

Winter 2022

ECE 8320 – Electromagnetic Compatibility in Power Systems

COURSE DESCRIPTION:

This course presents the theoretical foundations of electromagnetic compatibility (EMC) and susceptibility as well as application of EMC in power systems components such as transmission lines, cables, and grounding systems.

COURSE OBJECTIVE:

The objective of this course is to introduce and overview the subject of electromagnetic interference and compatibility analysis as it applies to electric power systems. Practical techniques for estimating electromagnetic emissions from electrical and electronic devices as well as typical susceptibility levels of devices will be covered. Characteristics, such as attenuation and frequency response, of typical coupling and propagation paths will be discussed and mathematical models will be constructed for specific problems. Application of EMC in power systems will be explored.

PRE-REQUISITES:

Undergraduate background in electromagnetics (ECE 3580/3590 or equivalent) and power systems (ECE 3720 or equivalent).

CONTACT HOURS:

3-hours per week

COURSE CONTENT:

The following topics will be discussed:

- Introduction to EMI/EMC
- Review of Maxwell's Equations and boundary conditions
- Transmission lines and signal integrity
- Nonideal behavior of components
- Conducted emissions and susceptibility
- Radiated emissions and susceptibility
- Crosstalk
- Grounding and shielding principles
- Topics on the application of EMC in power systems such as lightning studies, geomagnetic storms, etc.

HOMEWORK:

Homework will consist of assignments and preparation of a seminar and report on an assigned topic from the research literature.

TEXTBOOK:

H. W. Ott, *Electromagnetic Compatibility Engineering*. Wiley, 2009.

REFERENCES:

- C. R. Paul, Introduction to Electromagnetic Compatibility. Wiley Interscience, second edition, 2006.
- F. Lattarulo (editor), Electromagnetic Compatibility in Power Systems, Elsevier, 2007
- F. M. Tesche , M. Ianoz , and T. Karlsson, EMC Analysis Methods and Computational Models. Wiley Interscience, 1996.

GRADE ANNOUNCEMENTS:

Grades for this course will be announced by August 2022.

EVALUATION:

Your final course grade is determined by your performance in the components list below in the Evaluation Table (seminar, report, assignment, 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
Seminar & Report	1	10%	10	4 pages in IEEE double-column format
Assignment	4	10%	40	
Mid-Term Exam				
Final Examination	1	50%	50	
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

INSTRUCTOR INFO:

Name: Behzad Kordi
Office: SPC 308
Tel:..... (204) 474-7851
Email: Behzad.Kordi@umanitoba.ca

Office Hours:..... By appointment

VOLUNTARY WITHDRAW:

....

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

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 and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism* or any other form of cheating is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university) regardless of media

- examinations
- assignments
- laboratory reports
- term exams

A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty

Please refer any questions regarding Academic Integrity to your course instructor.

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