University of Victoria  
Department of Electrical and Computer Engineering  

COURSE INFORMATION AND ASSESSMENT TECHNIQUES  

(for updates and other materials see course website:  
http://www.ece.uvic.ca/~elec380/index.html)

Course:  
ELEC 380 - Electronic Circuits: II  
Term/Year:  
Sept.- Dec. 2013  
Class of 2015: 90 Students  
Class Rep.: Tim Rollerson  
trollerson@gamail.com

Professor in Charge: Dr. Adam Zielinski, tel: 250 721-8622, fax: 250 721-6052  
Email: adam@uvic.ca, web: http://www.ece.uvic.ca/~adam/

Office Hours:  
Days: Wednesdays, or any day or time but arrange through Email or phone  
Time: 10:30 a.m. – 11:45 a.m.  
Location: Room 411 EOW

Lectures:  
Section(s): A01 (CRN 11238), A02 (CRN 11239)  
Days: Mondays and Thursdays  
Time: 8:30 a.m. - 9:50 a.m. (Break: 9:20 -9:25)  
Location: ELL 167

Important Dates for 2013:  
Class starts: September 5, Thursday  
Thanksgiving: October 14, Monday  
Guest Lecture November 4, Monday  
(from 9:00 a.m. Speaker: Mr. Mark Butowski)  
Midterm Test: November 7, 8:30 a.m-9:50 a.m., Thursday (to be confirmed)  
Remembrance day November 11, Monday  
Reading Break: November 11-13, Monday-Wednesday  
Last Class: December 2, Monday  
Exam Period: December 7-20  
No classes: December 25 –January 6, 2014

Labs:

<table>
<thead>
<tr>
<th>Section (# of students)</th>
<th>Day</th>
<th>Time</th>
<th>Lab Instructor</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>B01 (21)</td>
<td>Mondays</td>
<td>11:30-14:20</td>
<td>Das Gupta, Sabuj</td>
<td><a href="mailto:sdlgupta@uvic.ca">sdlgupta@uvic.ca</a></td>
</tr>
<tr>
<td>B02 (22)</td>
<td>Thursdays</td>
<td>11:30-14:20</td>
<td>Lohrasbipeydeh, Hannan</td>
<td><a href="mailto:lohrashi@uvic.ca">lohrashi@uvic.ca</a></td>
</tr>
<tr>
<td>B03 (22)</td>
<td>Mondays</td>
<td>14:30-17:20</td>
<td>Edussooriya, Chamira</td>
<td><a href="mailto:chamira@ece.uvic.ca">chamira@ece.uvic.ca</a></td>
</tr>
<tr>
<td>B04 (22)</td>
<td>Thursdays</td>
<td>14:30-17:20</td>
<td>Sanadgol Nezami, Mohammadreza</td>
<td><a href="mailto:sanadgol@uvic.ca">sanadgol@uvic.ca</a></td>
</tr>
</tbody>
</table>
Assignment markers:

<table>
<thead>
<tr>
<th>Marker</th>
<th>Emails</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahbubeh Esmaeili</td>
<td><a href="mailto:mesmaei@uvic.ca">mesmaei@uvic.ca</a></td>
</tr>
<tr>
<td>Oladipo, Abimbola</td>
<td><a href="mailto:carolynoladipo@yahoo.com">carolynoladipo@yahoo.com</a></td>
</tr>
</tbody>
</table>

Assessment:

- Labs: 20%
- Mid-term: 20%
- Assignments: 10%
- Final Exam: 50%

The final grade obtained from the above marking scheme will be based on the following percentage-to-grade point conversion (see UVic calendar):

<table>
<thead>
<tr>
<th>Passing Grades</th>
<th>Grade Point Value</th>
<th>Percentage for Instructor Use Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>9</td>
<td>90 – 100</td>
</tr>
<tr>
<td>A</td>
<td>8</td>
<td>85 – 89</td>
</tr>
<tr>
<td>A-</td>
<td>7</td>
<td>80 – 84</td>
</tr>
<tr>
<td>B+</td>
<td>6</td>
<td>77 – 79</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>73 – 76</td>
</tr>
<tr>
<td>B-</td>
<td>4</td>
<td>70 – 72</td>
</tr>
<tr>
<td>C+</td>
<td>3</td>
<td>65 – 69</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>60 – 64</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>50 – 59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Failing Grades</th>
<th>Grade Point Value</th>
<th>Percentage for Instructor Use Only</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>0</td>
<td>35 - 49</td>
<td>Fail, conditional supplemental exam. (For undergraduate courses only)</td>
</tr>
<tr>
<td>F</td>
<td>0</td>
<td>0 – 49</td>
<td>Fail, no supplemental.</td>
</tr>
<tr>
<td>N</td>
<td>0</td>
<td>0 – 49</td>
<td>Did not write examination, Lab or otherwise complete course requirements by the end of term or session; no supplemental exam.</td>
</tr>
</tbody>
</table>

The rules for supplemental examinations are found on page 80 of the current 2013/14 Undergraduate Calendar.

<table>
<thead>
<tr>
<th>Term in which E Grade Was Obtained</th>
<th>Application Deadline for Supplemental Exam</th>
<th>Supplemental Exam Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>First term of Winter Session (Sept – Dec)</td>
<td>February 28 in the following term</td>
<td>First week of following May</td>
</tr>
<tr>
<td>Second term of Winter Session (Jan – Apr)</td>
<td>June 30 in the following term</td>
<td>First week of following September</td>
</tr>
<tr>
<td>Summer Session (May – Aug)</td>
<td>October 31 in the following term</td>
<td>First week of following January</td>
</tr>
</tbody>
</table>

Deferred exams will normally be written at the start of the student's next academic term; i.e., approximately 4 months following the deferral of the exam.
Electronic Simulation Laboratory:

The Department operates in Laboratory ELW-B326 the Electronic Simulation Laboratory consisting of several PCs utilizing simulation software MICRO-Cap 10 (see laboratory manual for MICRO-Cap 10 Tutorial). Free PC evaluation version of MICRO-CAP 10 can be obtained from website: http://www.spectrum-soft.com.

Other Simulation software:

<table>
<thead>
<tr>
<th>Producer/Website</th>
<th>Name</th>
<th>Price ($)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 National Instruments</td>
<td>Multisim</td>
<td>60</td>
<td>Click: “Ready to Buy Canada”</td>
</tr>
<tr>
<td>2 <a href="http://www.linear.com/designtools/software">http://www.linear.com/designtools/software</a></td>
<td>LTSpice</td>
<td>Free</td>
<td>Mac, Windows, Linux</td>
</tr>
<tr>
<td>4 <a href="http://www.gpled.org/index.html">http://www.gpled.org/index.html</a></td>
<td>Gnu Electronic Design Automation (gEDA)</td>
<td>Free</td>
<td>Electronic design tools from schematic to PCB.</td>
</tr>
<tr>
<td>5 <a href="http://www.picaxe.com/Software/Third-Party/PEBBLE/">http://www.picaxe.com/Software/Third-Party/PEBBLE/</a></td>
<td></td>
<td>Free</td>
<td>PC, Mac, Linux</td>
</tr>
<tr>
<td>6 <a href="http://qucs.sourceforge.net/screenshots.html">http://qucs.sourceforge.net/screenshots.html</a></td>
<td></td>
<td>Free</td>
<td>Mac, ipod, ipad</td>
</tr>
<tr>
<td>7 Circuit. app</td>
<td></td>
<td>$10</td>
<td>Mac, ipod, ipad</td>
</tr>
</tbody>
</table>

Laboratory Schedule:

Most laboratory sessions are associated with simulation exercise (in brackets) that is required as a preparation to the laboratory. The required simulations using MC 4 are included in the Class Notes. They can be performed in the Electronic Simulation Laboratory - ELWB324 or at home using MC 10. Students may also use any other simulation software but should indicate what package was used.

<table>
<thead>
<tr>
<th>Laboratory Sessions (8 sessions)</th>
<th>Title</th>
<th>Section B01/B03</th>
<th>Section B02/B04</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Exp. 1 (Sim.1)</td>
<td>Two-Stage Amplifier</td>
<td>Sept. 23</td>
<td>Sept. 26</td>
</tr>
<tr>
<td>2. Sim. 2 (no Exp.)</td>
<td>Large Signal Amplifier</td>
<td>Sept. 30</td>
<td>Oct. 3</td>
</tr>
<tr>
<td>3. Exp. 4 (Sim. 3)</td>
<td>Frequency Response</td>
<td>Oct. 7</td>
<td>Oct. 10</td>
</tr>
<tr>
<td>4. Exp. 5 (Sim. 4)</td>
<td>Differential Amplifier</td>
<td>Oct. 21</td>
<td>Oct. 24</td>
</tr>
<tr>
<td>5. Exp. 6 (no Sim.)</td>
<td>Parameters of Op. Amp.</td>
<td>Oct. 28</td>
<td>Oct. 31</td>
</tr>
<tr>
<td>6. Exp. 7 (Sim. 5)</td>
<td>Instrumentation Amp.</td>
<td>Nov. 4</td>
<td>Nov. 7</td>
</tr>
<tr>
<td>7. Exp. 9 (no Sim.)</td>
<td>Nonlinear Circuits</td>
<td>Nov. 18</td>
<td>Nov. 21</td>
</tr>
<tr>
<td>8. Sim. 6 (no Exp.)</td>
<td>Low Pass Filter</td>
<td>Nov. 25</td>
<td>Nov. 28</td>
</tr>
<tr>
<td>Last Report Due</td>
<td>Dec. 2</td>
<td>Dec. 2</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: only experiments No. 1, 4, 5, 6, 7 and 9 listed in the Laboratory Manual and only simulations 1, 2, 3, 4 and 5 listed the Class notes are required

Note 2: Students who can demonstrate prior experience and background in the material covered in the laboratory experiments should contact course Professor before the laboratory begins. Some of such students might be given a suitable project that will be marked and used in lieu of regular laboratory.
Texts
Required:
a. Title: Laboratory Manual for ELEC 380 - Electronic Circuits II
   Author: A. Zielinski
   Publisher: University of Victoria
   Year: Revised ©May 2013 ($15.75)
b. Title: Class Notes for ELEC 380 - Electronic Circuits II
   Author: A. Zielinski
   Publisher: University of Victoria
   Year: Revised ©May 2013 ($17.75)

Important Information regarding Class Notes:
Class notes as designed to supplement your active and systematic involvement in each class. By making your own notes you can customize them for your individual preferences. Please report any errors you notice immediately. Note also that some material in class notes is covered deeper than in the required text and might be used in test or/and exam.
c. Title: Electronic Devices – Conventional Flow ($176), rental-180 days: $70
   Author: T.L. Floyd
   Publisher: Prentice-Hall

Supplementary:
a. Title: Microelectronic Circuit Analysis and Design
   Author: Donald A. Neamen ($198)
   Publisher: McGraw Hill

Attendance at Lectures
Students are expected to attend all classes in which they are enrolled. Students, who neglect their academic work, including assignments, may be refused permission to write the final examination in a course.
See: http://web.uvic.ca/calendar2013/GI/2AYeID.html

Standards of Professional Behaviour
You are advised to read the Faculty of Engineering document Standards for Professional Behaviour at http://www.engr.uvic.ca/policy/professional-behaviour.php, which contains important information regarding conduct in courses, labs, and in the general use of facilities. Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult http://web.uvic.ca/calendar2013/FACS/UnIn/UARe/PoAcI.html for the UVic policy on academic integrity.

Specifics:
Cheating on assignments, tests and examinations: Cheating includes, but is not limited to:
• obtaining or seeking to obtain test or examination questions, or answers in advance,
• copying the answers or work of another person,
• sharing information or answers when the instructor has not authorized collaboration,
• using any materials or equipment (including calculators) other than those explicitly authorized for a test or an examination,
• impersonating another at a test or an examination or availing oneself of such an impersonation.
# Syllabus for ELEC 380

Electronic Circuits II  
Adam Zielinski  
September 2013

### Part 1 - Material Review

- JBT  
- Two stage amplifier: design and simulation.  
- Exercise 1.1

### Part 2 - Large signal amplifiers

- Class A operation  
- ac-load line  
- maximum compliance  
- swamped CE amplifier  
- efficiency  
- inductively coupled load  
- transformer coupled load  
- nonlinear distortion  
- class-B operation  
- biasing B-class amp.  
- transistor power rating  
- Exercise 2.1  
- Exercise 2.2

### Part 3 - Frequency response of transistor amplifiers

- coupling capacitors  
- swamped CE amplifier at lower frequencies  
- Bode approximation  
- Voltage follower at lower frequencies  
- Millers theorem  
- JFET amplifiers at higher frequencies  
- BJT amplifiers at higher frequencies  
- Design example, neutralization of input capacitance  
- Exercise 3.1

### Part 4 - Differential Amplifier

- differential and common mode gains  
- differential and common mode signals  
- CMRR  
- Transistor diff. amplifier  
- current mirror  
- active load  
- introduction to operational amplifiers

### Part 5 - Ideal and non-ideal op. amp.

- Ideal op. amp. virtual ground  
- inverting and non-inverting configurations  
- instrumentation amplifier  
- low frequency parameters (input offset voltage and currents)

### Part 6 - High frequency parameters of op. Amp.

- slew rate  
- frequency response  
- Exercise 6.1

Stable ac-coupled amplifier 7.1
operation from single supply 7.3
voltage reference 7.6
Circuits with transistors and diodes;
- current booster 7.7
- push-pull circuit 7.8
- rectifier 7.9
- peak detector 7.10
Voltage Controlled Current Source (VCCS) 7.11
Nonlinear Applications;
- comparator 7.12
- Schmitt trigger 7.16
- Astable multivibrator 7.19

Part 8 - Active filters
second order LP prototype 8.1
impedance and frequency scaling 8.1
higher order filters 8.6
LP-HP transformation 8.12
Band-pass filter 8.13
state variable filter 8.16
switch capacitor filters 8.17
Exercise 8.1

Part 9 - Negative feedback
general principle 9.1
sensitivity 9.2
nonlinear distortion 9.4
feedback through power supply 9.8
feedback through stray capacitance 9.9
feedback through ground loops 9.10

**Expected outcome:**
On completion of this course each student is expected to:
• understand the concepts of the dc and ac load lines and can use then in designing power amplifiers such as A and B class
• be aware of limitations of power amplifiers such as efficiency and nonlinear distortion
• be able to design and understand parameters of differential amplifiers
• understand functioning of the ideal and non-ideal Operational Amplifier including its linear (frequency response) and nonlinear (slew rate) limitations and other parameters.
• understand operation of several linear and nonlinear circuits such as comparator, Schmitt trigger, peak detector, multivibrator and other.
• be familiar with the design and implementation of various analog filters
• be familiar with general properties of the negative feedback as applied to electronic circuits
• appreciate the important role of proper circuit layout to avoid stray feedbacks

**Accommodation of Religious Observance**
See [http://web.uvic.ca/calendar2013/GI/GUPo.html](http://web.uvic.ca/calendar2013/GI/GUPo.html)

**Policy on Inclusivity and Diversity**
See [http://web.uvic.ca/calendar2013/GI/GUPo.html](http://web.uvic.ca/calendar2013/GI/GUPo.html)