Course Outline

Instructors

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Office Hours

- After lectures or by appointment

Teaching Assistants

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- Pandhittaya Noikorn
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- Quinn Thiessen
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Contact Hours

- 3 credit hours
- Lectures: 3 hours per week
- Laboratories: 3 hours x 10 weeks

Prerequisites:

- Minimum grade of 60% in Pre-Calculus Mathematics 40S, Physics 40S, and Chemistry 40S

Important Dates

- **Term Test**
  March 2nd, 2026
  6:30PM – 7:30PM
- **Voluntary Withdrawal Deadline**
  March 19th, 2026
- **Louis Riel Day**
  February 16th, 2026
  No classes or examinations
- **Spring Break**
  February 17th – 20th, 2026
  No classes or examinations
- **Good Friday**
  April 3rd, 2026
  No classes or examinations

ENG 1450 – Introduction to Electrical and Computer Engineering

Winter 2026

Course Objectives

This course introduces the fundamentals of electrical and computer engineering, including circuit analysis and selected topics on digital logic and electric motors. A number of standard electrical devices and components are presented in this course. The laboratory sessions involve the use of and familiarization with basic equipment and methods used in the workplace.

Course Content

The following topics will be covered:

- Fundamentals of electric circuits
- Kirchhoff's laws, voltage and current division, independent sources
- Capacitors and inductors
- Sinusoidal AC circuits
- Introduction to operational amplifiers, semiconductor devices, optical devices, electric motors
- Boolean logic, logic gates, combinational logic.

Textbook

Fundamentals of Electric Circuit Analysis: Select Chapters. University of Manitoba, ENG1450, Wiley, 2017 🔗
Hwang: Digital Logic Design. Select Chapters. University of Manitoba, ENG1450, Nelson, 2017 🔗

Learning Outcomes

1. Understand fundamental circuit theory and apply elementary circuit reduction and energy conservation techniques in the DC analysis of RLC circuits.
2. Apply circuit analysis techniques to solve electric circuits containing energy storage elements (L and C) in the sinusoidal AC steady state (phasor analysis).
3. Understand the representation of numbers in binary and hexadecimal notation and simple arithmetic operations in these bases. Understand basic Boolean algebra and logic, and apply this knowledge through the use of truth tables to design simple logic circuits from a written/verbal explanation of a problem.
4. Hands-on measurement and development of electric and digital circuits in a range of applications spanning the discipline.

Expected Competency Levels

Outcome	KB	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
1	I	D	I		D							
2	D	D	D		I							
3	I	I		D	I							
4	I	I	D	I	D	D	D		I		I	I

Traditional Territories Acknowledgement

The University of Manitoba campuses and research spaces are located on original lands of Anishinaabeg, Ininiwak, Anisininewuk, Dakota Oyate, Dene and Inuit, and on the National Homeland of the Red River Métis.

UM recognizes that the Treaties signed on these lands are a lifelong, enduring relationship, and we are dedicated to upholding their spirit and intent. We acknowledge the harms and mistakes of the past and the present. With this understanding, we commit to supporting Indigenous excellence through active Reconciliation, meaningful change, and the creation of an environment where everyone can thrive. Our collaboration with Indigenous communities is grounded in respect and reciprocity and this guides how we move forward as an institution.

Accreditation Details

Accreditation Units

- Mathematics: 0%
- Natural Science: 0%
- Complementary Studies: 0%
- Engineering Science: 100%
- Engineering Design: 0%

Graduate Attributes

KB: A knowledge base for engineering
PA: Problem analysis
IN: Investigation
DE: Design
ET: Use of engineering tools
IT: Individual and team work
CS: Communication skills
PR: Professionalism
IE: Impact of engineering on society/ environment
EE: Ethics and equity
EP: Economics and project management
LL: Life-long learning

Competency Levels

I - Introduced (Introductory)
D - Developed (Intermediate)
A - Applied (Advanced)

Evaluation

The final course grade is determined by the student's performance on assignments, in laboratories, and on tests and examinations.

Students must complete all laboratories and receive a minimum grade of 50% on the final examination in order to be eligible to receive a passing grade.

Component	Value (%)	Method of Feedback	Learning Outcomes Evaluated
Assignments	0	–	1, 2, 3
Quizzes	0	F, S	1, 2, 3, 4
Laboratories	20	F, S	1, 2, 3, 4
Term Test	30	F, S	1, 2, 4
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.

Student Absences

Attendance in lectures, tutorials, and laboratories is mandatory. For short-term absences due to illness or other extenuating circumstances of 120 hours (5 days) or less, students are required to complete a *Self-Declaration Form for Brief or Temporary Absence* available on the University website.🔗 This form must be submitted to the course instructor within 48 hours of the absence. (No additional documentation is required.)
Note that students are responsible to complete any missed work and must consult with the instructor to make appropriate arrangements.
For absences longer than 120 hours, students must contact the instructor and ECE Undergraduate Advisor, Tammy Holowachuk (Tammy.Holowachuk@umanitoba.ca) for further instructions.

Deferred Final Examinations

Students who miss the regular scheduled writing of a final examination, for valid medical or compassionate reasons, may be given the opportunity to write a deferred examination, subject to approval by the Associate Dean (Undergraduate). All requests for a deferred examination must be made within 48 hours of the missed examination, and must follow the procedure described on the Faculty website, without exception. Course instructors do not have the discretion to grant deferred final examinations.
(https://umanitoba.ca/engineering/student-experience#engineering-student-policies)

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). This includes the unauthorized use of AI when preparing course deliverables. A student found guilty of contributing to cheating by another student is also subject to serious academic penalty. Integrity also applies to respecting copyrighted course content, which should not be distributed without the creator's permission. Uploading content for the purpose of transcription or other AI-enabled features is commonly a violation of the copyright holder's rights.

Grading Scale

Letter	Mark
A+	95–100
A	85–94
B+	80–84
B	70–79
C+	65–69
C	55–64
D	45–54
F	< 45

Note: These boundaries represent a guide for the instructor and class alike. Provided that no individual student is disadvantaged, the instructor may vary any of these boundaries to ensure consistency of grading from year-to-year.

Copyright Notice

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.

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 passing final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if they are uncertain about their standing in the course and about their potential for receiving a failing grade. Students should also familiarize themselves with the University's *General Academic Regulations* 🔗, as well as the Price Faculty of Engineering *Academic Regulations* 🔗 dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, smart phones, smart watches, 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.

🔗 *Supplemental Resources*