ENGINEER 2MM3
Electrical Circuits & Power
Fall 2017
Course Outline

COURSE DESCRIPTION

Fundamentals of electromechanical energy conversion. Motors and generators, transformers, single and three-phase power circuits, three-phase induction motor, power measurements.

PRE-REQUISITES AND ANTI-REQUISITES

Prerequisites: Physics 1E03, and registration in Math 2M06, or Math 2P04 and 2Q04; and registration in the Faculty of Engineering
Antirequisites: ENGINEER 3M03

SCHEDULE

Lectures: Tuesday, Friday 8:30AM – 9:20AM, BSB B136
Tutorials: T01 Tuesday 10:30AM- 11:20AM at JHE 326H; T02: Thursday 13:30PM – 14:20PM at BSB 136
Labs: None

INSTRUCTOR OFFICE HOURS AND CONTACT INFORMATION

Dr. Matiari Howlader
ITB-A216
mrhowlader@ece.mcmaster.ca
ext. 26647

Office Hours:
Tuesday: 12:30PM - 14:00 PM (By appointment)

TEACHING ASSISTANT OFFICE HOURS AND CONTACT INFORMATION

Mehrsad Kafi
ITB-A301
kafim1@mcmaster.ca
905-525-9140 ext. 27935
Mondays: 17:00PM - 18:00 PM at ITB-A301

Nickolas Leahey
ITB-A204
leaheynk@ece.mcmaster.ca
905-525-9140 ext. 24087
Wednesdays: 17:00PM - 18:00 PM at ITB-A204

Arghyadeep Sarkar
ITB-A301
sarkaa5@mcmaster.ca
905-525-9140 ext. 27935
Fridays: 17:00PM - 18:00 PM at ITB-A301
COURSE WEBSITE/ALTERNATE METHOD OF COMMUNICATION
Course materials will be posted on Avenue to Learn (http://avenue.mcmaster.ca/). Copies of the lecture overheads for each week will be posted on the prior Friday.

COURSE OBJECTIVES
Upon completion of this course, students will be able to analyze, model, and predict the performance of ac power devices and systems including single-phase and balanced three-phase systems, transformers, and ac generators and motors.

KNOWLEDGE LINK
This level I course builds on the concepts of electricity and magnetic fields covered in Physics 1E03. Practical aspects of electric and magnetic power circuits are introduced and applied to the analysis of electric machines.

COURSE MATERIALS
Required Text Book: None
Calculator: Only the McMaster Standard Calculator will be permitted in tests and examinations. This is available at the Campus Store.
Reference Books:

COURSE OVERVIEW

<table>
<thead>
<tr>
<th>Topic</th>
<th>Readings</th>
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<tbody>
<tr>
<td>1. Fundamentals of Magnetic Circuits;</td>
<td>Chapman 1.4-1.5 and Skvarenina and William E. Dewitt-Chapter 4</td>
</tr>
<tr>
<td>2. Fundamentals of Electrical Circuits, Phasors;</td>
<td>Skvarenina and William E. Dewitt- Page 63-80</td>
</tr>
<tr>
<td>3. Power in AC Circuits;</td>
<td>Chapman 1.9 and Skvarenina and William E. Dewitt- Page 70-82</td>
</tr>
<tr>
<td>4. Transformers;</td>
<td>Chapman 2.1-2.6</td>
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<tr>
<td>5. AC Generators;</td>
<td>Chapman 3.1-3.3</td>
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<td>6. Active, Reactive and Apparent Power</td>
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<tr>
<td>(single phase) Balanced Three-Phase Circuits;</td>
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<tr>
<td>7. Three-phase Induction Motors;</td>
<td>Skvarenina &amp; William E. Dewitt- Chapter 7</td>
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ACCREDITATION LEARNING OUTCOMES

Note: The Learning Outcomes defined in this section are measured throughout the course and form part of the Department’s continuous improvement process. They are a key component of the accreditation process for the program and will not be taken into consideration in determining a student’s actual grade in the course. For more information on accreditation, please ask your instructor or visit: http://www.engineerscanada.ca.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Indicators</th>
<th>Measurement Methods</th>
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<tbody>
<tr>
<td>Can recognize and discuss fundamentals of electromechanical energy conversion</td>
<td>3.1</td>
<td>Quizzes, tests</td>
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<tr>
<td>Can recognize and follow engineering design processes for magnetic and electrical circuits</td>
<td>4.1</td>
<td>Quizzes, tests</td>
</tr>
<tr>
<td>Applies knowledge of operating principles of transformers, electrical generators and motors</td>
<td>4.2</td>
<td>Quizzes, tests</td>
</tr>
<tr>
<td>Can describe and apply relationships between magnetic and electric fields</td>
<td>4.6</td>
<td>Quizzes, tests</td>
</tr>
<tr>
<td>Can analyze, model and extract parameters in DC and AC electrical circuits</td>
<td>1.1, 2.2</td>
<td>Quizzes, tests</td>
</tr>
<tr>
<td>Can describe and analyze single phase and three-phase generators and induction motors</td>
<td>5.3</td>
<td>Quizzes, tests</td>
</tr>
</tbody>
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COURSE LOAD

2 lectures and one tutorial (one hour) per week, one term

ASSESSMENT

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Tutorial Attendance</td>
<td>3%</td>
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<tr>
<td>3 Quizzes (during tutorials, to be announced one week prior to the quiz)</td>
<td>12%</td>
</tr>
<tr>
<td>2 Midterm Examination (1.5 hrs. each, closed book)</td>
<td>35%</td>
</tr>
<tr>
<td>Final Examination (2.5 hrs, closed book)</td>
<td>50%</td>
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ACCREDITATION MEASUREMENTS

As part of the accreditation process for our undergraduate degrees, the Department is engaging in a “continuous improvement” process, part of which involves the assessment of the development of desirable attributes amongst a student cohort as a whole. This process is independent of the grading of individual students. In this course, indicators related to the development of the following attributes will be measured: Knowledge Base for Engineering, Problem Analysis, Investigation, Design, Individual and Team Work, Communication Skills, Professionalism, Impact of Engineering on Society and the Environment, Ethics and Equity, Life-long Learning and Sustainability.
Senate Policies for Academic Integrity

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at http://www.mcmaster.ca/academicintegrity

The following illustrates only three forms of academic dishonesty:
1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

Academic Accommodation

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University’s Policy for Academic Accommodation of Students with Disabilities - http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf

Notification of Student Absence and Submission of Request for Relief for Missed Academic Work

In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work": http://www.mcmaster.ca/msaf/.

Notice Regarding Possible Course Modification

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes. The instructor reserves the right to choose the format of any deferred midterms or deferred final exams (i.e. format may be written or oral).

THE END