ECE/CS 658   # Internet Engineering   Spring 2011

4 credits (3-3-0)

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Course URL: http://www.engr.colostate.edu/ECE658/2011

Office Hrs: Open hrs and by appointment

Objectives: The field of computer and communication networking continues its exponential growth posing new challenges and opportunities for the networking industry and researchers. Convergence of video/voice/data, high-performance wireless networks, mobile networking, optical networking, novel high-bandwidth applications, and sensor networking are examples of areas of active research and development. This course attempts to provide an understanding of the broad landscape of existing and emerging networking and inter-networking technologies.

Outcomes: Students successfully completing this course will be able to
       a) Use network programming concepts to develop and implement distributed applications and protocols over the Internet, OR Develop and use software based tools to implement and evaluate the performance of communication network protocols.
       b) Develop and implement next generation protocols required for emerging applications
       c) Model and evaluate performance of networking systems
       d) Carry out research and development tasks in networking

The course would be extremely useful for those who would like to gain an understanding of the fundamental principles and practical aspects of communication and data networks. It will open new career paths in these hot areas for those who want to join industry. Those looking for thesis research topics in networking will find this course useful as well.

Prerequisites: CS 457 – Data Communications, or EE456 – Computer Networks, or equivalent background;
Expertise in computer programming. [Assignments may be carried out in any language familiar to student. There will be no help for debugging programs. It is acceptable to do the assignments in C. C++, Java, Perl or another language; however with languages other than C, C++, the student will have to rely on his/her own resources for all the support.]

Texts: Selected conference and journal papers (*class handouts, on-line documents*)
Selected Internet Society RFC (Request for Comment) Standards

Topics:
- Internet protocol suite (TCP/IP)
  - End-to-end paradigm, Quality of Service (QoS) provisioning, Applications (VOIP, etc.), and Selected Protocols,
- Network programming
- Overlay and P2P Networks
- Performance evaluation of protocols and architectures
  - Analytical and simulation models, queuing systems and Markov chains, case studies
- Switching, routing and network processing architectures
  - Packet processing, packet classification, table lookup, etc.

- Topics in wireless networking
    - Selected examples and standards (WiFi, WiMax), wireless mesh networks
    - Cognitive radio and dynamic spectrum allocation
- Topics in Optical Networking   - Selected examples
- Topics in Sensor networking   - Hardware, protocols, standards and applications
- Future of networking

Grading:

Presentations	20%
Homework/Reading Assignments	15%
Lab assignments/ Project	40%
Minute papers	15%
Participation	10%

- The course will be a mix of lectures and student presentations on selected topics. Each student is required to make one 75-minute presentation on a course-related topic.
- There will be several homework and reading assignments. Only selected assignments and problems will be graded. Graded problems may vary from student to student
- The programming/ lab assignments are a very important part of this course. This year, we plan to offer a set of core assignments covering network programming and simulation. These will be followed by more in-depth assignments of student's area of choice or a project replacing 2 to 3 assignments. You must score >60% in each lab assignment/project to pass the course. Part of the grade for lab assignment may be based on a short presentation describing the approach and solution to in-depth assignments or the project.

    Programming is a creative process similar to composition, and the individual or the group must understand the problem and methodology to arrive at a solution. During this time, discussions with colleagues are encouraged. However, the program must be your own work, and no collaborative efforts are acceptable in developing the program, except in case of group assignments, for which any collaboration has to be limited to the group. *Under no circumstances should you copy a program or a segment of a program from another source. Providing code for use by someone else or using someone else's code in any form is academic fraud, and will be dealt with harshly. It is your responsibility to ensure that the code you write for the assignments is not accessible to others.*

- A minute paper is a short write-up addressing a lecture. What is the most significant things you learned in the lecture? Why is it significant? What question is uppermost in your mind at the end of the lecture? Be creative!! Since each minute paper is based on a lecture, you must not submit one for a lecture that you did not attend. The minute paper for a given lecture must be submitted prior to the next lecture. Follow the link from course web page to submit minute papers.
- Active participation in class, such as contributing to discussions will be rewarded. ***Please do not check e-mail, browse web etc. during the lecture except when it is directly related to the lecture.***