CS 254 - Computer Networks
Course Syllabus
Fall, 2018
Douglas Patrone

Time and Place
Lecture: Mon 6:30pm – 9:00pm Walsh 204
Lab Wed 6:30pm – 8:30pm Walsh 101

Instructor
Mr. Douglas Patrone (dpatrone@sbu.edu)
Walsh G15
Phone: (585) 376-0122
Office hours:
3:00pm – 5:00pm Monday
3:00pm – 5:00pm Monday
*Other times by appointment

(These hours may be changed during the first couple of weeks of class)

Course web page http://www.cs.sbu.edu/dpatrone/CS254

In general, announcements, readings, and assignments for CS 254 will be given in class AND published on the course web page. Students are expected to check that page regularly for news, and are nonetheless responsible for any assignment announced in either manner.

Textbook (optional)

Catalog Description
A study of computer networks based on the OSI model of a layered network architecture. The TCP/IP protocol suite is used to illustrate network protocols. The course includes an overview of local area networks, routing algorithms, and network applications. The course consists of three lecture hours and one two-hour laboratory per week. The laboratory component provides experience in network programming using sockets. 4 credits.

Prerequisites
CS 132 – Computer Science II

Course Objectives
1. To understand the underlying principles in the design of a layered network architecture.
2. To be able to identify the general characteristics of local area networks (LANs) and wide area networks (WANs).
3. To be exposed to the TCP/IP protocol stack as an example of a layered network architecture and the St. Bonaventure campus network as an example of a local area network system.
4. To be familiar with Internet applications including the World Wide Web, electronic mail, file transfer protocol (ftp), and the Domain Name System (DNS).
5. To be familiar with the basics of network security.
6. To be familiar with current trends in networking technologies including the Internet of Things.
**Topical outline**

<table>
<thead>
<tr>
<th>Number Of Weeks</th>
<th>Topics</th>
<th>Relevant Labs</th>
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<tbody>
<tr>
<td>2</td>
<td>Introductory Material and Internet Applications</td>
<td>Simulation of Ethernet packet transmission</td>
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<td>System Tools for Network Interrogation</td>
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<tr>
<td>3</td>
<td>Data Communications and Network Hardware (TCP/IP Addressing / Routers/ DNS)</td>
<td>Configuring IP Addresses</td>
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<td></td>
<td></td>
<td>TCP Socket Programming in Java</td>
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<tr>
<td>3</td>
<td>Packet Switching and Network Technologies (LANs, WANs, wireless technologies)</td>
<td>Ethernet Packet Traces</td>
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<tr>
<td>4</td>
<td>Internetworking (IP, TCP, ARP, ICMP, DHCP, NAT, BGP, RIP)</td>
<td>Ethernet Packet Traces II - Using Wireshark to Examine TCP/IP Traffic</td>
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<tr>
<td></td>
<td></td>
<td>TCP Unicast vs. UDP Multicast</td>
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<tr>
<td>2</td>
<td>Network Security and Current Trends in Networking</td>
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**Learning Objectives**

1. Students will learn the underlying principles used to design a layered network architecture.
2. Students will understand the client-server model of Internet services and be able to identify the transfer protocols and client-server interaction used in web browsing, FTP, email, and DNS.
3. Students will understand the different physical media and transmission mechanisms for communication, both wired and wireless. This includes modulation/demodulation, multiplexing/demultiplexing.
4. Students will be able to identify and compare the different local area network topologies and technologies.
5. Students will be able to contrast WAN technologies and LAN technologies for supporting networks.
6. Students will be able to describe the operation of a store-and-forward paradigm for network communication including the need for routing tables and routing algorithms.
7. Students will be able to describe the characteristics of Ethernet as a layer 2 protocol.
8. Students will be able to identify the different layers of the TCP/IP protocol stack and the protocols that are used at each layer. In particular the students will be able to describe the mechanics of the IP, ARP, ICMP, TCP, UDP protocols in supporting internet communications and services.
9. Students will be able to understand the security aspects of a network and the Internet, including access control, private key encryption, public key encryption, firewalls, intrusion detection systems, virtual private networks (VPNs).
10. Students will be able to perform basic network configuration including the configuration of routers.
11. Students will be able to write both servers that support connection-oriented services and servers that support connectionless services.
12. Students will be able to write multi-threaded concurrent servers that can be accessed over the Internet.
13. Students will learn both Windows and Linux command-line utilities for accessing network services and learning network characteristics.
14. Students will be able to capture and trace network traffic using a network analysis tool such as Wireshark.

**Course Policies**
Grades

Grades will be based on:
1. Homework & laboratory assignments 40%
2. Quizzes (8) 30%
3. Final exam (comprehensive) 30%

Homework assignments
Written homework problems will be periodically assigned, collected, and graded. A 10% per day penalty will be assessed for late assignments up to the time the graded work is returned by the instructor. No late assignments will be permitted after the graded work is returned.

Laboratory assignments
There are two types of laboratory experiences. Some of the labs will involve experimenting with network configuration, performance analysis tools, and security monitoring tools. Other labs will require network programming in Java. Many of the laboratory assignments will involve using the LINUX operating system. Each lab assignment will require a write-up that is written using a word processor. Late lab assignments will be penalized 10% per day late.

Quizzes
Approximately eight quizzes will be given. Only the five highest quiz scores will be kept. There is generally no make-ups for missed quizzes.

Final exam
The final exam is comprehensive and is scheduled for Monday, December 10th during the scheduled class time.

Attendance policy
There is no attendance requirement, however students are expected to attend all of the classes and will be responsible for all assignments. Attendance will be monitored. More than two absences (one week of classes) is considered excessive.

Absences from class, excused or not, do not exempt the student from completing the assigned work. If you miss a class it is your responsibility to determine the assignment and complete the work on time.

Classroom Etiquette
Use of cell phones or other personal electronic devices during class is rude and inconsiderate of others. Please turn off cell phones and similar devices during classes and labs. This policy does not apply to personal laptops which may be used for notes and lab exercises.

Academic integrity policy
Academic dishonesty is inconsistent with the moral character expected of students in a university committed to the spiritual and intellectual growth of the whole person. It also subverts the academic process by distorting all measurements. It is a serious matter and will be dealt with accordingly. A list of unacceptable practices, penalties to be assigned, and procedures to be followed in prosecuting cases of alleged academic dishonesty may be found in the Student Handbook.

Students are expected to read and abide by the department’s Academic Practices and Policies, a copy of which will be distributed with the course syllabus. Unless other instructions are explicitly stated all graded work will be subject to the policy “Individual Project With Limited Collaboration: In particular, you may discuss the assignment and concepts related to the assignment with the following persons, in addition to an instructor in this course: any St. Bonaventure University instructor, any student enrolled in CS 254, and any other person
specifically approved by your instructor. You may use the following materials produced by other students: NONE.”

In addition, if you do collaborate with anyone other than the instructor, there must be a note to that effect at the top of the work you turn in.

**Academic dishonesty in any form will not be tolerated.** Typically the first offense will result in a zero on the assignment. Repeated offenses will likely result in a failing grade for the course. Any offense deemed punishable will also be referred to the Dean of Arts and Sciences.

**Services for Students with Disabilities**
Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the Disability Support Services Office, Doyle Room 26, at 375-2065 as soon as possible to better ensure that such accommodations are implemented in a timely fashion.

**Computer Science Department Goals and Objectives addressed in this course:**

**Goal 1: Discipline Specific Learning**

Students will be able to understand and apply the theoretical tools of computer science to standard problems from the field.

Objectives:

1. Students will learn core concepts of the discipline as determined by a nationally recognized professional computer science education organization.
4. Students will describe the design principles used in the construction of particular software systems.
6. Students will develop software solutions in at least three different application areas, such as database systems, user interfaces, graphics, computer networks, operating systems, robotics, etc.

**Goal 2: Reasoning and Inquiry Skills**

Students will be able to read, write, and analyze program fragments and complete programs.

Objectives:

1. Students will write complete programs to solve small problems typical of the field.
2. Students will enhance existing (larger) programs to add capabilities and/or improve the quality of code.