

**COURSE:** ECE477/ECE 770-T6  
**COURSE TITLE:** Photonic Communication Devices & Systems  
**INSTRUCTOR:** Prof. Na Young Kim  
Office: RAC1 2101, x30481  
Office hours: TBA or by appointment via email  
email: [nayoung.kim@uwaterloo.ca](mailto:nayoung.kim@uwaterloo.ca)  
**Note: Do not use LEARN email to reach the instructor**

**LECTURES:** T 4:00 -5:20 pm, Th 2:30 - 3:50 pm, Synchronous & Asynchronous formats  
(1/12/2021 - 4/13/2021: 23-25 Lectures)

**TUTORIAL:** TBA

**LAB INSTRUCTOR:** HeeBong Yang, email: [heebong.yang@uwaterloo.ca](mailto:heebong.yang@uwaterloo.ca)

**LABS:** **3 Labs: On-line and/or in-person (if permitted)**

### **COURSE OBJECTIVE**

The course is designed for students to learn

- the physical principles for important optical devices and modules;
- their applications in photonic circuits and systems including optical fiber communication systems and networks.

**Expected Background:** Basic electromagnetism, calculus

### **TEXTBOOK**

Gerd Keiser, "Optical Fiber Communications", McGrawHill, 4th edition, 2011.

Reference Textbooks (Optional)

- B.E.A. Saleh & M.C. Teich, "Fundamentals of Photonics", John Wiley & Sons, 1991.
- S. O. Kasan, "Optoelectronics & Photonics, Principles & Practices", McGrawHill, 2001

### **COURSE WEBSITE**

The course homepage is in [LEARN.uwaterloo.ca](http://LEARN.uwaterloo.ca), where course syllabus, lecture notes and problem sets are uploaded. Any important updates will be announced as well.

### **GRADE DISTRIBUTION (SUBJECT TO CHANGE)**

#### **WIN 2021 - POTENTIAL ADJUSTMENT**

- **Problem Sets : Graduate students** 30%
- **Lab Reports:** Undergraduate students 30%
- **Mid-term :** 20%, 4 quizzes or on-line exam
- **Final:** 50%, 4 quizzes + take-home exam or project

#### **WIN 2020 - REFERENCE**

- **Problem Sets : Graduate students** 30%
- **Lab Reports:** Undergraduate students 30%
- **Mid-term:** 20%, closed-book
- **Final:** 50%, closed-book/in-class

**SYLLABUS (WINTER 2021, TENTATIVE: SUBJECT TO CHANGE)**

Week	Date	Topic	Reading	Problem Sets/ Quizzes
1	Lec.1: Jan. 12	Overview of Photonic Comms.	1.1, 1.2, 1.3, 1.6, 1.7	
	Lec.2: Jan. 14	Review of EM Waves	2.1, 2.2	
2	Lec.3: Jan. 19	Optical Fibers	2.3	PS1-out
	Lec.4: Jan. 21	Mode Theory	2.4	Q1
3	Lec.5: Jan. 26	Single-mode Fibers	2.5, 2.7	PS1-Due
	Lec.6: Jan. 28	Fiber Types/ Properties	2.8, 2.10	Q2
4	Lec.7: Feb. 2	Attenuation, Signal dispersion	3.1, 3.2,	PS2-out
	Lec.8: Feb.4	Specialty Fibers	3.5	Q3
5	Lec.9: Feb. 9	Dispersion mechanism, Charaterization		PS2-Due
	Lec.10: Feb. 11			Q4
6	Study Break			
7	Feb. 23	Midterm ?		
	Lec.11: Feb. 25	Single-mode lasers	4.4	
8	Lec.12: Mar. 2	Photonic Sources	4.1, 4.2	PS3-out
	Lec.13: Mar. 4	LED, Laser Diodes	4.2, 4.3	Q5
9	Lec.14: Mar. 9	Modulation and Noise	4.5	
	Lec.15: Mar. 11	Power Launching	5.1	PS3-Due
10	Lec.16: Mar. 16	Lensing for Coupling	5.2	Q6
	Lec.17: Mar. 18	Fiber-to-Fiber Joints	5.3	
11	Lec.18: Mar. 23	Fiber Splicing	5.5	PS4-out
	Lec.19: Mar. 25	Photodetectors	6.1, 6.2	
12	Lec.20: Mar. 30	Avalanche Photodiodes	6.5, 6.7	Q7
	Lec.21: Apr. 1	Digital Photonics	7.1, 7.2	PS4-Due
13	Lec.22: Apr. 6	Analog Receivers, Digital Links	7.5, 8.1	
	Lec.23: Apr. 8	Advanced Topics		Q8
14	Lec. 24: Apr. 13	Advanced Topics		

## UW POLICIES

- **Collaboration Policy on Problem Sets** : Discussion among students and Professor are permitted and encouraged. Answers to problem sets must be prepared on your own in terms of wording, equations etc.. Copying from any source without explicit reference is a violation of this policy (Plagiarism).
- **Academic Integrity Policy** : As a member of the UW community, we promote honesty, trust, fairness, respect and responsibility. More information: <https://uwaterloo.ca/academic-integrity/>
- **Policy 70 - Student Petitions and Grievance** :  
<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>  
Please consult with the departments' administrative assistant who will provide answers.
- **Policy 71 - Student Discipline** :  
<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>  
We honor this policy throughout the course.  
Typical penalties will be given in the guideline:  
<https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties>
- **Policy 72 - Student Appeals** :  
<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72>  
A decision made or penalty imposed under Policy 70 or Policy 71 may be appealed if there is a ground according to Policy 72.
- For Students with Disabilities:  
The Office for Persons with Disabilities (OPD) is in Needles Hall, Room 1132. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.
- [turnitin.com](https://www.turnitin.com): Plagiarism detection software might be used to screen problem sets in this course. This is being done to verify that use of all material and sources in problem sets is documented.