

Course Outline (F2025)

EES512: Electric Circuits

Instructor(s)	Sudip Nag [Coordinator] Office: EPH 400Q Phone: TBA Email: sudip.nag@torontomu.ca Office Hours: Tuesdays 11 a.m. to 01.00 p.m. (https://torontomu.zoom.us/j/91648468354)
Calendar Description	This one-semester lecture/lab course covers general electric circuit parameters and laws. Topics include: basic electric circuits, voltage and current sources, resistance, analysis of DC circuits, power considerations. Concepts of capacitance, inductance, and their transient behaviour. Introduction of AC sources, phasors, reactance and impedance, AC analysis of RC, RL, and RCL circuits, the effect of resonance, real and complex power in reactive loads.
Prerequisites	MTH140 and MTH141
Antirequisites	None
Corerequisites	None
Compulsory Text(s):	<ol style="list-style-type: none"> 1. EES512 Laboratory: Laboratory Manual by A. O'Halloran and K. Raahemifar, posted online on D2L Brightspace. 2. Web Pages: EES 512 D2L Brightspace
Reference Text(s):	<ol style="list-style-type: none"> 1. Text Book: Fundamentals of Electric Circuits, 7th Edition by C. K. Alexander & M.N. Sadiku, published by McGraw-Hill. Chapter 1 - 4, 6 - 11. 2. Reference Book (relevant chapters, as per the outline): Electrical Engineering Principles and Applications, 7th edition by Allen R Hambley, Publisher: Pearson, ISBN: 978-1-269-05525-3. 3. EES-512: Lecture Notes, The lecture notes will be available on D2L Brightspace.
Learning Objectives (Indicators)	<p>At the end of this course, the successful student will be able to:</p> <ol style="list-style-type: none"> 1. Understand, interpret, articulate, and apply the basic voltage and current laws in the identification, formulation, and solution of the basic problem of circuit analysis. (1a) 2. Develop linear equations based on different circuit configurations. Solve linear equations using variable elimination or Cramer rule. (1b) 3. Conduct experiments using the basic principles of circuit analysis and analyze and interpret the obtained results. (2a) 4. Use current and voltage measurement instruments, including volt/current meters and oscilloscope to measure the voltage and current characteristics of various circuits. (5a) <p>NOTE: Numbers in parentheses refer to the graduate attributes required by the Canadian Engineering Accreditation Board (CEAB).</p>

Course Organization	3.0 hours of lecture per week for 13 weeks 2.0 hours of lab per week for 12 weeks 0.0 hours of tutorial per week for 12 weeks																
Teaching Assistants	Hamed Mohammadkazemi (hmohammadkazemi@torontomu.ca) Anahita Abbasnejad Seresti (aseresti@torontomu.ca)																
Course Evaluation	<table border="1" data-bbox="427 380 1352 848"> <thead> <tr> <th colspan="2" data-bbox="427 380 1352 441">Theory</th> </tr> </thead> <tbody> <tr> <td data-bbox="427 441 1177 499">Quizzes (in tutorial)</td> <td data-bbox="1177 441 1352 499">10 %</td> </tr> <tr> <td data-bbox="427 499 1177 558">Mid term</td> <td data-bbox="1177 499 1352 558">30 %</td> </tr> <tr> <td data-bbox="427 558 1177 617">Final Exam</td> <td data-bbox="1177 558 1352 617">40 %</td> </tr> <tr> <th colspan="2" data-bbox="427 617 1352 678">Laboratory</th> </tr> <tr> <td data-bbox="427 678 1177 737">Lab Tests</td> <td data-bbox="1177 678 1352 737">10 %</td> </tr> <tr> <td data-bbox="427 737 1177 795">Lab Reports</td> <td data-bbox="1177 737 1352 795">10 %</td> </tr> <tr> <td data-bbox="427 795 1177 848">TOTAL:</td> <td data-bbox="1177 795 1352 848">100 %</td> </tr> </tbody> </table> <p data-bbox="310 905 1458 1083">Note: In order for a student to pass a course, a minimum overall course mark of 50% must be obtained. In addition, for courses that have both "Theory and Laboratory" components, the student must pass the Laboratory and Theory portions separately by achieving a minimum of 50% in the combined Laboratory components and 50% in the combined Theory components. Please refer to the "Course Evaluation" section above for details on the Theory and Laboratory components (if applicable).</p>	Theory		Quizzes (in tutorial)	10 %	Mid term	30 %	Final Exam	40 %	Laboratory		Lab Tests	10 %	Lab Reports	10 %	TOTAL:	100 %
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Examinations	<p data-bbox="310 1167 1463 1255">1. The midterm is scheduled on October 20, 2025 , 12.00 pm to 2.00 pm (2 hours), outside regular lecture hours. It will be a closed book exam and of 2 hours duration. The location will be announced later.</p> <p data-bbox="310 1289 1463 1377">2. The official final exam will be announced by the timetabling department. The final exam includes materials discussed from the beginning to the end. It will be a closed book exam and of 3 hours duration.</p> <p data-bbox="310 1411 1435 1465">Note: Refer to the course webpage on D2L Brightspace for updated information on the Midterm and Final Exam schedule and coverage.</p>																
Other Evaluation Information	<p data-bbox="310 1497 1463 1644">1. Students are encouraged to earn passing marks in both theory and lab components separately. In the absence of students lab portions with valid medical reasons and proper documents submitted and verified by students department, the grades will be shifted to final exam. As labs are hands-on, earning lab grades during the term is a lot simpler than compensating lab grades in final exam. Lab reports should be handed in the week after the labs.</p> <p data-bbox="310 1677 1458 1913">2. The lab tests are conducted individually. There are two lab tests (for laboratory components). The first lab test is conducted after labs 1 to 3 are completed. It is worth 50% of lab tests marks. The second lab test is conducted after labs 4 and 5 are completed. It is worth another 50% of lab tests marks. Lab tests are scheduled for one hour per person and have small pre-lab, implementation, and post- lab reports handed in. These test reports are written per person, will be marked and posted online. There is no question asked policy for lab tests. Students must use actual lab sessions as their practice run, as there is no practice lab session (or make-up labs, or extra time) prior to the tests.</p> <p data-bbox="310 1946 1382 1976">3. Only university-approved calculators are allowed. Only the non-programmable approved</p>																

	calculator (e.g., Sharp EL546 or Casio FX-991MS and their later models) will be allowed. Also, both midterm and final exams are 'no question-asked' exams.
Teaching Methods	In-person (classes, labs, and exams).
Other Information	<ol style="list-style-type: none"> 1. Lectures will be held in-person in the designated classroom (ARC108 Classroom; Mondays; 3:00PM - 6:00PM). 2. The In-Lab Work to be undertaken in-person in the designated laboratory room. 3. Office hours will be online. The link will be shared later. 4. Please carefully check your schedule for location of the lecture and lab classes. Lab attendance is mandatory.

Course Content

Week	Hours	Chapters / Section	Topic, description
1-2	12	1, 2, course notes	Introduction to EES512: scope and objectives course management. Basic concepts charge, current, voltage, power, energy, Kirchhoff's current law and voltage law, Ohm's Law, combination of resistors ,resistive circuits
3-4	12	3, 4, course notes	Series and parallel circuits, voltage and current divisions, circuit reduction, Nodal, Mesh Nodal and Mesh analysis, Thevenin and Norton theorems, Source Transformation, Superposition principles, Wheatstone bridge, ideal and real voltage sources and Maximum power transfer theorem
5	3	6, 7, course notes	Capacitance practical capacitors series and parallel connections transients in RC circuits. Self-inductance series and parallel connections transients in RL circuits time constants and graphical representations.
5-6	12	9, 10, 11, course notes	Generation of AC voltages parameters of AC waveforms average and effective (RMS) values review of complex number algebra phasor representation impedance and admittance capacitive and inductive reactance.
7	3	7,8, course notes	Series R-L R-C and R-L- C loads general series-parallel AC circuits. Phasor analysis of AC currents voltage and phase shifts. AC Power Analysis

Laboratory(L)/Tutorials(T)/Activity(A) Schedule

Week	L/T/A	Description
1	No Lab	(Sep. 08, 2025) No Lab /Tutorial
2	Lab 1 Tutorial 1 & Quiz 1	(Sep. 15, 2025) Tutorial 1 and Quiz 1
3	Lab 2 Tutorial 2 & Quiz2	(Sep. 22, 2025) Lab 1.1 Ohm's Law (Sep. 22, 2025) Lab 1.2 Series Circuit and Kirchhoff's Voltage Law Lab 1.3 Parallel Circuits and Kirchhoff's Current Law
4	Lab 3 Tutorial 3 & Quiz3	(Sep. 29, 2025) Tutorial 2 & Quiz 2
5	Lab Test 1 Tutorial 4 and Quiz 4	(Oct. 06, 2025) Lab 2 Nodal Analysis
6	Lab 4, Lab 5	(Oct. 20, 2025) Lab 3.1 Thevenin Theorem Lab 3.2 power Transfer
7	Lab Test 2 Tutorial 5 and Quiz 5	(Oct. 27, 2025) Lab Test 1: Covering Labs 1, 2, and 3

University Policies & Important Information

Students are reminded that they are required to adhere to all relevant university policies found in their online course shell in D2L and/or on [the Senate website](#)

Refer to the [Departmental FAQ page](#) for further information on common questions.

Important Resources Available at Toronto Metropolitan University

- [The University Libraries](#) provide research [workshops](#) and individual consultation appointments. There is a drop-in Research Help desk on the second floor of the library, and students can use the [Library's virtual research help service](#) to speak with a librarian, or [book an appointment](#) to meet in person or online.
- [Student Life and Learning Support](#) offers group-based and individual help with writing, math, study skills, and transition support, as well as [resources and checklists to support students as online learners](#).
- You can submit an [Academic Consideration Request](#) when an extenuating circumstance has occurred that has significantly impacted your ability to fulfill an academic requirement. You may always visit the [Senate website](#) and select the blue radio button on the top right hand side entitled: Academic Consideration Request (ACR) to submit this request.

For Extenuating Circumstances, [Policy 167: Academic Consideration](#) allows for a once per semester ACR request without supporting documentation if the absence is less than 3 days in duration and is not for a final exam/final assessment. Absences more than 3 days in duration and those that involve a final exam/final assessment, always require documentation. Students must notify their faculty/contract lecturer once a request for academic consideration is submitted. See Senate [Policy 167: Academic Consideration](#).

Longer absences are not addressed through Policy 167 and should be discussed with your Chair/Director/Program to be advised on next steps.

- [FAQs Academic Considerations and Appeals](#)
- Information on Copyright for [Faculty/Contract Lecturers](#) and [students](#).

Lab Safety (if applicable)

Students are to strictly adhere and follow:

- a. The Lab Safety information/guidelines posted in the respective labs,
- b. provided in their respective lab handouts, and
- c. instructions provided by the Teaching Assistants/Course instructors/Technical Staff.

During the lab sessions, to avoid tripping hazards, the area around the lab stations should not be surrounded by bags, backpacks etc, students should place their bags, backpacks etc against the walls of the labs and/or away from their lab stations in such a way that it avoids tripping hazards.

Accessibility

- Similar to an [accessibility statement](#), use this section to describe your commitment to making this course accessible to students with disabilities. Improving the accessibility of your course helps minimize the need for accommodation.
- Outline any technologies used in this course and any known accessibility features or barriers (if applicable).
- Describe how a student should contact you if they discover an accessibility barrier with any course materials or technologies.

Academic Accommodation Support

Academic Accommodation Support (AAS) is the university's disability services office. AAS works directly with incoming and returning students looking for help with their academic accommodations. AAS works with any student who requires academic accommodation regardless of program or course load.

- Learn more about [Academic Accommodation Support](#).
- Learn [how to register with AAS](#).
- Learn about [Policy 159: Academic Accommodation of Students with Disabilities](#)

Academic Accommodations (for students with disabilities) and Academic Consideration (for students faced with extenuating circumstances that can include short-term health issues) are governed by two different university policies. Learn more about [Academic Accommodations versus Academic Consideration and how to access each](#).

Wellbeing Support

At Toronto Metropolitan University, we recognize that things can come up throughout the term that may interfere with a student's ability to succeed in their coursework. These circumstances are outside of one's control and can have a serious impact on physical and mental well-being. Seeking help can be a challenge, especially in those times of crisis.

If you are experiencing a mental health crisis, please call 911 and go to the nearest hospital emergency room. You can also access these outside resources at anytime:

- **Distress Line:** 24/7 line for if you are in crisis, feeling suicidal or in need of emotional support (phone: 416-408-4357)
- **Good2Talk:** 24/7-hour line for postsecondary students (phone: 1-866-925-5454)
- **Keep.meSAFE:** 24/7 access to confidential support through counsellors via [My SSP app](#) or 1-844-451-9700

If non-crisis support is needed, you can access these campus resources:

- **Centre for Student Development and Counselling:** 416-979-5195 or email csdc@torontomu.ca
- **Consent Comes First - Office of Sexual Violence Support and Education:** 416-919-5000 ext 3596 or email osvse@torontomu.ca
- **Medical Centre:** call (416) 979-5070 to book an appointment

We encourage all Toronto Metropolitan University community members to access available resources to ensure support is reachable. You can find more resources available through the [Toronto Metropolitan University Mental Health and Wellbeing](#) website.