

Electrical, Computer And Systems Engineering Department
ESCE-6660 Broadband and Optical Networking
Spring 2003 Syllabus

Class Time: **Wed 6-9 pm**
Site Live Delivery Modes:
Online Delivery Modes:

Instructor:

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Teaching Assistant (for all grading queries):

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JEC 6212
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DESCRIPTION

This course will develop fundamental concepts and protocols of broadband and optical networking. Broadband networking has been driven by the imminent convergence of telephony (voice), Internet (data), cable (video), and wireless networks. We will review fundamental ideas in each of these areas, and then study architectural and protocol concepts for integrating their traffic into a scalable, high-speed optical networking infrastructure. Concepts and architectures covered in this course will include: high-speed switching & router-design, traffic engineering (MPLS, ATM, frame-relay), fiber optical communications, optical networking concepts, protection/restoration/survivability, optical link layers (SONET, WDM), quality of service (QoS) architectures & building blocks, Gigabit Ethernet for MANs, protocol issues for multimedia (VoIP, video streaming/conferencing), broadband last-mile technologies (cable-modem, DSL, 3G wireless, smart antennas, 802.11-based community networks, free-space-optics). The course will involve substantial reading and a term project to help student synthesize the variety of concepts and appreciate the broad techno-economic challenges.

Prerequisites

Probability for Engineering Applications (ECSE-4500) and Computer Communication Networks (ECSE-4670).
Suggested complementary course: Internet Protocols (ECSE-6600)

Textbooks (REQUIRED)

1. Srinivasan Keshav, **An Engineering Approach to Computer Networking**, Addison-Wesley, 1997. ISBN: 0201634422
2. Rajiv Ramaswami, Kumar Sivarajan, **Optical Networks: A Practical Perspective (Second Edition)**, Morgan Kaufmann Publishers; ISBN: 1558606556; 2nd edition (October 15, 2001)

REFERENCES:

1. John Bellamy, **Digital Telephony**, Third Edition, John Wiley, 2000
2. James Farmer, David Large, Walter S. Ciciora, **Modern Cable Television Technology: Video, Voice, & Data Communications**, Morgan Kaufmann Publishers; ISBN: 1558604162; 1st edition (January 15, 1999).

Computing

Email and World Wide Web access required for course communications and printing of course notes. Access to WebCT, Rensselaer's course management tool, is required. Please refer to the Internet Access section on page 11 for

more information. We will use the online homework submission, and bulletin board facility of WebCT. Also the video streams of the class will be available on WebCT. Course materials will be available through the instructor's home page: <http://www.ecse.rpi.edu/Homepages/shivkuma/>

Format and Grading Percentages:

Primarily lecture-based class. There will be a lot of reading assignments, 4-6 homeworks, a term project/paper and 3 exams.

Homework	25%
Term Project/Paper	15%
Exams	60%

Exam (Quiz) Schedule and Conflicts

Since the **exams will be held during class hours**, you should not have any conflicts. However, if you do have a scheduled conflict for the exam period with a **lower-numbered course**, see the instructor. There will be **NO make-up exams**. All exams will be **open book/notes**. Exams will typically consist of quantitative problems, design questions, multiple choice (true-false) questions and short answer questions and will focus on concepts. Exams will be **extremely time-limited** and will cover both text and additional reading material. The exams will be cumulative, i.e. will cover all the material covered in that course thus far, with a majority weightage on incremental material covered since the prior exam.

Exam dates:

- EXAM 1: February 5th, 2002 (15%)*
- EXAM 2: March 5th, 2002 (20%, cumulative)*
- EXAM 3: April 30th, 2002 (25%, comprehensive)*

Term Project: The term project is intended to give you a first hand, in-depth experience in researching a new area in broadband and optical networking. Groups of up to two students are allowed per term project, but a more in depth study and report is expected from groups of two. You can propose a topic. Each topic must have a list of mandatory paper readings, followed by a set of other references. Your task is to critique the material, organize it in a framework of your own, and make sound judgments about the past and future directions of work in the topic area. The case study report should be a document no longer than 10 pages. I will expect the case study to be of high quality, reflecting deep understanding, original thinking and be written like a professional technical paper, and will **grade it strictly**. Brilliant original thinking which could lead to new research contributions in the area **could win up to 5% extra credit**.

Course Secretary [for all non-RSVP administrative requests]

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RSVP Point-of-contact [for all RSVP-related administrative requests]

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General Policies Regarding Graded Material:

1. The exams and problems sets are based upon lectures and required reading. The lectures and other course material will also be available through the web.
2. Homeworks, labs and term project should be submitted through the webCT dropbox by the BEGINNING of lecture on which it is due. Our policy will be to return graded material to you within one week of handing it in. All issues regarding graded material should be resolved within one week of the date graded material is returned.
3. **Late submission policy:** Any problem set submitted later than this will be marked as late. Any papers not handed at the beginning of class (e.g. slipped under a door, placed in a mailbox) will be marked as late. There will not be a penalty for upto one late submission per student. The second late submission onwards will be each assessed a penalty of 10%. Exceptions will require a valid and documented reason (eg: doctor's letter). Late submissions will NOT BE ACCEPTED after one week of the deadline or the day solutions are made available. There will be no makeups for homeworks.
4. If you feel that an error was made in grading, you should submit a re-grading request to the TA WITHIN A WEEK of the date the graded material was returned to the class. Requests for re-grading or any questions regarding graded material WILL NOT BE ACCEPTED after that time. Any graded material that is not picked up within two weeks will be discarded.
5. **Academic Honesty:** Please refer to the university's academic honesty statements. While we encourage you to interact with your colleagues, your submissions must be only your own work. Issues of academic dishonesty will be dealt with severely.