Faculty of Engineering

COURSE OUTLINE

ELEC 365– APPLIED ELECTRONIC AND ELECTRICAL MACHINES

Term – FALL 2015 (201509)

Instructor (Applied Electronics)
Dr. Subhasis Nandi
E-mail: snandi@ece.uvic.ca

Office Hours
Days: Tuesday, Wednesday
Time: 11:45 am–12:15 pm, 1:45 pm-2:15 pm
Location: EOW 407

Instructor (Electrical machines)
Mr. Babak Manouchehrinia
E-mail: bmn14@uvic.ca

Office Hours
Days: Wedensday
Time: 2 pm-4 pm
Location: EOW 419 (Tentatively)

Instructor (Tutorial)
Ms. Parniyan Tayebi
E-mail: parniyan_tayebi@yahoo.com

Office Hours
Days: Mondays
Time: 1.30 pm to 3.30 pm
Location: EOW 239

Lectures
A-Section(s): A01 (11263) & A02 (11264)
Days: Tuesdays, Wednesdays, Fridays
Time: 12:30 p.m. – 1:20 p.m.
Location: Elliot Building (ELL) – 167

Labs   **Location: ELW**

B-Section(s):	Days:	Time(s):
B01&B02	Tuesday	08:30 - 11:30 am
B03& B04	Wednesday	08:30 - 11:30 am
B05& B06	Friday	08:30 - 11:30 am
B07& B08	Thursday	04:00 - 07:00 pm
B09	Wednesday	04:30 - 07:30 pm

Odd-numbered lab sections begin the week of Sep. 28
Even-numbered sections begin the week of Oct. 5
Sequence of experiments: 3, 4, 1, and 2

Course Objectives

- 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.

- Develop and analyze simple magnetic circuit equation using Ampere's Law and simple circuit theory concepts. Define flux, flux density, permeance, inductance etc.

- 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.

Learning Outcomes

As described at the beginning of each slide set.

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.

A-Section(s): A01 / CRN 11263   A02/CRN 11264
Days: TWF
 Time:12:30 pm – 1:20 pm
Location: Elliott Building (ELL) 167

Required Text

Title: Electrical Engineering Principles and Applications
Author:Allan R. Hambley
Publisher: Prentice-Hall (Pearson Education)
Year: 6th ed., 2013

References: Lecture notes and article reprints available on website:

http://www.ece.uvic.ca/~elec365/

Assessment:

Assignments: 6	**0%**
Labs:	**24 %**
4 Mid-terms (Two for Electronics, Two for machines):	**15% each**

Dates:
Sept.30, Wednesday, (Electronics: covering diodes and BJTs (Part))
Oct. 16, Friday, (Electronics: BJTs (Rest), MOSFETS and Op-Amps),
Nov. 18, Wednesday, (Electrical Machines: Magnetic circuits, Transformers and DC Machines (Part))
Dec. 04, Friday, (Electrical Machines: DC Machines (Rest), Induction and Synchronous Machines)

4 Tutorial Quizzes (Two for Electronics Two for machines)   4% each
Dates:
Sept.28, Monday, (Electronics: covering diodes and BJTs (Part))
Oct. 14, Wednesday, (Electronics: BJTs (Rest), MOSFETS and Op-Amps), during regular class hour
Nov. 16, Monday, (Electrical Machines: Magnetic circuits, Transformers and DC machines),
Nov. 30, Monday, (Electrical Machines: DC Machines, Induction and Synchronous Machines)

Important Announcements:

i)   **Only scientific calculators are allowed during midterms and Quizzes. Programmable and other sophisticated calculators are not allowed. Students found using such calculators will be severely penalized.**

ii)   **The instructors will provide formula sheets during the midterm. It will be posted prior on the website.**

ii)   Applied Electronics will be taught in the first section of this course, and Electrical Machines in the second.

iii)   Food and drinks are <u>NOT</u> allowed in the classrooms.

iv)   **Except for health reasons and family emergencies, the midterms cannot be rescheduled.**

v)   **Laboratory attendance and report submission are mandatory.** Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.

vi)   **There will be no classes during the week of September 21-25 as the instructor will be away to a conference. Make up lecture hours are as follows:**

Monday: Sep 14, 4 - 5:15 pm, CLE A127 (same time as ELEC 365 tutorial)

Thursday: Sep 17, 4 - 5:15 pm, ECS 125

Make up tutorial: Tuesday, Sep 22, 12:30 -1:20, ELL 167

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

There will be no supplemental examination for this course.

http://web.uvic.ca/calendar/FACS/UnIn/UARe/Grad.html

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

Accommodation of Religious Observance
http://web.uvic.ca/calendar/GI/GUPo.html

Policy on Inclusivity and Diversity
http://web.uvic.ca/calendar/GI/GUPo.html

Standards of Professional Behaviour

You are advised to read the Faculty of Engineering document <u>Standards for Professional Behaviour</u>, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the entry in the current Undergraduate Calendar for the UVic policy on academic integrity.

http://web.uvic.ca/calendar/FACS/UnIn/UARe/PoAcI.html

Course Lecture Notes

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally,

whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.