Course Objectives
The objective of this course is to introduce elementary concepts in AC circuits, electric machines, and digital subsystems. Topics include electrical impedance, capacitors, inductors, electric motors and generators, logic gates, decoders, multiplexing, flip flops, registers, microprocessor structures, I/O and data acquisition.

Prerequisites
ENG 1450 Introduction to Electrical and Computer Engineering
MATH 2132 Engineering Mathematical Analysis 2

Course Content
The following topics will be covered:
- Introduction to digital devices
- Digital systems: basic computer model; input and output; and microcontroller hardware and software
- Basics of linear direct current circuits
- DC machines
- Basics of linear alternating current circuits
- AC machines

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

Web Page
https://universityofmanitoba.desire2learn.com/

Textbook
*Elements of Electric Machines and Digital Systems*, Blair Yoshida, 2013 (available from instructor)

Other References
*Electronics: Circuits & Devices*, by Ralph J. Smith
(These reference texts will be available through Library Reserve).

Evaluation Details
Students must receive a minimum of 50% on the final examination in order to be eligible to receive a passing grade. Programmable calculators are not allowed in the mid-terms and final examinations. Students must complete all the laboratories in order to be eligible to receive a passing grade.

Mid-Term
Wednesday, November 5, 2014, 6:00-8:00 PM (location TBA)
Instructors
Mohammad Asefi
Room: E3-522 EITC
Telephone: (204) 474-6805
Email: asefim@cc.umanitoba.ca

Blair Yoshida, P.Eng
Room: E3-411 EITC
Telephone: (204) 480-1402
Email: Blair.Yoshida@umanitoba.ca

Office Hours
By appointment

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. Understanding the operation of basic digital circuits, and the ability to describe and design basic digital circuits.
2. Understanding how basic digital circuits can be combined into a programmable digital system, and the interfacing to and code execution of these systems.
3. Understanding the basic construction, operation, and terminal analysis of a DC machine.
4. Understanding the basic construction, operation, and terminal analysis of an AC machine.

Expected Competency Level **

<table>
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<tr>
<th>Learning Outcome</th>
<th>A1</th>
<th>A2</th>
<th>A3</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 × 13 weeks/term = 39 hrs
- Laboratories: 3 hrs laboratory × 5 weeks = 15 hrs
- Tutorials: 0 hr tutorial × 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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<tr>
<td>Assignments</td>
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<td>F, S</td>
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* Methods of Feedback: F - formative (written comments and/or oral discussion), S - summative (number grades)