2. Text Book

- Chapter 1: Basic circuit concepts (voltage amplifiers, frequency response, Bode plots)
- Chapter 2: Operational Amplifiers
- Chapter 3: Introduction to Semiconductor Physics
- Chapter 4: Diodes
- Chapter 5: Field-Effect Transistors (MOSFETs)
- Chapter 6: Bipolar Junction Transistors (BJTs)
- Chapter 7: Transistor Amplifiers

3. Marking Scheme

<table>
<thead>
<tr>
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<th>Percentage</th>
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<tbody>
<tr>
<td>Quiz (two)</td>
<td>10%</td>
</tr>
<tr>
<td>Labs (six labs)</td>
<td>15%</td>
</tr>
<tr>
<td>(lab 1: 1%, Lab 2: 2%, other 4 Labs: 3%)</td>
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<tr>
<td>Midterm Test</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
<td>45%</td>
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<tr>
<td>Total</td>
<td>100%</td>
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Updated Jan. 6, 2020
4. Learning Objectives
- Basic theoretical concepts and techniques on Operational Amplifiers
- Theoretical and practical design of circuits based on DIODES
- Theoretical and practical design of circuits based on MOSFET and BJT
- Integrated circuit transistor amplifier design

A detailed week-by-week schedule is posted on the course web-site.

5. Tutorials

Tutorials run Wednesdays 9-11am, and consist of a tutorial hour and a guided-study hour. Each hour is held in a different room (room assignment to be posted on Quercus). Half of the class will start with the tutorial hour, and half of the class will start with the guided-study hour.

In the tutorial hour, important sample problems will be taken up on the board. Similar to ECE212 last semester, there will be a bonus mark (1%) for participation: students will be asked to work through a problem, typically from a past test or exam. In general, these past test problems will only be available in the tutorial and will not be posted online. Participation will tracked each week by the tutorial TAs, so students must attend their assigned session.

In the guided-study hour, students will be able to discuss and solve problems in small groups under the guidance of a TA.

6. Midterm and Quizzes

There is one midterm exam (Thu. Feb. 27) and two quizzes, Feb. 5 and March 18.

7. Circuit Simulation

SPICE simulation is an integral part of electronic circuit verification. Students will use NI Multisim throughout the course. The installation package is available at:

www.ni.com/gate/gb/GB_ACADEMIC_EVALMULTISIM/US

Unfortunately Multisim is only available for the Windows environment, however Mac/Linux are encouraged to download the free VirtualBox package:

www.oracle.com/technetwork/server-storage/virtualbox/downloads/index.html#vbox

Alternatively, all students are free to use the cross-platform LTSpice simulator, however it is not officially supported by the course staff:

www.linear.com/designtools/software/

8. Labs

There are 6 lab experiments (two involving simulation and four with hands-on electronics experiments). These labs give students experience with circuit simulation, and with the design and debugging of practical electronic circuits. Students work in teams of two. Prior to the first lab experiment, students must register their team using an online form (the link will be provided on the course web-site).

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### 9. Course Website

The course website is accessible through the main UofT Quercus portal, q.utoronto.ca

Under your “Courses” tab, you should see the link:

https://q.utoronto.ca/courses/132813

- All the official course announcements, handouts, and other information are posted on the Quercus site.

### Discussion Board on Quercus:

We will use Quercus for our discussion board. Our goal is to encourage active discussion amongst students: do not simply wait for an answer from your TA or instructor – please take part in answering questions. We will actively monitor the discussion and provide feedback.

**Have a Question?**

In general, questions relating to the course material, labs, and homework should be posted on the piazza discussion board so that everyone can benefit from the answer. Email correspondence should be limited to administrative issues such as handling a missed quiz or lab, etc. Emails should be sent to ta231@eecg.utoronto.ca, an email alias that includes both instructors and TAs who can respond to issues concerning the labs and tutorials.

### 10. Homework

- Homework for each section is provided in the Course Syllabus (NOTE: Homework ‘exercises’ are found within each section in the chapter, whereas homework ‘problems’ are found at the end of the chapter.)
- Questions relating to the homework should be posted on the discussion board or brought up during tutorials.

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