



COURSE OUTLINE
ELEC 365 – Applied Electronics and Electrical Machines
Fall 2013

Instructor:

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Office Hours:

Days: Same as tutorial time in CLE A127
 Time: Other times by appointment in EOW 407

Lectures:

A-Section(s): A01 / CRN 11218
 A02 / CRN 11219
Days: Tues., Wed. and Fri.
Time: 12:30 – 1:20 PM
Location: **COR B112**

Labs:

Location: ELW B303/324

B-Section(s) Days Time

Will be announced later.

Odd-numbered lab sections begin the week of Sep. 23

Even-numbered sections begin the week of Oct. 30

Sequence of experiments: 1, 2, 3, and 4

THERE WILL BE NO LABS DURING THE WEEK OF OCTOBER 14 AND NOVEMBER 11

Tutorial:

Location: CLE A127

<u>T-Section</u>	<u>Days</u>	<u>Time</u>
T01	Mon.	5:00-5:50 PM

Required Text:

Title: Electrical Engineering Principles and Applications
 Author: Allan R. Hambley
 Publisher: Prentice-Hall (Pearson Education)
 Year: 6th ed., 2013 (earlier editions from the 2nd edition onwards can also be used).

References:

Electronics

Title: Electronic Principles, 3rd ed.
 Author: A.P. Malvino
 Publisher: McGraw-Hill

Electric Machines

Title: Principles of Electric Machines and Power Electronics, 2nd ed.
 Author: P.C. Sen
 Publisher: John Wiley & Sons

Assessment:

Assignments : Six sets. Not graded. They are for your practice and contains similar questions asked in mid-term and final.

Tutorial Quizzes (2)	5%	: Mon. Oct. 21, Mon., Dec. 02
Labs	25%	
Mid-term	25%	Date: Wed. Oct. 30 in COR B112 .
Final	45%	Date: TBA.

Note: Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.

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

Passing Grades	Grade Point Value	Percentage For Instructor Use Only	
A+	9	90 - 100	
A	8	85 - 89	
A-	7	80 - 84	
B+	6	77 - 79	
B	5	73 - 76	
B-	4	70 - 72	
C+	3	65 - 69	
C	2	60 - 64	
D	1	50 - 59	
Failing Grades	Grade Point Value	Percentage For Instructor Use Only	Notes
E	0	35 - 49	Fail, conditional supplemental exam.
F	0	0 - 34	Fail, no supplemental exam.
N	0	0 - 49	Did not write examination, Lab or otherwise complete course requirements by the end of the term or session; no supplemental exam.

The rules for supplemental examinations are found on page 81 of the current 2012/13 Undergraduate Calendar.

Term in which E Grade Was Obtained	Application Deadline for Supplemental Exam	Supplemental Exam Date
First term of Winter Session (Sept - Dec)	February 28 in the following term	First week of following May
Second term of Winter Session (Jan - Apr)	June 30 in the following term	First week of following September
Summer Session (May - Aug)	October 31 in the following term	First week of following January

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.

Syllabus

The following chapters from the text will be addressed:

Tutorial :

- Chapters 2 & 5, in addition to the others as described below.

Electronics:

- Chapter 10: Diodes excluding voltage controlled attenuator in section 10.8.
- Chapter 13: Bipolar Junction Transistors excluding section 12.7 CMOS logic gates.
- Chapter 12: Field-Effect transistors
- Chapter 14: Operational Amplifiers excluding section 14.10 Active filters.

Electric Machines:

- Chapter 15: Magnetic Circuits and transformers
- Chapter 16: DC Machines excluding section 16.7 other than separately excited DC generators.
- Chapter 17: AC Machines excluding section 17.4 single-phase motors and section 17.5 stepper motors and brushless dc motors.

In the class I will teach from powerpoint slides previously posted on the website. I will also review some DC and AC circuit fundamentals.

Learning Objectives

- Develop and analyze simple magnetic circuit equation using Ampere's Law and simple circuit theory concepts. Define flux, flux density, permeance, inductance.
- Develop and analyze single phase transformers and evaluate their performance using Faraday's law, Lenz's law and single phase AC circuit fundamentals.
- Develop basic operating principles of dc machines using Fleming's right hand and left hand rule. Analyze and evaluate different types of dc machines.
- Develop the rotating magnetic field theory using three phase AC circuit fundamentals. Develop the concepts of slip, slip frequency, synchronous speed and combine them to explain, analyze and evaluate 3- phase induction machines.
- Analyze and evaluate synchronous machines and contrast them to induction machines.
- Compare different types of electrical machines and conclude.
- Compare a diode with an one way valve to illustrate its operation. Develop different diode models. Describe different types of diodes such as rectifier diodes, zener diodes, schottky diodes etc. Analyze different diode circuits such as rectifiers, voltage regulators, limiters, clippers, voltage multipliers.
- Compare a BJT with a controlled one way valve to illustrate its operation. Describe different types of BJTs. Analyze the active, saturation and cut-off modes of NPN BJT. Evaluate four resistor biasing circuit. Analyze common emitter, emitter follower amplifiers using dc and ac equivalent circuits. Evaluate voltage regulators. Analyze PNP BJT based current sources.
- Compare a MOSFET with a BJT to illustrate its operation. Analyze the active, triode and cut-off modes of an N channel MOSFET. Analyze common source, source follower amplifiers using dc and ac equivalent circuits.
- Develop the concept of virtual ground and negative feedback after describing the functional block diagram of an op-amp. Evaluate inverting, non-inverting and differential amplifiers, integrators, differentiators. Analyze positive feedback op-amp circuits. Outline the limitations of practical op-amps such as offset and bias currents, slew rate, gain-bandwidth product etc.

About the instructor

I am an Associate Professor in the department of Electrical and Computer Engineering with fourteen years of teaching and eight years of industry experience. I am a doctorate in Electrical Engineering specializing in modeling and fault diagnosis of electric machines. I have numerous journal and conference publications in this area and a book titled 'Electric Machines, modeling, condition monitoring and fault diagnosis' that I co-authored with H. Toliyat, S. Choi and H. Meshgin-Kelk. I am also a senior member of the IEEE and a professional engineer in the province of British Columbia, Canada.

I believe in learning from concepts. This will provide the logical connection among the equations and numerical examples and makes the learning process very smooth. This way your problem solving skills will become systematic and not a haphazard search for equations and plugging numbers for answers. I very strongly encourage your asking questions which will promote interactive learning. I look forward to our journey together over the next three months.

Important Announcements:

- i) Only scientific calculators are allowed during midterm and final examinations. Programmable and other sophisticated calculators are not allowed.
- ii) Electric Machines will be taught in the first section of this course, and Electronics in the second.
- iii) Food and drinks are NOT allowed in the classrooms.
- iv) Except for health reasons and family emergencies, the Midterm cannot be rescheduled.
- v) Laboratory attendance and report submission are mandatory. Failure to do so will result in a Fail grade.
- vi) The instructor is planning to maintain a class website www.ece.uvic.ca/~snandi where important announcements/homework assignments, etc. will be posted. However, regular updates may not be possible at all times.

Accommodation of Religious Observance

See <http://web.uvic.ca/calendar2012/GI/GUPo.html>

Policy on Inclusivity and Diversity

See <http://web.uvic.ca/calendar2012/GI/GUPo.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/calendar2012/FACS/UnIn/UARe/PoAcI.html> for the UVic policy on academic integrity.