Syllabus for EE4272 - Computer Networks
Spring, 2004

Instructor:
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Lectures:
TuTh 8:05-9:20am, EERC 218
Office hours: TuTh. 9:30-10:30am, or by appointment
Course Homepage:  http://www.ee.mtu.edu/ee/faculty/cchigan/ee4272/ee4272.html
Course Mailing List: ee4272-l@mtu.edu

Required Text:

Reference Texts:
2) Communication Networks – Fundamental Concepts and Key Architectures, by Alberto Leon-Garcia & Indra Widjaja, 2000;

Course Objective:
This is not a system administrator training course; It focuses on the principles underline instead of the knowledge of network applications. The goal of this course is to introduce the fundamental network architecture concepts and their core principles/issues in the emerging Communication/Data Networks. The course intends to give the students a complete picture of the data and computer networks systematically. The course emphasizes the concepts and issues underlying the design and implementation of communication networks.
After taking this course, you should have a good understanding of:
- The Basic Principles of Data Communications;
- Communication Protocols and Protocol Architectures;
- Alternative Design Approaches;
- Standards in Data Communications.

Course Outline:
The coursework will include reading, homework & Quizzes, programming-based project/term paper, and two exams. As a senior level course, in addition to the basic material covered in the lectures, the course project and term paper are designed to motivate the students' further interests on some state-of-the-art technologies and research topics within the current network community. The required text "Computer Networks – A System Approach" covers most of the lecture and
homework material. The supplemental material related to the course project and term paper will be provided via the course webpage. Tentative topics to be covered:

- **Introduction**: Requirements of Building a Network; Network Architectures; Implementing Network Software (Chapter 1, Peterson)
- **Direct Link Networks**: Fundamental of Digital Transmission, Encoding, Framing, Error Detection, Reliable Transmission, Ethernet, Token Ring, SONET (Chapter 2, Peterson)
- **Multiplexing**: Frequency-Division Multiplexing, Synchronous Time-Division Multiplexing, Statistical Time-Division Multiplexing, Wavelength Division Multiplexing (WDM) (Chapter 8, Stallings)
- **Circuit Switching**: Space-Division Switching, Time-Division Switching, Routing in Circuit Switch Networks, Control Signaling (Chapter 9, Stallings)
- **Packet Switching**: Switching/Forwarding, Bridges & LAN Switches, ATM, Switching Hardware (Chapter 3, Peterson)
- **Internetworking**: IP, Routing, Global Internet, Multicast (Chapter 4, Peterson)
- **End-to-End Protocol**: UDP, TCP (Chapter 5, Peterson)
- **Congestion Control & Resource Allocation**: Queuing Disciplines, TCP Congestion Control, QoS (Chapter 6, Peterson)
- **Network Security**: Cryptographic Algorithms, Security Mechanisms, Firewalls (Chapter 8, Peterson)
- **Applications** (Chapter 9, Peterson)

**Evaluation/Grading:**

Homework & Quizzes: 25% (At most 8 homework sets will be assigned throughout the Semester).
Midterm Exam: 25%.
Final Exam: 25% (The exams will be comprehensive and closed book/notes).
Project/Term paper: 25% (3 work stages will contribute to the total of 25 points. Each of the first two stages contributes to 5 points).

Notes:
- A Pop Quiz will be given about once a week at the mid of lecture time. It generally has one or two short questions related to the previously assigned HW problems, reading assignments, and the lecture materials.
- HW is not purposed on preparing the exams, but helping you on studying the course material. Therefore the problems in the mid and final exams do not have to be similar to the HW problems. In general, the exam problems are less difficult than the HW problems.
More on Project/Term paper:

Students are required to choose working on a programming based course project, or an academic term paper. The finalized projects and the suggested term paper topics will be distributed by the 10th of Feb. Basic/Medium level Java/C/C++ programming skill are expected to work on the course project. The term paper requires literature study on the latest development/research issues and technologies within the coverage of this course. Up to 2 students are allowed to group into one team for the course project; the term paper has to be done individually. You can choose to work on either the course project or term paper before the due date of “phase 1” of the course project/term paper assignment. Check out at http://www.ee.mtu.edu/ee/faculty/cchigan/ee4272/projects/projects-papers.html for the most updated information.

Course Policies & Notices:

- Attendance of the lectures is strongly recommended. The instructor is not responsible for the material covered in your absence. If you have a legitimate reason for the absence of any lecture session, please let me know before the lecture session.
- The course mailing list is ee4272-l@mtu.edu. All registered students should be able to access this mailing list. Course announcements such as schedule changes and problem discussions will be posted through this mailing list. It is the students’ responsibility to keep up to the most updated announcements.
- Homework assignment and due date will be distributed via mailing list and posted on the course webpage. Late assignment will be penalized 20% of the earned points for each class day. Exceptions to this rule will only be made for cases brought to the instructor’s attention PRIOR to the due date.
- I will answer questions regarding assignment in office, lecture and via email. However, I will cease to respond to an assignment 24 hours prior to the due date.
- Discussions on the assignments are allowed, however, copying or representing someone else’s work or any forms of cheating may cause a grade of F as the penalty.