

Electrical, Computer And Systems Engineering Department
ESCE-6961 Internet Protocols
Spring 2000 Syllabus

Course Description

The information technology revolution is *just* beginning ! The Internet cuts across the barriers of space and time enabling rich forms of communications, a virtual marketplace, integration of supply chains of manufacturers with front-end customer interfaces. It redefines the business model for virtually every business not to mention the incredible number of new businesses (startups) it has spawned. This course aims to prepare you to participate actively in this revolution. It will equip you with a knowledge not only about a broad range of Internet protocols that make it work, but also help you develop critical insight into their design, and a first hand feel for implementation through lab exercises. Another key goal is to prepare you for doing research in the field of networking.

Specifically, we will study internet protocols including transport (TCP, UDP), network (IP, IPng), routing (RIP, OSPF), network management (SNMP, SNMPv2, RMON), and other important protocols like ARP, ICMP, DNS, BOOTP, DHCP and HTTP. Advanced topics like Mobile IP, QoS architecture for the Internet (Int-serv, Diff-serv, RTP, RSVP), IP multicast (IGMP, MBONE, Multicast Routing) and Network security (IPSEC and firewalls) will also be covered.

I will expect a student to be prepared for active research in the internetworking area after this course, and lead in the IT revolution.

Prerequisite

Required (no exceptions):

ESCE-4670 Computer Communication Networks or equivalent
C programming knowledge

Desirable:

Operating Systems
Computer Architecture (ECSE-4730 or equivalent)

Instructor

Prof. Shivkumar Kalyanaraman. (Call me “**Shiv**”).

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Office Hours: **Mon, Wed: 1:00 pm - 2:30 pm or by appointment**

Teaching Assistant(s)

Adnan El-Nasan, elnasan@rpi.edu or elnasan@ecse.rpi.edu

Required Text

1. *TCP/IP Illustrated, Vol 1*; W.R. Stevens, Addison-Wesley professional computing series. ISBN: 0-201-63346-9.

Recommended Resources:

Internetworking with TCP/IP, Vol 1, Third Edition; D. Comer, Prentice-Hall

Other supplementary texts/ papers/RFCs will be recommended for various parts of the course. The course home page will contain online links to several resources.

Tentative Grading Percentages

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|------------------------------|-----------------------------|
| Exams (Quizzes) | 40% (best two out of three) |
| 2 Labs: (15 points each) | 30% |
| 3 Homeworks (6 points each) | 18% |
| Case Study | 12% |

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**. There will be three exams and the **best two out the three scores** will be considered for grading purposes. If you miss one exam for whatever reason, you have two others which can be used for grading purposes. All exams will be **open book/notes**. Exams will typically consist of quantitative problems, 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.

Exam dates: (Please DO NOT schedule interviews etc on these dates.)

Wednesday, **February 9th**

Wednesday, **March 8th**

Wednesday, **April 26th**

Course Delivery Format:

This course will consist of lectures, in-class exercises, informal quizzes, problem sets, a case study and examinations (quizzes).

- **Lectures** will consist of up to 75% of class time. I want to promote an **interactive learning experience**. Though we have a lot of ground to cover, we will pose problems TOGETHER and DISCOVER together how the solutions have evolved in the Internet, and what design alternatives exist.
- **Informal quizzes** will be held periodically (approx once in two weeks). Informal quizzes will consist of true/false answers which will help revise course material and emphasize important concepts. There is no grading of informal quizzes.
- **Homeworks** will contain reading exercises (detailed RFCs, seminal papers etc), short experiments (using the tcpdump tool), and design problems which might be open-ended – but test your ability to think, pose the right questions and find approaches to solutions.
- **Lab assignments** (one on IP and one on TCP). Each lab assignment comes in the form of a package with files and handouts. Support is provided by a simulation and a graphical user interface which allows you to visualize/debug the protocol code you write. Your coded protocol should match the performance of a demo (which is provided in the package) and you need to produce a short report for each lab.
- **Exams** will contain true/false questions, design questions, short-answer or quantitative type questions. Exams will be open-book, but will be extremely time-constrained. **Best two out of three exams** will be considered for final grading (see below). Material from both slides, text and reading/homeworks will be included in the scope of exams.
- **Case study** is intended to give you a first hand, in-depth experience in researching a new area in networking. It will also give you an experience in articulating research ideas and survey of current work in the form of a report. I will expect the case study to be of high quality and be written like a professional technical paper, and grade it strictly. The course home page will have suggested topics and papers. However, a good place to look for such studies is the IETF Active Working Groups and the IRTF's active Research Groups (links provided from class homepage). I will also consider case studies proposing to develop Linux implementations of a challenging protocol or to develop the core implementation of a route. There are limited lab facilities which can be leveraged for the latter activity. In any case, I expect a thorough critique of research and engineering issues which should reflect your deep understanding and original thinking.

The purpose of these different instruments is to have a positive learning experience, critical thinking about research issues, and sound grasp of Internet protocol fundamentals. **If you feel any of these instruments is not working for any reason, please send me an email and I will consider a change in the format of delivery.** You will also have an opportunity to express your opinion on course format and delivery in an **informal mid-semester feedback** sheet. The **course web page also has an anonymous feedback form** which you can use for this purpose. I value your feedback and will sincerely try to make changes to enhance your learning experience.

Important: Course materials will be put up on the **course homepage**. We will also set up a **mailing list** for administrative and discussion purposes. If you have questions which might be of interest to the entire group of students, please post to the mailing list and not send me the questions directly. Any one can reply to your questions, and you can reply to any one's questions. **PLEASE SEND AN EMAIL ASAP TO THE TA TO ALLOW US TO QUICKLY SETUP THE MAILING LIST.**

General Policies Regarding Graded Material:

1. The exams and problems sets are based upon lectures and required reading. So that you can plan your time well, a tentative schedule of topics and readings is included on the attached course calendar.
2. Homeworks (or problem sets) should be **handed in at the beginning of lecture on which it is due.** Any problem set submitted later than this will be marked as late. There won't be a penalty for one or two late submissions. However if you make a habit of late submissions, there will be a **penalty of 10% for lateness.** Any papers not handed in during the problem section (e.g. slipped under a door, placed in a mailbox) will be marked as late. No makeups for problem sets. Late submissions of labs/code reading reports will be assessed with a 10% penalty. Late submissions **will NOT BE accepted** after the day solutions are made available to the class.
3. If you feel that an error was made in grading, do not wait toward the end of the semester to tell us about it. . PLEASE DIRECT ALL GRADING RELATED REQUESTS TO THE TA. **You should submit a regrading request to the TA within a week of the date the graded material was returned to the class. Requests for regrading will not be accepted after that time.** Any graded material that is not picked up within two weeks will be discarded.

Course Home page

The course homepage will be accessible through the instructor's website:

<http://www.ecse.rpi.edu/Hompages/shivkuma/>

All slides of lectures, and homeworks will be available there. The slides/homeworks of the previous offering of the course are also available through this site.

Academic Integrity

Student-teacher relationships are based on trust. Acts which violate this trust undermine the educational process. Violations of academic integrity will not be tolerated by your classmates, teaching assistants, nor instructors. Please refer to the *Rensselaer Handbook* for definitions of various forms of academic dishonesty and the applicable penalties. We take cheating very seriously; you can expect to be punished for violations of academic integrity.