ECE 2262 – Electric Circuits

IMPORTANT NOTICE – In-Person Laboratories

This course will be delivered using online lectures and in-person laboratories. Students are required to pre-screen themselves before travelling to campus for their laboratory and must not attend the campus if they are experiencing any COVID-19 symptoms or if they have been in contact with someone who has tested positive for COVID-19.

In addition, the University requires that all students must be fully vaccinated (first dose by Sept 22nd, second dose by October 31st). As well, students must wear a face mask at all times while attending the laboratory and in all common indoor spaces on campus, or whenever social distancing cannot be maintained. For further information, please visit the UofM COVID-19 Resources website (https://umanitoba.ca/coronavirus/recovery).

Course Objectives

The application of circuit concepts; network theorems and formal methods, steady state analysis, frequency and transient response, application of the Laplace transform in the analysis of linear time-invariant networks, and circuits using operational amplifiers.

Course Content

The following topics will be covered:

- Circuit analysis techniques, network theorems and formal methods.
- Introduction to the operational amplifiers.
- Storage energy elements, transient behaviour.
- First and second order circuits’ transient response.
- Sinusoidal steady state analysis and steady state response.
- Steady state analysis using phasors.
- Maximum power transfer and the ideal transformer.
- Frequency response: introduction to filters.

Textbook:

None. Online resources will be supplied.

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). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

Learning Outcomes

1. Comprehend and apply general circuit-analysis theorems and techniques.
2. Analyze circuits with energy storage elements, ideal op amps, and ideal transformers.
4. Analyze circuits in the sinusoidal steady state, perform steady-state power analysis, and calculate maximum power transfer.
5. Determine and analyze frequency response of RLC circuits.

Course Website:

https://umanitoba.ca/umlearn

Traditional Territories Acknowledgement

The University of Manitoba campuses and the Department of Electrical and Computer Engineering are located on the original lands of the Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the Métis Nation. We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.

Updated: September 14, 2021
### Expected Competency Levels

| Outcome | KB | PA | IN | DE | ET | IT | CS | PR | IE | EE | EP | LL |
|---------|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1       | 4  | 4  | 3  | 3  | 3  | 1  |     |    |    |    |    |    | 1  |
| 2       | 4  | 4  | 3  | 3  | 1  |    |    |    |    |    |    |    | 2  |
| 3       | 3  | 3  | 3  | 2  | 1  |    |    |    |    |    |    |    | 2  |
| 4       | 4  | 4  | 3  | 3  | 1  |    |    |    |    |    |    |    | 2  |
| 5       | 3  | 3  | 3  | 2  | 1  |    |    |    |    |    |    |    | 2  |

### Evaluation

Students must receive a minimum of 50% on the final examination in order to be eligible to receive a passing grade. Students who are unable to write term tests for medical (or other acceptable) reasons will have their final examination weighted to include the term test weighting. Students must complete all the laboratories in order to be eligible to receive a passing grade.

#### Component
- **Quizzes (Best 5 of 6)**: Value (%) 30, Method of Feedback F, S, Learning Outcomes Evaluated 1, 2, 3, 4, 5
- **Laboratories**: Value (%) 15, Method of Feedback F, S, Learning Outcomes Evaluated 1, 2, 3, 4, 5
- **Final Examination**: Value (%) 55, Method of Feedback S, Learning Outcomes Evaluated 1, 2, 3, 4, 5

* 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.1** – Gathers information (literature review, measurements, experiments, laboratory exercises) and analyzes data.

### 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 final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with the University’s General Academic Regulations, as well as Section 3 of the Faculty of Engineering Academic Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, 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.

### Copyright Notice

All materials provided in this course are copyright and are provided under the fair dealing provision of the Canadian Copyright Act. This material may not be redistributed in any manner without the express written permission of the relevant copyright holder.
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.

**Grading Scale**

<table>
<thead>
<tr>
<th>Letter</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>95–100</td>
</tr>
<tr>
<td>A</td>
<td>85–94</td>
</tr>
<tr>
<td>B+</td>
<td>80–84</td>
</tr>
<tr>
<td>B</td>
<td>70–79</td>
</tr>
<tr>
<td>C+</td>
<td>65–69</td>
</tr>
<tr>
<td>C</td>
<td>55–64</td>
</tr>
<tr>
<td>D</td>
<td>45–54</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 45</td>
</tr>
</tbody>
</table>

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.