Course Objectives and Content

This course covers basic principles of communication networks. The material is presented in the context of the seven layer International Standards Organization Open Systems Interconnection reference model. The course will concentrate on the data link, network, and transport layers. Particular emphasis is given to the Internet protocol suite, the IEEE 802.x protocols, and to ATM networking.

Objectives:

Upon completion of the course, the student should be able to

1. Explain the ISO Reference Model, the purpose of each layer, and identify and describe the protocols constituting each layer.
2. Define the TCP and IP protocols and explain the problems that they solve.
3. Explain the major local area network protocols.
4. Explain the problems in point-to-point communication and the techniques of solving the problems.
5. Explain how the Berkeley socket interface is used to write distributed programs.
6. Define flow and congestion control problems, and describe algorithms for their solution.
7. Understand the principles and operation of network routing protocols.

Prerequisites

- The equivalent of CS/ECPE 4504 (basic computer architecture) is a prerequisite. Therefore you should be familiar with virtual memory; multiprogramming; and basic memory, processor, and I/O subsystem organizations
- Strong programming ability in C
• User-level understanding of the UNIX operating system
• Ability to undertake substantial independent design projects

Resources

Required text:


Optional texts:

• Wright and Stevens, *TCP/IP Illustrated*, Vol 1. Addison Wesley

Additional resources:

• World Wide Web site: http://courses.cs.vt.edu/~cs5516/

*(All students are required to have email and WWW access)*

Grading

Semester grades will be determined after all work is completed and graded. Point ranges for letter grades will be based on absolute grading. At instructor discretion, final grades may also be based on grading curves.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>5%</td>
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<tr>
<td>Midterm</td>
<td>20%</td>
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<tr>
<td>Project 1</td>
<td>20%</td>
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<tr>
<td>Project 2</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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 Assignments

All students are required to know how to create and send assignments electronically (using FTP). Assignments submitted after the due date will not be accepted unless there are extenuating circumstances and special arrangements are made prior to the due date. *This course presumes knowledge of the C programming language for programming assignments and projects.*

Projects: Projects involve programming assignments to gain a better understanding of the specific research issues. Projects require the design and implementation of network protocols and routing algorithms to study their impact on network services. Projects should be submitted electronically.
Honor Code Policy

Adherence to Virginia Tech's honor code is expected in all phases of this class. All graded work is expected to be the original work of the individual student unless otherwise directed by the instructor. In working on problem sets, discussion and cooperative learning are allowed and, in fact, encouraged. However, copying or otherwise using another person's detailed solutions to assigned problems is an honor code violation. Projects are to be the work of the individual student. You may discuss general concepts, such as system calls, software libraries, Internet resources, or class and text topics, with others. However, discussion of project solutions, specific code, or detailed report content is an honor code violation. All source material used in project code and reports must be properly cited. Please discuss any questions that you may have about what is or is not permitted with the instructor. Honor code violations, particularly borrowing code – even from past years, will be strictly prosecuted, through evidence from automated code analyzers from UC Berkeley.

Special Needs or Circumstances

Any students with special needs or circumstances should feel free to meet with or otherwise contact the instructor.