ELEC ENG 2MM3
Electrical Circuits and Power

COURSE OUTLINE

Please refer to course website for updated information.

COURSE DESCRIPTION

Fundamentals of electromechanical energy conversion. Motors and generators, transformers, single and polyphase power circuits, synchronous and induction machines, power measurements.

PRE-REQUISITES AND ANTI-REQUISITES

Pre-requisite(s): PHYSICS 1E03; MATH 2Z03
Anti-requisite(s): ENGINEER 3M03; ENGINEER 2MM3

SCHEDULE AND MODE OF DELIVERY

Lectures:	Tuesday & Thursday	5:30 - 6:20 PM
Tutorial:	Friday	9:30 - 10:20 AM
Labs:	None	

The material for this course will be delivered in person and therefore attendance is required.

INSTRUCTOR

Dr. Mahmoud Maghrabi
Email: maghrabm@mcmaster.ca
Office:N/A
Office Hours: Fridays (3:30 pm – 4:30 pm)

TEACHING ASSISTANTS

Names, contact information and office hours are provided on the course website.

COURSE WEBSITE

The Course Management System will be **Avenue to Learn**. The student is required to **check the system daily** for assignment, course related material, and posted announcements.
http://avenue.mcmaster.ca/

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.

CEAB GRADUATE ATTRIBUTES (GAS)

Note: The CEAB Graduate Attributes (GAs) 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

Attributes	Indicators		Measurement Method(s)
	Number	Description	
Knowledge Base for Engineering	1.3	Competence in engineering fundamentals	exam
Problem Analysis	2.1	Identifies and states reasonable assumptions and suitable engineering fundamentals, before proposing a solution path to a problem.	exam
Investigation	3.1	Selects appropriately from relevant knowledge base to plan appropriate data collection methods and analysis strategies.	exam
Design	4.2	Explores a breadth of potential solutions, considering their benefits and trade-offs as they relate to the project requirements.	exam
Use of Engineering Tools	5.1	Evaluates engineering tools, identifies their limitations, and selects, adapts, or extends them appropriately.	exam

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 MATERIAL

Required Text:

- Textbook: *"Electric Machinery Fundamentals"* by Stephen J. Chapman, McGraw---Hill, 5th edition, 2012, ISBN: 9780073529547.

Optional Texts: (these are the course references):

- "*Basic Engineering Circuit Analysis"*, By: J.D. Irwin, R.M. Nelms, eleventh edition, Wiley, 2011.

Calculator:

- Any calculator can be used on quizzes, tests and examinations.

COURSE OVERVIEW

Week	Topic
1	Course Introduction
2	Resistive Circuits Analysis
3	Complex Numbers and AC Circuit Steady Analysis
4-5	Three-phase AC Circuit Analysis
6	Introduction to Energy Conversion
7 – 8	Transformers
9	Fundamentals of AC machines
10-11	Synchronous Generators
12	Induction Motors
13	Other machines

A more detailed time line is available on the course website.

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).

ASSESSMENT

Course Evaluation:

Components	Weight
Quizzes and/or Assignments	15%
Midterm Exam (two 1-hour exams)	35%
Final Exam (2.5 hours, scheduled and supervised by the registrar)	50%
Total	**100%**

Grading and Evaluation Policies

- No make-up/deferred quizzes/mid-terms. With MSAF filed, the weight of a missed mid-term/quiz test is transferred to that of the final exam.
- **Late submissions of Assignments** are subject to **20%** penalty per day (less than one day is counted as one day).

Note:

The instructor(s) reserves the right to choose the format (i.e. written or oral) of any deferred midterm or exam in this course. Please note that announcements concerning any type of graded material may be in any format (e.g., announcements may be made only in class). Students are responsible for completing the graded material regardless of whether they received the announcement or not.

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. It is your responsibility to understand what constitutes academic dishonesty.

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. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at https://secretariat.mcmaster.ca/university-policies-proceduresguidelines/

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.

AUTHENTICITY / PLAGIARISM DETECTION

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online. It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

ACADEMIC ACCOMMODATIONS

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. 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 should submit their request to their Faculty 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.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC WORK

McMaster Student Absence Form (MSAF): 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.