Sonoma State University
Engineering Science
Course Syllabus – Fall 2011

Course: **ES485 / CES590- Optical Networking**

Instructor:
Dr. Farid Farahmand
Office: 2010 A Salazar
Phone: (707) 664-3491
E-mail: farahman@sonoma.edu
Web: http://www.sonoma.edu/users/f/farahman/

Office Hours: By Appointment – I am not available on Fridays.

Text

- *Optical Networks: A Practical Perspective*, Third Edition, Rajiv Ramaswami and Kumar Sivarajan, Morgan-Kaufmann

References

- *Optical WDM Networks*, Biswanath Mukherjee, ISBN: 978-0-387-29055-3, 2006
- *WDM Optical Networks: Concepts, Design, and Algorithms*, C. The following references will be used.Siva Ram Murthy and Mohan Gurusamy, Prentice Hall PTR, ISBN: 0130606375, 2002.
- *Optical Switching Networks*. *Martin Maier, Université du Québec, Montréal*. Hardback. ISBN: 9780521868006; Publication date: May 2008.
- *Optical Fiber Communications: Principles and Practice* (3rd Edition) – J. M. Senior.

Grading Plan:

Exams (Midterm & Final)	40%
Homework/Articles	15%
Formal Labs	15%
Quiz	20%
Research Paper	10%
Extra Credit	2%

Grading:

95 - 100 A	70 – 73 C-
90 – 94 A-	77 – 79 C+
87 – 89 B+	67 – 69 D+
84 – 86 B	64 – 66 D
80 – 83 B-	60 – 63 D-
74 – 76 C	< 60 F

Course Description

CES559 is a **system-level** course on optical networking. This course is not about detailed design of optical components, e.g., couplers, filters, gratings, lasers. Those interested in more details should take Photonics class. The course is divided into two parts. In the first 6 weeks we will cover signal propagation in optical fiber and review different optical components. In the second part of the course we will focus on the network design and engineering, e.g., framing, multiplexing, optimization, control and management, architectural design, network dimensioning. Analysis of wavelength-routed networks and optical packet-/burst-switched networks will also be addressed in this course. Although ES465 is not a prerequisite of this course, a basic understanding of the OSI layers (including transport, network, link layers) is required. This course will be treated as a graduate course devoted to the recent advances in optical networking. Thus, students are expected to read assigned articles and journals to learn about current and future research topics in optical networking. Course has a research term paper/project with an oral presentation by each student.

Reminder:
ES485/CES590 a 3 credit hour course requiring an average of 12 hours of study per week!

No eating or drinking is allowed in the lab!

Basic Outline of Course

Introduction. Evolution of Optical Networking	
Propagation of Signals in Optical Fiber	
Optical Components and Overall System Design	
Optical Networking Overview	
Optical Client Layers	-Multiplexing, framing, control and management, protection, packet-over-SONET, generic framing procedure (Chs. 6, 10)
WDM Systems	-WDM network elements, G.709, optical layer protection and restoration, optical control plane, GMPLS (Ch. 7, 10) - Lightpath topology design, routing and wavelength assignment, maximum load dimensioning models (Ch. 8)
Optical Packet Switching	- Photonic packet switching (Ch. 12)
Passive Optical Networking	

POLICIES

CLASSROOM CONDUCTS: In order to create an appropriate environment for teaching and learning, students must show respect for their instructor and fellow students. Listed below are a few guidelines for classroom behavior. Students are expected to follow these rules to ensure that the learning environment is not compromised.

1 **Class Participation**: You are expected to be in class the entire class time. Please do not enter late or leave early. Rare exceptions may be made, particularly in emergency situations. Your participation in the class and lab and the discussions are very important and would help me understand how much you follow the material.
2 **Absences**: Inform the instructor in advance, if you know you are going to miss a class. Also, take responsibility for getting missed assignments from other students. Your instructor is not responsible for re-teaching the material you missed due to an absence or being late.
3 **Conversation**: Do not carry on side conversations in class.
4 **Sleep**: Do not sleep in class.
5 **Internet browsing**: Please turn off all monitors/laptops and listen to lectures. Check your emails before coming to class!
6 **Attitude:** You are expected to maintain a civil attitude in class. You may not use inappropriate or offensive commentary or body language toward the instructor or fellow students.
7 **Cell phones and iPhone:** You may not use your cell phone during class. Please turn off your cell phone upon entering the classroom.
8 **Please note that NO eating or drinking is allowed in the lab!**

PLAGIARISM: All forms of cheating and plagiarism are serious offenses that can result in disciplinary penalties including expulsion from the university. This includes copying assignments from the Internet! Refer to the student handbook for details. Occasionally, I will use http://www.dustball.com/cs/plagiarism.checker/ to ensure there assignments are original and free of any possible plagiarism. All students are required to sign and return a copy of the Statement of Ethics. Assignments which are identical in every aspect with receive ZERO! This includes copying assignments from the Internet!

WITHDRAWAL: Authorized withdrawals are permitted without penalty or notation on the students' academic record. No student will be granted a withdrawal after this date unless under extreme extenuating circumstances. Please be advised that the instructor will not grant a grade of 'W' after the deadline for any student failing the course. Policy regarding withdrawal is stated in the university catalog.

SPECIAL NEEDS: If you have emergency medical information that needs to be shared with the instructor, or require special arrangements in case the building must be evacuated, please inform the instructor.

UNIVERSITY POLICIES: As a student at Sonoma State University, it is important that you know the policies and procedures that affect you. These five policies and procedures were selected by the SSU Academic Senate for their importance to your academic career ….more here.

ASSIGNMENTS

HOMEWORK: All students are required to complete homework assignments. Homework assignments require familiarity with different software tools such as Excel, and VISIO. Homework assignments must be submitted in class. Late submissions will receive 15 deduction points for each late day, including weekends. All hardcopy submissions must be stapled and have a coversheet, otherwise they will *not* be accepted. Please avoid printing your homework when class starts! Unless specified in advance, no handwritten homework will be accepted.

BLOGS: Each student is required to register for the discussion group and log on using his/her first and last name (e.g., Cesar Chavez or Angela Davis).

RESEARCH PAPER: You are required to submit one individual final research paper. You need to pick a topic in the suggested areas. All topics require prior approval from your instructor. No team work is allowed. Each student must submit an abstract identifying the research topic and objective of the research. Each student must also provide a formal final research report. You must use the template provided. You must use at least FIVE IEEE (IEEE Library at Sonoma) papers as your main reference. All IEEE papers must be attached to your final report. The report will be graded as follow:

1 ***General format (10 points):*** The project must be submitted as a formal document. Your submission must be easy to read, free of any technical or writing errors, and have many figures for clarity. Use the provided template.

2 ***Abstract (15 points):*** Each report must have a formal abstract. The abstract must briefly describe the scope of your paper and what you are discussing in the report. The abstract must be between 200-300 words.

3 ***Body (50 points):*** The body consists of at least three parts: problem statement (5 points), motivation (5 points), and solution (10 points). In the problem statement section, you must clearly state the purpose of the design. Then, describe the application of the design. Finally, you must present your solution to the design. Provide all your test results and calculations.

4 ***References (10 points):*** All papers must have a reference section with several relevant references. Projects without proper citation will receive zero for plagiarism.

5 ***Summary and future works (15 points):*** In this section you must provide a brief conclusion of your design. This section must be no more that 300 words. Also, you must state how the design can be improved and what other areas can be modified in the future, should you or some one else decide to continue exploring this topic.

EXAMS: Exams will consist of problems designed to test your understanding of the concepts covered in class and lab. Anyone missing an exam will receive a zero grade for that exam. Make-up exams will only be given with a doctor's slip stating that you were too ill on the day of the exam to attend, or documented extraordinary circumstances.

ARTICLES: Throughout the semester students are required to write 5-7 articles. All articles must be submitted with the original source. Only articles from IEEE (IEEE Library at Sonoma) sources are accepted. Each article summary should be no more than two paragraphs. Each student must give a quick oral presentation in class. All article summaries must be submitted to the discussion group.

SIMULATION SOFTWARE: Throughout the students are required to become familiar with a number of software and hardware tools, including the following:

1- Matlab to model physical characteristics of optical networks.
2- Others?

LABS: There will be 1-3 lab experiments in this class. All students are expected to complete a formal lab report for each lab experiment. Labs can be done in groups of two. Lab reports must be done individually. These labs are critical aspect of the course and must be carefully completed. Students are responsible to learn about the lab equipments. Each student is required to be present for lab demo. You will receive no grade for the lab if you miss the demo unless your absence is excused.

QUIZ: We will have 3-6 quizzes in this class. The quizzes will be over the materials we covered in class and laboratory experiments. We start each quiz at the beginning of class.

GRADING SUMMARY

Each student's final grade will be calculated according to the Grading Plan mentioned above. Please note the following:

1 All assignments must be submitted at the beginning of the class. They must be stapled and have a coversheet.
2 Late assignments (hardcopy or softcopy) will receive 15 deduction points for each late day, including weekends.
3 There will be no curving (89.2 is still a B^+).
4 There will be no make-ups. Please arrive to the classroom on time.
5 Pay attention to the grading plan!
6 Signup for the discussion group.
7 No eating or drinking is allowed in the lab!
8 No late assignments are accepted, except homework!

NOTE: No Late submissions (except homework assignments) will be accepted. Late articles, abstract, research paper, project, lab report, etc. will not be accepted under any circumstances. If you do not submit the assignment at the beginning of the class, it is considered to be late submission!

Please make sure you speak to me before you decide on dropping the class!

I will be available, if you are willing to learn!