Electrical, Computer And Systems Engineering Department

ESCE-4670 Computer Communications Networks (CCN)

Fall 2001 Syllabus

Course Description

This course will provide a broad, yet design-based, introduction to the wonderful field of data networking. Concepts will be taught using a "building block" approach, which means that you should be able to identify how to flexibly put together concepts to understand complex network protocols. Comparison to telephony concepts will be made where relevant. Certain mathematical tools for design and analysis of networking systems will also be introduced.

Specifically, we will study core problems such as framing, error recovery, multiple-access, flow control, congestion control, routing and end-to-end reliability. The concepts will be learnt using a top-down approach as proposed in the textbook. We will organize concepts learnt into a set of abstract layers and get a firm understanding of the data-link, network and transport layers. We will also have a introduction to useful mathematical tools like probability, statistics and queuing theory, with a focus on how these tools are applied in quantitative modeling and analysis of networks.

Prerequisite

- Background in elementary probability (***Probability for Engineering Applications, ECSE-4500***, ***Discrete structures, CSCI-4320,*** or ***Modeling and Analysis of Uncertainity, ENGR-2600)***
- Knowledge of basic computer organization (***ECSE-2660 Computer Architecture, Networks and Operating Systems or CSCI-2500 Computer Organization***)

Class times:

Tue, Fri: 12:30-1:50pm
Darrin (DCC) 337

Instructors

Prof. Shiv Kalyanaraman. ("**Shiv"**).
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Office Hours: Tue, Fri: 10:00-11:00 am

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Office Hours: Tue, Fri: 3:00-4:00 pm

Teaching Assistant(s)

G Liu
H. Yang
Yong Pei (RSVP)
Satish Raghunath (RSVP)

Required Text

1. James F. Kurose, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet," **1st Edition**, Addison-Wesley, ISBN 0-201-47711-4, 2000.

Amazon.com Link: http://www.amazon.com/exec/obidos/ASIN/0201477114/qid=997815763/sr=2-1/ref=aps_sr_b_1_1/103-2409722-3052631
Publisher's Web Page:
http://www.awl.com/kurose-ross

Recommended Resources:

2. B. Davie, L. Peterson, D. Clark "Computer Networks: A Systems Approach," Morgan-Kauffman, ISBN-1558605142, 1999.
3. S. Keshav, "An Engineering Approach to Computer Networking," Addison-Wesley Professional Computing Series, ISBN 0-201-63442-2, 1997.

Tentative Schedule of topics:

- Introduction: Computer Networks and the Internet: Chapter 1
- Networking Design, Performance Concepts and Roadmap
- Application Layer: Chapter 2
- Transport Layer (+ lab exercise): Chapter 3
- Network layer (+ lab exercise): Chapter 4
- Link Layer
- Performance Analysis: probability, queuing,

The class slides have been adapted, in part, from slides of Prof. Jim Kurose, Prof. Raj Jain, CIS, OSU, Prof. Ken Vastola, ECSE, RPI, Prof. S. Keshav of Cornell, and Prof. Larry Peterson of U Arizona. Acknowledgements will also be included in the slides themselves.

Tentative Grading Percentages

Exams	50%	(3 exams: 15 pts, 15 pts, 20 pts respectively)
Homeworks (6 homeworks: 5 points ea):	30%	
2 Labs:	20%	(based upon C and Java programming)

Course Delivery Format/Policies:

This course will consist of lectures, in-class exercises, informal quizzes, homeworks, labs and examinations (quizzes).

- **Informal quizzes** will be held handed out for your practice every two-three weeks, just to quickly recap material. Informal quizzes will consist of true/false answers. There is no grading of informal quizzes.
- **Homeworks** will contain problems, short-answer questions and reading exercises.
  - Homeworks should be **handed in at the beginning of lecture on which it is due.**
  - Any homework submitted later than this will be marked as late. There will not be a penalty for the first late submissions. However for other late submissions, there will be a **penalty of 10% for lateness** (includes homeworks slipped under the door etc). No makeups for homeworks.
  - Late submissions **will NOT BE accepted** after the day solutions are made available to the class.
  - 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***.
- Labs will be based upon the lab assignments suggested in the book: Chap 3 and 4. The book website: www.awl.com/kurose-ross/ has all the details about the labs. It will involve C programming.
- **Quizzes** will contain true/false questions, short-answer questions, and quantitative problems. The focus will be on understanding of concepts, and problem-solving skill. Quizzes account for 50% of the final grade.
  - Exams will be **open-book/notes**, but will be extremely time-constrained.
  - Exams will be held **during class hours** on **Oct 2nd, Nov 2nd and Dec 4th** (easy to remember).
  - However, if you do have a scheduled conflict for the exam period with a lower-numbered course, please submit a request to the course secretary.
  - Material from slides, text and reading/homeworks will be included in the scope of exams.

Miscellaneous:

- The purpose of these different instruments is to have a positive learning experience, critical thinking about networking issues, and sound grasp of 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. The WebCT bulletin board is a good forum for exchange of opinions.** You will also have an opportunity to express your opinion on course format and delivery in an **informal mid-semester feedback** sheet.
- Important: Course materials will be put up on the WebCT, and also through the instructor's homepages.
- Please use the WebCT bulletin board 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. **The TAs will be assigned to watch the WebCT bulletin boards on every day of the week. So you can expect prompt replies.**

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.