ECE 3010 – Elements of Electric Machines & Digital Systems

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

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.

Textbook
*Elements of Electric Machines and Digital Systems*, Blair Yoshida, 2016 (available from instructor).

Other Resources
*The 68HC11 Microcontroller*, by J.D. Greenfield.
*Digital Design* by Morris Mano.
*Electronics: Circuits & Devices* by Ralph J. Smith.
(These reference texts will be available through Library Reserve.)

Requirements and 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 the University’s General Academic Regulations, as well as Section 3 of the Faculty of Engineering Academic 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.
- Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g. Academic Integrity, Respectful Behaviour, Examinations and related matters.

Instructor
- Mohammad Asefi, Ph.D.
  E3-522 EITC
  Mohammad.Asefi@umanitoba.ca

Office Hours
- By appointment

Teaching Assistant
- Max Hughson
  hughsonmj@myumanitoba.ca
- Sajad Mirzaie
  mirzaei1@myumanitoba.ca
- Narges Zarean Shahraki
  zareansn@myumanitoba.ca

Contact Hours
- 4 credit hours
- Lectures: 3 hours x 13 weeks = 39 hours
- Laboratories: 3 hours x 5 weeks = 15 hours

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

Course Website:
http://ece.eng.umanitoba.ca/undergraduate/ECE3010/

Important Dates
- **Term Test**
  October 24th, 2019
  6:00PM – 8:00PM
- **Voluntary Withdrawal Deadline**
  November 18th, 2019
- **Thanksgiving Day**
  October 14th, 2019
  No classes or examinations
- **Remembrance Day**
  November 11th, 2019
  No classes or examinations
- **Fall Term Break**
  November 12th–15th, 2019
  No classes or examinations

Faculty of Engineering
Department of Electrical and Computer Engineering
Learning Outcomes

1. Understand 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 Levels

<table>
<thead>
<tr>
<th>Outcome</th>
<th>KB</th>
<th>PA</th>
<th>IN</th>
<th>DE</th>
<th>ET</th>
<th>IT</th>
<th>CS</th>
<th>PR</th>
<th>IE</th>
<th>EE</th>
<th>EP</th>
<th>LL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Evaluation

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-term test and final examination. Students must complete all laboratories to be eligible to receive a passing grade.

Component | Value (%) | Method of Feedback | Learning Outcomes Evaluated |
---|---|---|---|
Assignments | 5 | F, S | 1, 2, 3 |
Quizzes | 10 | F, S | 1, 2, 3, 4 |
Laboratories | 10 | F | 1, 2, 3, 4 |
Term Test | 25 | F, S | 1, 2 |
Final Examination | 50 | S | 1, 2, 3, 4 |

* Method of Feedback: F - Formative (written comments and/or oral discussion), S - summative (numerical grade)

CEAB Graduate Attributes Assessed

KB.3 – Recalls and defines, and/or comprehends and applies information, first principles, and concept in fundamental engineering science.
IN.3 – Interprets results and reaches appropriate conclusions.

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 on Academic Integrity, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

Retention of Student Work

Students are advised that copies of their work submitted in completing course requirements (i.e. assignments, laboratory reports, project reports, test papers, examination papers, etc.) may be retained by the instructor and/or the department for the purpose of student assessment and grading, and to support the ongoing accreditation of each Engineering program. This material shall be handled in accordance with the University’s Intellectual Property Policy and the protection of privacy provisions of The Freedom of Information and Protection of Privacy Act.
(Manitoba). Students who do not wish to have their work retained must inform the Head of Department, in writing, at their earliest opportunity.