University of Manitoba

Department of Electrical & Computer Engineering
Graduate Course Outline

FALL 2022

ECE 7440 – Optoelectronics

COURSE DESCRIPTION:

The course starts with an introduction to light and optics. Light sources of different types are discussed, including lasers and Light Emitting Diodes (LEDs). Light modulation and detection methods are also discussed. Finally the course covers fiber optic systems including fiber optic communications and introduces elements of nonlinear optics and nanophotonics.

COURSE OBJECTIVE:

The goal of this course is to provide a logical framework for the principles, operation and characteristics of optoelectronic devices and systems with specific emphasis on optical elements, lasers, photodetectors and fibers.

PRE-REQUISITES:

Undergraduate courses in physics and optics; ECE 3600 Physical Electronics (ECE students).

CONTACT HOURS:

3-hours per week

COURSE CONTENT:

The following topics will be discussed:

- Properties of Light and Optical Elements;
- Radiation Sources: Radiation Profiles, Gas Discharge, LEDs;
- Lasers: Principles of Operation, Types of Lasers, Modes of Operation;
- Laser Diodes: Principles of Operation, Structures, Main Characteristics;
- Light Detectors and Modulators;
- Fiber Optics: Theory of Operation, Characteristics of Fibers;
- Nonlinear optics (time permitting).

Additional advanced research topics as determined by the instructor.

HOMEWORK:

Assignments on material covered in class.

TEXTBOOK:

Notes available from instructor.

B. E. A. Saleh and M. C. Teich, “Fundamentals of Photonics”, 2nd Ed., Wiley, 2007

GRADE ANNOUNCEMENTS:

Grades for this course will be announced by January 18, 2023

EVALUATION:

Your final course grade is determined by your performance in the components listed 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
Seminars	1	10%	10	
Assignments	5	2%	10	
Project	1	10%	10	
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:..... Arkady Major
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Tel:..... (204) 474-7541
Email:..... a.major@umanitoba.ca

Office Hours: ..... By appointment

VOLUNTARY WITHDRAW:

TBA

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