

FALL 2021

ECE 7680 – Dielectric Properties and Phenomena

COURSE DESCRIPTION:

Elementary structure of matter, polarization, response of dielectrics to static and periodic fields, ionization and decay processes, electrical breakdown of gases, liquids, and solids.

COURSE OBJECTIVE:

The goal of this course is to develop fundamental understanding of the models used to describe the response of dielectric systems to dc and ac fields, and the onset of electric breakdown in these systems. These principles will be applied to electrical insulation systems and novel materials for electrical insulation applications.

PRE-REQUISITES:

ECE 3600 or equivalent (i.e. permission of the instructor).

CONTACT HOURS:

3-hours per week

COURSE CONTENT:

- Structure of matter at the atomic scale
- Polarization
- Dielectric loss and relaxation
- Breakdown: onset and phenomena in gases, liquids and solids
- Space charge (solid systems)
- Nanodielectrics

Additional advanced research topics as determined by the instructor.

HOMEWORK:

A combination of assigned problems and self-directed projects will be set.

TEXTBOOK:

Reference: Dielectrics in Electric Fields, GG Raju (CRC Press, 2017) – available as an e-book from the Library

GRADE ANNOUNCEMENTS:

Grades for this course will be announced by January 2022

EVALUATION:

Your final course grade is determined by your performance in the components list below in the Evaluation Table (seminar, assignments, project, mid-term, 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
Assignments	10	3%	30	
Mid-Term Exam	1	20%	20	
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: Derek Oliver

Office: E2-390G EITC – *not applicable due to COVID-19*

Tel: (204) 474-9563 – *not applicable due to COVID-19*

Email: Derek.Oliver@umanitoba.ca

Office Hours: By appointment – using *MS Teams*

VOLUNTARY WITHDRAW:

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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