University of Manitoba

Department of Electrical & Computer Engineering
Graduate Course Outline

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

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.

WINTER 2026

ECE 7440 (T03) – Advanced Transmission Line Theory

COURSE DESCRIPTION:

This course covers advanced topics in transmission line theory, analysis, and applications. It also provides an introduction to common software packages used in transmission line simulations.

COURSE OBJECTIVE:

Transmission lines have applications in a wide range of areas, from electronic circuits to power systems. The objective of this course is to provide the fundamental theory of multiconductor transmission lines (MTL), frequency-domain and time-domain solution of multiconductor transmission line equations, and practical applications. Further, classic numerical techniques are reviewed and their application in the simulation of transmission lines is presented.

PRE-REQUISITES:

ECE 3590 Electromagnetic Theory (or equivalent) and ECE 3720 Electric Power and Machines (or equivalent)

INSTRUCTOR INFORMATION:

Name:..... Behzad Kordi
Office:..... SPC 308
Email:..... Behzad.Kordi@umanitoba.ca
Office Hours: ..... By appointment

CONTACT HOURS:

3-hours per week

COURSE CONTENT:

The following topics will be discussed:
Part A: Transmission Line Theory

- Review
- The multiconductor transmission-line equations
- The per-unit-length parameters
- Frequency-domain analysis
- Time-domain analysis

Part B: Review of Computational Electromagnetics

- Finite difference techniques
- Finite element method

Part C: Application of Numerical Techniques in the Analysis of Transmission Lines

COURSEWORK:

Homework will consist of assignments and a final project and presentation.

TEXTBOOK:

C. R. Paul, *Analysis of Multiconductor Transmission Lines*. Wiley IEEE Press, 2nd Edition, 2007, ISBN: 978-0470131541.
M. N. O. Sadiku, *Numerical Techniques in Electromagnetics with MATLAB*. CRC Press , 3rd Edition, 2009 ISBN: 978-1420063097.

GRADE ANNOUNCEMENTS:

Grades for this course will be announced by ***1 May 2026.***

EVALUATION:

Your final course grade is determined by your performance in the components list below in the Evaluation Table (seminar, assignments, project, and a final examination). Students must receive a minimum of 50% on the final examination and must complete and pass all components in the course in order to be eligible to receive a passing grade.

Each component is weighted as follows:

COMPONENT	NO	VALUE %	TOTAL VALUE	DETAILS / ADDITIONAL INFO
Seminars	1	5%	5	
Assignments	4	10%	40	
Project	1	15%	15	
Mid-Term Exam	-	-	-	
Final Examination	1	50%	40	
TOTAL			100	

GRADE SCALE:

LETTER	MARK	LETTER	MARK	LETTER	MARK	LETTER	MARK
A+	95-100	B+	80-84	C+	65-69	D	45-54
A	85-94	B	70-79	C	55-64	F	<45

VOLUNTARY WITHDRAW:

March 19, 2026

REQUIREMENTS/REGULATIONS

Student Responsibilities: It is the responsibility of each student to contact the instructor if he/she is uncertain about his/her standing in the course and his/her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with, among others, incomplete term work, deferred examinations, attendance and withdrawal, etc..

Lectures: Attendance at lectures is essential for successful completion of this course. Students must satisfy each evaluation component in the course.

ACADEMIC INTEGRITY

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.**

Copyright

*****Plagiarism: to steal and pass off (the ideas or words of another) as one's own; use (another's production) without crediting the source