Course Objectives
Theory and operation of power semiconductor devices, dc-dc converters (choppers), uncontrolled/controlled rectifiers, ac voltage controllers, voltage source converters, power electronic applications in motor drives and electric power systems.

Prerequisites
ECE 2160 Electronics 2E
ECE 3720 Electric Power and Machines

Course Content
The following topics will be covered:
- Electric circuit and Fourier series (review only)
- Power electronic devices, ratings, control and protection
- DC-DC converters
- Uncontrolled and controlled rectifiers
- AC voltage controllers and cycloconverters
- Voltage source converters
- Application areas:
  - Power systems
  - Motor drives

Accreditation Units
Mathematics: 0%
Natural Science: 0%
Complementary Studies: 0%
Engineering Science: 75%
Engineering Design: 25%

Web Page
http://ece.eng.umanitoba.ca/undergraduate/ECE4370

Textbook

Evaluation Details
The final course grade is determined by the student’s performance in assignments, laboratories, and examinations. Students must complete all the laboratories in order to be eligible to receive a passing grade.

Mid-Term
Friday, October 17, 2014, 6:00-8:00 PM (location TBA)

Instructor
Prof. S. Filizadeh
Room: E1-449 EITC
Telephone: (204) 480-1401
Email: shaahin.filizadeh@umanitoba.ca
Office Hours
Thursdays 3:00-4:00 PM.

Teaching Assistants
TBA

Voluntary Withdrawal Date
Wednesday, November 12th, 2014

Requirements/Regulations
- Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.

Academic Integrity
Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism or any other form of cheating in examinations, assignments, laboratory reports or term tests is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.

Learning Outcomes
1. Describe the characteristics of power semiconductor devices and identify suitable switch choices for a given application
2. Analyze controlled and uncontrolled single- and three-phase rectifiers, and cycloconverters.
3. Analyze dc-ac converters, and use pulse-width modulation techniques.
5. Explain power electronic applications in power systems and motor drives, and evaluate suitable converter types of a given application.

Expected Competency Level **

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Attribute*</th>
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**Attributes:**
A1 A knowledge base for engineering
A2 Problem analysis
A3 Investigation
A4 Design
A5 Use of engineering tools
A6 Individual and team work
A7 Communication skills
A8 Professionalism
A9 Impact of engineering on society/environment
A10 Ethics and equity
A11 Economics and project management
A12 Life-long learning

**Competency Levels:**
1 - Knowledge (Able to recall information)
2 - Comprehension (Able to rephrase information)
3 - Application (Able to apply knowledge in a new situation)
4 - Analysis (Able to break problem into its components and establish relationships)
5 - Synthesis (Able to combine separate elements into whole)
6 - Evaluation (Able to judge of the worth of something)

**Student Contact Time (Hrs)**
- Lectures: 3 hrs lecture/week $\times$ 13 weeks/term = 39 hrs
- Laboratories: 3 hrs laboratory $\times$ 5 weeks = 15 hrs
- Tutorials: 0 hr tutorial $\times$ 0 weeks = 0 hrs

**Evaluation**

<table>
<thead>
<tr>
<th>Component</th>
<th>Value (%)</th>
<th>Methods of Feedback *</th>
<th>Learning Outcomes Evaluated</th>
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<td>Assignments + Quizzes</td>
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<td>F,S</td>
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<td>Laboratories</td>
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<td>Final Examination</td>
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<td>S</td>
<td>1,2,3,4,5</td>
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* Methods of Feedback: F - *formative* (written comments and/or oral discussion), S - *summative* (number grades)