Fall 2004

CEG 702: Advanced Computer Communications

Daniel C. Lee
Wright State University - Main Campus

CEG 702: Advanced Computer Communications

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Syllabus | Announcements

Syllabus

Time/Place: 4:10-5:25pm, TuTh, Room A230 in *Creative Arts*

Instructor

- Dr. Daniel C. Lee, Associate Professor
- 353 Russ Engineering Center
- Tel: (937) 775-5061,
- E-mail: dclee@cs.wright.edu
- Office hours: 2:00-3:00pm Tu, Th or by appointment

Prerequisites

- CEG 402/602, CEG 433/633
- CS 400 and proficiency in C or C++
- Programming experience in C or C++
- Program development tools: editors, compilers, linkers, debuggers
- Data structures: arrays, stacks, queues, lists, and binary trees

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Textbooks

No textbook is required, but students do need to read the following papers:

Papers (Mandatory Reading)

Optical Networks (examples of modern circuit-switching networks)

- **[ZJM00]** H. Zang, J. P. Jue, and B. Mukherjee, "A review of routing and wavelength assignment approaches for wavelength-routed optical WDM networks," *Optical Networks Magazine*, vol. 1, no, 1, Jan. 2000. (pdf) (due on Sept. 23)
- **[XLW00]** S. Xu, L. Li and S. Wang, "Dynamic routing and assignment of wavelength algorithms in multifiber wavelength division multiplexing networks," *IEEE J. Select Areas Commun.*, vol. 18, no. 10, Oct. 2000. (due on Sept. 28)

Internet Philosophy

- **[Cla88]** D. Clark, "The design philosophy of the DARPA Internet protocols," *SIGCOMM'88*, pp. 106-114, Palo Alto, CA, Sept 1988. (.ps and .pdf available at [.html]) (due on Sep. 30)
- **[Cla00]** D. Clark. "Rethinking the design of the Internet: end to end arguments vs. the brave new world," presented at *TPRC 2000*, Alexandria, Va., September 23-25th, 2000. [.pdf] (due on Sep. 30)

Congestion Control

- **[Jac88]** V. Jacobson, "Congestion avoidance and control," *Proc. ACM SIGCOMM '88*, Sept. 1988, pp. 314-329. [.html] (due on Oct. 5)
- **[Ste97]** W. Stevens, "TCP congestion control," *RFC 2001*, Jan 1997. [.html] (due on Oct. 5)

Quality of Service: Link Sharing

- **[PG93]** A. Parekh and R. Gallager, "A generalized processor sharing approach to flow control in integrated services networks: the single node case," *IEEE/ACM Trans. on Networking*, vol. 1, no. 3, pp. 344--357, June 1993. (PDF) (due on Oct. 12)

Quality of Service: MPLS (Multi-Protocol Label Switching)

- **[Ar00]** G. Armitage, "MPLS: the magic behind the myths," *IEEE Communications Magazine*, Jan. 2000.(PDF) (due on Oct. 19)
- **[SL03]** S. Spitler and D. C. Lee, "Integrating effective-bandwidth-based QoS routing and best effort routing," *Proc. IEEE INFOCOM*, San Francisco, CA, 2003 -extended. (PDF) (due on Oct. 19)

Quality of Service: Integrated Service

- **[BCS94]** R. Braden, D. Clark, and S. Shenker, "Integrated Services in the Internet Architecture: an Overview," RFC 1633, June 1994. [.html] (due on Oct. 26)

Quality of Service: Differentiated Service

- **[B+98]** S. Blake et al., "An architecture for differentiated services," RFC 2475, Dec. 1998. [.txt] . (due on Nov. 4)
- **[SZ99]** I. Stoica and H. Zhang, "Providing guaranteed services without per flow management." *ACM SIGCOMM'99*, Boston, MA, Sept. 1999. [.ps.gz][.pdf] [.html] (due on Nov. 4)

Delay-tolerant Networks (For student project)

- **[KFall03]** K. Fall, "A delay-tolerant network architecture for challenged internets," *Proc. ACM SIGCOMM'03* , Larlsruhe, Germany, Aug. 2003. (research paper due on Nov. 11)

References:

1. Archive (to increase level of knowledge and understanding)
2. *Computer Networks: A system approach*, 2nd ed., Larry L. Peterson, Bruce S. Davie, Morgan Kaufmann, 2000. (Highly recommended)
3. *Computer Networks*, 4th ed., Andrew S. Tanenbaum, Prentice Hall, 2002.
4. *Computer Networking: A top-down approach featuring the Internet*, 2nd ed., Kurose & Ross, Addison-Wesley, 2002.

Web Page http://www.cs.wright.edu/~dclee/ceg702_fall04.htm

Course Objectives: The general objective of this graduate-level course on advanced computer communication and networking technologies is to develop students' abilities to (1) conduct research in the area of computer networks and (2) innovate network technologies. This objective will be achieved through a reading/lecture/discussion component and a project component. In particular, we will read papers on various aspects of advanced computer networking, e.g., routing, admission control, congestion/flow control, queuing theory, link scheduling, internetworking, wireless technologies, quality of service, and peer-to-peer networks. We will also learn how to apply (mathematical) optimization to networking.

Students' Responsibilities: Each student must:

1. **participate in class**, asking intelligent questions and offering informative comments and constructive criticisms. Thus, each student must read the appropriate materials (the papers listed above and more, if necessary) **prior to** class and attempt to understand them on his or her own. For each paper listed above, each student must write and submit a **one- or two-page review**. Instructions on how to review a paper will be given. Each student must attend class on a regular and timely basis. **Regular class attendance is mandatory** and essential for success in the course. Students are responsible for gathering all content, handouts, and announcements made in class.
2. complete and turn in the two laboratory projects in a timely manner. You are expected to write your own programs. **Do not** copy from or give your work to others, and **do not** make it possible for others to copy any portions of your work. Violators will receive **Zero** credit on the assigned project.
3. be present for exams at the scheduled times. If a catastrophic event prevents him/her from taking an exam, please contact the instructor as soon as possible.
4. read the paper [KFall03] and write a small **research paper** on the topics discussed there. Page length is not limited, but greater length is not given any merit. This research paper must contain some new results, for example, in the form of a new problem definition, an analytic solution, or simulation results. The objective of this assignment is to train students to find a research topic.

Course Evaluation: Students' final course grade will comprise the weighted score earned on all required course assignments and exams.

Methods: % of final grade

1. Lab projects 20%
2. Paper reviews and class participation: 20%
3. Final exam: 30%
4. Research paper: 30%

Grading scale:

A. 90-100
B. 80-89.9
C. 70-79.9
D. 60-69.9

F. below 60

Re-grading policy: If you have a question about how an assignment or exam was graded, submit **in writing** a re-grading request detailing the rationale for your request.

Late Submission of Programming Assignments: You will lose 5% of the total points for an assignment for each 24-hour period that the assignment is late. Late assignments will be accepted up to 4 days after the due date specified on the assignment handout. The late penalty accrues on weekends just as during the week. Partial credit will be given to students who turn in partially completed assignments. Special consideration will be given to students who have a medical reason for late submission when a doctor's written confirmation of illness is provided. This consideration may also extend to medical emergencies involving children or other family members. Such consideration is at the discretion of the instructor, and will be as reasonable as possible. Special consideration may also be given for employment conflicts (e.g., military duty, travel) if brought to the instructor's attention **prior to** the due date for an assignment. Other courses' requirements are **NOT** valid reasons for special consideration.

Missed Quizzes and Exams: Missed quizzes and exams can be made up only under extenuating circumstances such as medical emergencies and work conflicts, as noted above. Please see the instructor as soon as possible if you know you will be unable to attend a quiz or exam. You are expected to schedule your departure for any end-of-quarter travel *after* your final exam.

Plagiarism: Students are members of a learning community committed to the search for knowledge and truth. Essential to that search is the faithful adherence by all students to the highest standards of honesty and integrity. A grade of 0 or F will be assigned to examinations or assignments on which cheating, plagiarism, or any other form of academic dishonesty is committed or determined to have occurred. For details, see the *Wright State University Student Handbook* section on Academic Dishonesty.

Lab Projects using OPNET

- Lab - introduction
- Lab Project 1, due on Oct. 21, 2004
- Lab Project 2, due on Nov. 11, 2004
