

ECE 756
Design of Lightwave Communication Systems and Networks

COURSE OUTLINE

Please refer to the course website for updated information.

CALENDAR DESCRIPTION

Lightwave communication has emerged as the undisputed transmission method of choice in almost all areas of telecommunication, mainly because it offers unrivaled transmission capacity at low cost. This course will mainly focus on the design and simulation of the physical layer of lightwave communication systems and networks based on the advanced discrete and integrated photonic devices and optical fibers.

SCHEDULE AND MODE OF DELIVERY

The material for this course will be delivered through in-person lectures and projects.

Format: In-person

Lab: No

INSTRUCTOR

Dr. S. Kumar

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Office: ITB-A314

Phone: 905-525-9140 ext. 27697

Office Hours: Mondays 11:30 am – 1:30 pm

COURSE WEBSITE/S

https://www.ece.mcmaster.ca/~kumars/Lightwave_course.htm

COURSE OBJECTIVES

By the end of this course, students should be able to:

- develop knowledge on operating principles of photonic devices and optical fibers,
- design methodologies and analyzing techniques of lightwave communication systems.
- model simple fiber optic communication systems.
- gain hands-on experience on fiber-splicing and fiber optic systems design.

ASSUMED KNOWLEDGE

Communication Systems (3TI4), Electromagnetics (3FK4), and some background on Matlab.

COURSE MATERIALS

Textbooks:

“Fiber Optic Communications: Fundamentals and Applications”, S. Kumar and M. J. Deen, John Wiley and Sons, Inc., 2014.

"Fiber-Optic Communication Systems", Govind P. Agrawal, John Wiley and Sons, Inc., 1997, ISBN 0-471-17540-4

COURSE OVERVIEW

Week	Topic
1	Review of Electromagnetics
2	Fiber Modes
3	Fiber Dispersion
4	Fiber Transmission
5	Lasers – Basic concepts
6	Lasers – Rate equations
7	Semiconductor lasers
8	Receiver design
9	Transmission system design
10	Transmission system design
11	WDM systems and networks
12	
13	

A more detailed time line is available on the course web site.

At certain points in the course it may make good sense to modify the schedule. The instructor may modify elements of the course and will notify students accordingly (in class, on the course website).

ASSESSMENT

Component	Weight	Due Date
Project	40 %	
Final Exam	45 %	

Assignment	15 %
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Total	100 %

Late submissions of assignments or project report are subject to 20% penalty per day (less than one day is counted as one day).

CONDUCT EXPECTATIONS

As a McMaster graduate student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the [Code of Student Rights & Responsibilities](#) (the “Code”). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online.**

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students’ access to these platforms.

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The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

ACADEMIC ACCOMMODATIONS OF STUDENTS WITH DISABILITIES

Students with disabilities who require academic accommodation must contact [Student Accessibility Services](#) (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University’s [Academic Accommodation of Students with Disabilities](#) policy.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the [RISO](#) policy. Students should submit their request to their Faculty Office **normally within 10 working days** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

RESEARCH ETHICS

The two principles underlying integrity in research in a university setting are these: a researcher must be honest in proposing, seeking support for, conducting, and reporting research; a researcher must respect the rights of others in these activities. Any departure from these principles will diminish the integrity of the research enterprise. This policy applies to all those conducting research at or under the aegis of McMaster University. It is incumbent upon all members of the university community to practice and to promote ethical behaviour. To see the Policy on Research Ethics at McMaster University, please go to <http://www.mcmaster.ca/policy/faculty/Conduct/ResearchEthicsPolicy.pdf>.

www.eng.mcmaster.ca/ece