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, CHM 190

Instructor: Dr. Chiu-Tai Law
Office: EMS 1039
Phone: 229-6203
Email: lawc@uwm.edu
Office Hours: MW 1:00-3:00PM, TR 3:30-6:00PM

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

Required Textbook:

References:

Homework:
Problem sets are assigned every week and usually due on the Tuesday at 5PM in the following week. Students can submit their homework by email after notifying instructor by email or call. Homework submitted two 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 (Oct. 13) 27%
Final (Dec. 17) 27%
Project [proposal (Oct. 8), progress report (Nov. 5), draft of final report (Dec. 1) & final report (Dec 19) and presentation (Dec. 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:

Extra-credit exercise:
Extra-home work 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: Sept. 3
Introduction to optical networks (chapter 1 of text book)

WEEK 2: Sept. 8 and 10
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)
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: Sept. 15 and 17
Interaction of light with matter (section 1.7 of text; chapter 2 of Ref. 1; chapter 2 & pp. 194-209 of Ref. 2)
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: Sept. 22 and 24
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 5: Sept. 28 and Oct. 1
Optical Spectral filters and gratings (section 3.3 of text; chapter 4 of Ref. 1)

WEEK 6: Oct. 6 and 8
Optical Demultiplexers (section 3.3 of text; chapter 4 of Ref. 1) and review for mid-term
Proposal due on Oct. 8

WEEK 7: Oct. 13 and 15
Mid-term test on Oct. 13
Light sources (section 3.5 of text; chapter 6 of Ref. 1)

WEEK 8: Oct. 20 and 22
Light sources (section 3.5 of text; chapter 6 of Ref. 1)

WEEK 9: Oct. 27 and 29
Photodetectors; Light amplifiers (section 3.4, 3.6, 5.5 & pp. 258-269 of text; chapters 7 & 8 of Ref. 1)

WEEK 10: Nov. 3 and 5
Optical cross-connects and add-drop multiplexers. (sections 3.7 & 3.8 of text; chapters 9-11 of Ref. 1)
Progress report due on Nov. 5

WEEK 11: Nov. 10 and 12
Coding and decoding of optical information; concepts in communication network. (chapter 4 of text)

WEEK 12: Nov. 17 and 19
Wavelength division multiplexing (DWM)

WEEK 13: Nov. 24
Engineering issues for DWM

WEEK 14: Dec. 1 and 3
Draft of final report due on Dec. 1
Time-division multiplexing
Subcarrier multiplexing and review for final exam.

WEEK 15: Dec 8 and 10
Project presentations

WEEK 16: Dec 17 and 19
Final examination will be held on Dec. 17 3:00-5:00PM and project report will be due on Dec. 19 noon.