ELEC 5301F Silicon Photonics **COURSE OUTLINE** Fall 2020

Course Description: Review of wave optics; electromagnetic optics; polarization optics; guided wave optics; interference; interferometry; resonator optics; semiconductors; lasers and detectors. Photonic devices using silicon: passive devices (waveguides), active devices (modulators, lasers, photodetectors), opto-electronic integration, applications in bio-medical sensing, telecommunication, and renewable energy.

Instructors: Professor Winnie Ye Email: winnie.ye@carleton.ca
Office hours: **Wednesdays @2-2:30pm and @5:30-6pm**

Prerequisite: Advanced EM theory

Learning Modality: Due to the transition to online learning this year, this course will be delivered as a mixture of synchronous teaching (live lectures and office hours) and asynchronous activities (such as assignments and projects). I will be using **Zoom** as the online teaching tool for the live lectures on **Wednesdays**, from **2:30pm to 5:30pm**.

The link to the lectures is: **https://zoom.us/j/4782003091** with the Meeting ID of: 4782003091 and Passcode: **ELEC5301**

The students are encouraged to "attend" the live lectures in the allotted time slot on Wednesdays.

Suggested Textbooks: **Silicon Photonics: The State of the Art**, Graham T. Reed; Wiley 2008. ISBN: 9780470025796
Silicon Photonics: An Introduction, Graham T. Reed and Andrew P. Knights; Wiley 2004. ISBN: 0470870346
Fundamentals of Photonics, B.E.A. Saleh and M.C. Teich; Wiley, 2007. ISBN:9780471358329

Course Material: Course information will be posted on **cuLearn** (https://www.carleton.ca/culearn/). Check it at least weekly for course related information. ALL online lectures will be recorded and posted on cuLearn.

Marking Scheme: Final Exam (50%); Assignments (20%); Term Project (30%)

Required Software: Lumerical (You will need a vlsi account, please contact Nagui for setting up your account.)
Technical support: Mr. Nagui Mikhail
Email: Nagui.Mikhail@carleton.ca
Phone: 613-520-2600 Ext.5766
Office: ME5124

Tentative Weekly Outline: (Please log onto **cuLearn** for the most up to date information)

Week	Topics
1	Chapter 1: Introduction
2	Chapter 2: Waveguides Theory and Properties
3	Chapter 3: Coupling Theory
4	Chapter 4: Passive Devices: Directional Couplers, MMIs, Y-junctions, MZI, AWG
5	Chapter 5: Resonators: Ring Resonators, Photonic Crystals
6	
7	Chapter 6: Active Devices: Modulators

8	Fall break: **Oct 26th to Oct 30th**
9	Chapter 7: Active Devices - Optical Sources (light-emitting diodes, optical amplifiers, lasers)
10	Chapter 8: Active Devices - Light Detectors (photodetectors, photodiodes, avalanche photodiodes)
11	Chapter 9: Optoelectronic Integration
12	Chapter 10: Applications
13	Review

Plagiarism and Cheating

It is an instructional offence to use or pass off as one's own idea or product which is the work of another without expressly giving credit to that other. It is also an instructional offence to copy the work of a fellow student. If students do plagiarize or cheat, the Dean's office will be notified and appropriate action will be taken.

Academic Accommodations

https://students.carleton.ca/course-outline/

For an accommodation request, please check the link above on the processes for the following accommodations:

- Pregnancy obligation
- Religious obligation
- Academic Accommodations for Students with Disabilities
- Survivors of Sexual Violence
- Accommodation for Student Activities

Please note the deadline for fall term courses as outlined in the Undergraduate Calendar.