UWM, Dept. of EECS

EE 465 Lec 001
Broadband optical networks

Spring 2018

Prerequisites: junior status, EE 361 and EE 305

Course description:
Multichannel lightwave systems based on wavelength division, multiplexing, time-division multiplexing, subcarrier multiplexing; optical devices and coding techniques for implementing optical network.

Course goal: Understand the capabilities of optical networks and related components. Able to explain the roles and operating principles of each major component in an optical network. Expose to current issues in optical network design.

Time and place: MW 3:30PM-4:45PM, EMS E170

Instructor: Dr. Chiu-Tai Law
Office: EMS 1039
Phone: 229-6203
Email:lawc@uwm.edu
Office Hours: MW 10:00AM-1:30PM, TR 5:00-6:30PM

Homepage of the course: http://scylla.ceas.uwm.edu/465

Required Textbook:
R. Ramaswami and K. N. Sivarajan *Optical networks a practical perspective,* 3rd Ed., Margan Kaufmann, San Francisco, California, 2010.

References:

1. S. V. Kartalopoulos, *Introduction to DWDM Technology,* Wiley-Interscience, New York, New York, 2000.
2. B. E. A. Saleh and M. C. Teich, *Fundamentals of Photonics,* Wiley-interscience, New York, 1991. (TA152.S24 1991)
3. Govind P. Agrawal, *Fiber-Optic Communication Systems,* 2nd Ed., John Wiley & Sons, New York, New York, 1997. (TK 5103.59.A37)
4. Max Ming-Kang Liu, *Principles and Applications of Optical Communications,* 2nd Ed., Irwin, Chicago, Illinois, 1996.
5. Joseph C. Palais, *Fiber Optic Communications,* 4th Ed., Prentice Hall, Englewood Cliffs, New Jersey, 1998.
   (Pages from these references related to the topics will be posted under the corresponding summaries.)

Homework:
Problem sets are assigned every week and usually due on the Thursday at 5PM in the following week. Students can submit their homework by email after notifying instructor by email or call. Homework submitted two work days late will not be accepted. 20% of points will be deducted for late homework. Graduate students will be assigned additional problems.

Exam and project:

One mid-term and one final will be given during the semester for all students. Graduate students are required to do different and/or additional problems for examinations. No makeup exam if the instructor is not notified before the scheduled exam. Each student will choose a project. Detailed requirements and possible topics will be described later in a handout. In summary, a proposal and progress report will be due in the middle of the semester. At the end of semester, each student is required to give 15 minutes presentation and submit a final report.

Grading:

Assignments (homework and class work)	16%
Mid-term (Mar. 13)	27%
Final (May 16)	27%
Project [proposal (Mar. 6), progress report (Apr. 10), draft of final report (May 1) & final report (May 18) and presentation (May 8, 10)]	30%
	100%

Student conduct and rights:

According to academic misconduct regulations, Chapter UWS 14, cheating in examinations and copying assignments are prohibited. Serious misconduct can result in probation, suspension or expulsion. Details for this and other policies as well as rights can be found in the following document on the web:
http://uwm.edu/secu/wp-content/uploads/sites/122/2016/12/Syllabus-Links.pdf.

Extra-credit exercise:

Extra-homework problems will be given from time to time.

Course Outline

(Note: this schedule may subject to changes according to the real needs of students.)

WEEK 1: Jan. 23 and 25
Introduction to optical networks. (chapter 1 of text book)
Nature of light (pp. 765-771 of text; plane wave in Electromagnetic field textbook; pp. 7,8,11-14 of Ref. 1; chapter 5 of Ref. 2)

WEEK 2: Jan. 30 and Feb. 1
Interaction of light with matter. (section 1.7 of text; chapter 2 of Ref. 1; chapter 2 & pp. 194-209 of Ref. 2)

WEEK 3: Feb. 6 and 8
Optical waveguide and its properties. (section 1.7, pp. 772-777, chapter 2 of text, section 5.8 of text; chapter 3 of Ref. 1)

WEEK 4: Feb. 13 and 15
Optical Spectral filters and gratings. (section 3.3 of text; chapter 4 of Ref. 1)

WEEK 5: Feb. 20 and 22
Optical Demultiplexers. (section 3.3 of text; chapter 4 of Ref. 1)

WEEK 6: Feb. 27 and Mar. 1
Light sources. (section 3.5 of text; chapter 6 of Ref. 1) and review for mid-term

WEEK 7: Mar. 6 and 8
Proposal due on Mar. 6

Photodetectors; Light amplifiers. (section 3.4, 3.6, 5.5 & pp. 258-269 of text; chapters 7 & 8 of Ref. 1)

WEEK 8: Mar. 13 and 15
Mid-term on Mar. 13
Photodetectors; Light amplifiers. (section 3.4, 3.6, 5.5 & pp. 258-269 of text; chapters 7 & 8 of Ref. 1)

WEEK 9: Mar. 27 and 29
Optical cross-connects and add-drop multiplexers. (sections 3.7 & 3.8 of text; chapters 9-11 of Ref. 1)

WEEK 10: Apr. 3 and 5
Coding and decoding of optical information; concepts in communication network. (chapter 4 of text)

WEEK 11: Apr. 10 and 12
Progress report due on Apr. 10
Wavelength division multiplexing. (DWM)

WEEK 12: Apr. 17 and 19
Engineering issues for DWM.

WEEK 13: Apr. 24 and 26
Time-division multiplexing.

WEEK 14: May 1 and 3
Draft of final report due on May. 1
Subcarrier multiplexing.

WEEK 15: May 8 and 10
Project presentations and review for final.

WEEK 16: May 16 and 18
Final examination will be held on May 16 10:00AM-noon and project report will be due on May 18 noon.