University of Victoria
Electrical & Computer Engineering

Department of Electrical and Computer Engineering

COURSE OUTLINE

ELEC 370 - ELECTROMECHANICAL ENERGY CONVERSION
FALL 2014

Term - FALL 2014 (201409)

Instructor

PhD candidate: Babak Manouchehrinia
E-mail: bmn14@uvic.ca

Office Hours

Days: Tuesday, confirm by Email
Time: 3 pm – 5 pm.
Location: EOW 419

Lectures

A-Section(s): A01 (11222) & A02 (11223)
Days: Tuesday, Wednesday and Friday
Time: 08:30 a.m. - 09:20 a.m.
Location: Elliot Bldg. Room 167

Labs **Location: ELW**

B-Section(s):	Days:	Time(s):
B01&B02	Monday	15:00 - 18:00 pm
B03& B04	Tuesday	14:30 - 17:30 pm
B05& B06	Wednesday	14:00 - 17:00 pm
B07& B08	Friday	14:00 - 17:00 pm

Required Text

Title: Principles of Electric Machines and Power Electronics
Author: P.C. Sen
Publisher: John Wiley & Sons
Year: Second edition - 1996

Optional Text

Title: Electric Machines and Drives
Author: G.R. Slemon
Publisher: Addison-Wesley Publishing Company Inc.
Year: 1992

References: Lecture notes and article reprints available on website:

http://www.ece.uvic.ca/~elec370/

Assessment:

Assignments:	5%
Labs	20%
Mid-term	30%
Final	45%

Tests:
Date: October 1 (Wednesday) Test 1 (15%)
Date: November 4 (Tuesday) Test 2 (15%)

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

Due Dates for Assignments: Due date to be announced.

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

**Assignment of E grade will be at the discretion of the Course Instructor.*

The rules for supplemental examinations are found on page 80 of the current 2014/15 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.

Course Description

1. Course Objectives

- Production of magnetic field and basic principles, magneto-motive-force, reluctance, analogy between magnetic and electric circuits, series and parallel circuits, fringing, Kirchoff's laws for magnetic circuits, magnetization curves, Faraday's law of electromagnetic induction, eddy currents, hysteresis.
- Basis and construction of transformer, development of linear equivalent circuit, coupled circuit representation, sinusoidal excitation, primary and secondary side referred equivalent circuits, determination of equivalent circuit parameters, auto transformers, instrument transformers.
- Structures and performance characteristics of dc, induction and synchronous machines, force equation, magnetic circuit and magnetization curve, EMF and torque equations, excitation methods for DC, IM motor and Synchronous machines; equivalent circuits for each one, performance as generators and motors; starting and speed control of different machines.
- Stepper Motor and Brushless DC Machines.

2. Learning Outcomes

- Basic principles of magnetic circuits, how to draw equivalent circuits and how to analyse them to calculate different parameters like flux, energy density, etc.
- The basic principles of operation and construction details of transformers and dc machines (as a generator and a motor); their equivalent circuits and their use in calculating performance parameters such as regulation and efficiency.
- The basic principles of operation and construction details of induction motors and synchronous machines (as a generator and as a motor); their equivalent circuits and their use in calculating performance parameters such as regulation and efficiency.
- Speed-torque characteristics of dc motors and induction motors and how to control their speed.

3. Syllabus

- Faraday's law of electromagnetic induction, transformers and generators. Magnetic circuits. Force on a current carrying wire and motors. Energy and coenergy in the derivation of torques and forces. Structures and performance characteristics of dc, induction and synchronous machines. Stepper motor and brushless dc machines. Introduction to electric drives.

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 ECE Chair by email or the ECE Chair's Secretary eceasst@uvic.ca to set up an appointment.

Accommodation of Religious Observance

See http://web.uvic.ca/calendar2014/GI/GUPo.html

Policy on Inclusivity and Diversity

See http://web.uvic.ca/calendar2014/GI/GUPo.html

Standards of Professional Behaviour

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour at http://www.uvic.ca/engineering/current/undergrad/index.php#section0-25 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/calendar2014/FACS/UnIn/UARe/PoAcI.html for the UVic policy on academic integrity.