

ENGINEER 2MM3
Electrical Circuits & Power

COURSE OUTLINE

Please refer to course website for updated information.

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

Prerequisite(s): Physics 1E03, and registration in Math 2M06, or Math 2P04 and 2Q04; and registration in the Faculty of Engineering
Antirequisite(s): ENGINEER 3M03

SCHEDULE

Lecture: Monday, Thursday 3:30PM – 4:20PM, JHE 264
Tutorial: T01: Monday 1:30PM- 2:20PM at BSB 119
T02: Tuesday 12:30PM – 1:20PM at BSB 119
Lab: None

INSTRUCTOR

Dr. Matiar Howlader
Email: mrhowlader@ece.mcmaster.ca
Office: ITB-A216
Phone: 905-525-9140 ext. 26647
Office Hours: Thursdays: 4:30PM - 5:20 PM

TEACHING ASSISTANTS

Contact information and office hours are provided on the course website.

TAs for this course are:

- Xiao, Dianxun
- Younus, Ali
- Maksud. Alam

COURSE WEBSITE/S

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

By the end of this course, students should 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

ASSUMED KNOWLEDGE

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 Texts:

None

Calculator:

Only the McMaster Standard Calculator (Casio fx-991 MS or MS Plus) will be permitted in tests and examinations. This is available at the Campus Store.

Reference Books:

S.J. Chapman, Electric Machinery Fundamentals, McGraw Hill, Fifth Edition, 2012.

COURSE OVERVIEW

Week	Topic	Readings
1	Electrical Circuits and Elements	
2	Fundamentals of Electrical Circuits – 1	
3	Fundamentals of Electrical Circuits – 2	
4	Complex Numbers and Phasors	
5	Impedance in AC Circuits	Chapman 2.3
6	Magnetic Fields and Circuits	Chapman 1.4
7	Properties of Magnetic Materials	Chapman 1.4–1.5
8	FIRST MID-TERM TEST (IN CLASS)	

9	Simple Machines	Chapman 1.6 – 1.8
10	Power in Single-Phase AC Circuits	Chapman 1.9
11	Transformers -1	Chapman 2.1 – 2.5
12	Transformers - 2	Chapman 2.6, 2.12
13	Three-Phase Circuits	Chapman Appendix A
14	Basic Machinery	Chapman 3.1
15	AC Machinery	Chapman 3.2
16	SECOND MID-TERM TEST (IN CLASS)	
17	Synchronous Generators	Chapman 4.1 – 4.10
18	Synchronous Motors	Chapman 5.1 – 5.5
19	Induction Motors	Chapman 6.1 – 6.4
20	DC Machinery	Chapman 7.1
21	DC Motors	Chapman 8.1 – 8.6
22	Special Motors	Chapman 9.1, 9.3, 9.6
23	SPARE FOR REVIEW CLASS	
24	SPARE FOR REVIEW CLASS	

A more detailed time line is available on the course web site.

At certain points in the course it may make good sense to modify the schedule. The instructor may modify elements of the course and will notify students accordingly (in class, on the course website).

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> .

Outcomes	Indicators	Measurement Method(s)
Can recognize and discuss fundamentals of electromechanical energy conversion	3.1	Assignments, tests
Can recognize and follow engineering design processes for magnetic and electrical circuits	4.1	Assignments, tests
Applies knowledge of operating principles of transformers, electrical generators and motors	4.2	Assignments, tests
Can describe and apply relationships between magnetic and electric fields	4.6	Assignments, tests

Can analyze, model and extract parameters in DC and AC electrical circuits	1.1, 1.2	Assignments, tests
Can describe and analyze single phase and three-phase generators and induction motors	5.3	Assignments, tests

ASSESSMENT

Component	Weight
4 Assignments	10 %
2 Mid-term Tests (50 mins each, closed book)	40 %
Final Examination (2 hrs, closed book)	50 %
Total	100 %

No make-up midterm tests will be granted. Weight of a missed midterm test will be transferred to final exam.

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 www.mcmaster.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:

- Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- Improper collaboration in group work.
- Copying or using unauthorized aids in tests and examinations.

ACADEMIC ACCOMMODATIONS

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. 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 Academic Accommodation of Students with Disabilities policy.

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to the Engineering Student Services office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations.

Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

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".

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

www.eng.mcmaster.ca/ece