Air Force Institute of Technology
Graduate School of Engineering and Management
Department of Electrical and Computer Engineering

CSCE 560
Introduction to Computer Networking
Course Syllabus
Fall Quarter 2018

Meeting times	1400-1540 Monday & Wednesday
Location	Building 642, Room 204
Instructor	Dr. Barry E. Mullins
Office location	Building 642, Room 209
Office hours	By appointment or as available. Please feel free to drop in anytime that I'm in the office. If I don't have time to meet with you then, we can at least set a time to meet. I prefer you make appointments via email.
Contact information	barry.mullins@afit.edu / (937) 255-3636 ext 7979

Course Description

This course provides an introduction to the fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications. Students will understand and evaluate network protocols. The course discusses the basic performance and engineering tradeoffs in the design and implementation of computer networks. Topics include: overview of network architectures, network topology design, applications, network programming interfaces (e.g., sockets), transport protocols, flow control, routing, network protocols, data link protocols, addressing, and local area networks. Examples are drawn primarily from the Internet (e.g., TCP, UDP, and IP) protocol suite. Socket programming and packet sniffing are used to emphasize topics.

Credits	4
Prerequisites	None

Student Learning Objectives

1	Understand fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications
2	Understand and evaluate network protocols
3	Be able to discuss the basic performance and engineering tradeoffs in the design and implementation of computer networks

Required Books and Resource Materials

- James F. Kurose and Keith W. Ross, *Computer Networking A Top-Down Approach Featuring the Internet*, 7th ed, by Person, 2017.

Recommended/Optional Books and Resource Materials

- B. Forouzan and F. Mosharraf, *Computer Networks: A Top Down Approach*, McGraw-Hill, 2011.
- Larry L. Peterson and Bruce S. Davie, *Computer Networks*, 4th ed, Morgan Kaufmann Publishers, 2007.
- W. Stallings, *Data and Computer Communications*, 7th ed, Macmillan, 2004.
- S. Tanenbaum, *Computer Networks*, 4th ed, Prentice Hall, 2003.
- D. Comer, *Internetworking with TCP/IP*, 4th ed, Prentice Hall, 2000.
- W. Richard Stevens, *TCP/IP Illustrated, Vol 1*, Addison Wesley, 1994.
- Gary Wright, *TCP/IP Illustrated, Vol 2*, Addison Wesley, 1995.

Grading Scheme/Policy

Grading:	Exams (2 @ 16% each)	32%
	Final exam	20%
	Homework (6)	25%
	Lab Assignments (Wireshark x 6) (Python x 2)	23%

Examinations: Three in-class exams will be given for this course: two exams and the final exam. Exams are to be worked solely by the individual. There is to be no collaboration of work on exams.

Homework: Homework must be individual effort. Other students may be consulted for approaches to solving problems but all work must be your own. Submit a hardcopy during class unless told otherwise. Please do not email your work. Please do not "drop off" your work at my office.

Lab Assignments: The labs are intended to have the students apply principles discussed in class and to observe networking protocols in action. Submit a hardcopy during class unless told otherwise. Please do not email your work. Please do not "drop off" your work at my office.

The numerical to letter grade distribution is as follows:

Grade	Grade Point Equivalent	Percent Equivalent
A	4.0	93.0-100.0
A-	3.7	90.0-92.9
B+	3.3	87.1-89.9
B	3.0	83.0-87.0
B-	2.7	80.0-82.9
C+	2.3	77.1-79.9
C	2.0	73.0-77.0
C-	1.7	70.0-72.9
D+	1.3	67.1-69.9
D	1.0	60.0-67.0
F	0.0	below 60.0

Policies

1. **Attendance**: Attendance at all class sessions and exams is mandatory for military and civilians assigned to AFIT as full-time students except for extenuating circumstances. Scheduled classes and exams are defined by the instructor, and they are documented in the course schedule. Part-time students are expected to attend scheduled classes, and absences should be explained to the instructor. The student should provide advance notice, if possible. (Student Handbook, Graduate School Catalog)
2. **Academic Integrity**: All students must adhere to the highest standards of academic integrity. Students are prohibited from engaging in plagiarism, cheating, misrepresentation, or any other act constituting a lack of academic integrity. Failure on the part of any individual to practice academic integrity is not condoned and will not be tolerated. Individuals who violate this policy are subject to adverse administrative action including disenrollment from school and disciplinary action. Individuals subject to the Uniform Code of Military Justice may be prosecuted under it. Violations by government civilian employees may result in administrative disciplinary action without regard to otherwise applicable criminal or civil sanctions for violations of related laws. (Student Handbook, ENOI 36 – 107, Academic Integrity)
3. **Academic Grievance**: AFIT and the Graduate School of Engineering and Management affirm the right of each student to resolve grievances with the Institution. Students are guaranteed the right of fair hearing and appeal in all matters of judgment of academic performance. Procedures are detailed in ENOI 36 – 138, Student Academic Performance Appeals.
4. **Late Assignments and Make-ups**: The late penalty for work not submitted on time is as follows:

1 business day	-10%
2 business days	-30%
3 business days	-60%
4 business days	-100%

5. **Recording Lectures:** You may not record the lectures. Non-Attribution – What you say in class will not be attributed to you if and when your thoughts or ideas are repeated outside of class. (AFIT Faculty Handbook 2014 and AU Instruction 36-2305)

Tentative Schedule

Course assignments, due dates and other requirements may be subject to change.

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.

Class number	Date	Topic	Section
		Course Overview	
		What Is the Internet?	1.1
		The Network Edge	1.2
1,2	1-Oct	The Network Core	1.3
	3-Oct	**No class - Leave**	
	8-Oct	**No class - Holiday**	
		Delay, Loss, And Throughput in Packet-Switched Networks	1.4
3,4	10-Oct	Protocol Layers and Their Service Models	1.5
		Principles of Network Applications	2.1
5,6	15-Oct	The Web and HTTP	2.2
		File Transfer: FTP	
		Electronic Mail in the Internet	2.3
7,8	17-Oct	DNS - The Internet's Directory Service	2.4
		Peer-to-Peer Applications	2.5
		Socket Programming: Creating Network Applications	2.7
		Introduction and Transport-Layer Services	3.1
9,10	22-Oct	Multiplexing and Demultiplexing	3.2
		Connectionless Transport: UDP	3.3
11,12	24-Oct	Principles of Reliable Data Transfer	3.4
13,14	29-Oct	**Exam1 - Chap 1,2**	
		Connection-Oriented Transport: TCP	3.5
		Principles of Congestion Control	3.6
15,16	31-Oct	TCP Congestion Control	3.7
		Overview of Network Layer	4.1
		What's Inside a Router?	4.2
17,18	5-Nov	The Internet Protocol	4.3
		Generalized Forwarding and SDN	4.4
		Introduction	5.1
19,20	7-Nov	Routing Algorithms	5.2
	12-Nov	**No class - Holiday**	
		Intra-AS Routing in the Internet: OSPF	5.3
		Routing Among the ISPs: BGP	5.4
		The SDN Control Plane	5.5
21,22	14-Nov	Introduction to the Link layer	6.1
		Error-Detection and -Correction Techniques	6.2
23,24	19-Nov	Multiple Access Links and Protocols	6.3
25,26	21-Nov	**Exam2 - Chap 3,4,5**	

		Switched Local Area Networks	6.4
27,28	26-Nov	Retrospective: A Day in the Life of a Web Page Request	6.7
		Introduction to Wireless	7.1
29,30	28-Nov	Wireless Links and Network Characteristics	7.2
31,32	3-Dec	WiFi: 802.11 Wireless LANs	7.3
		What is Network Security	8.1
		Principles of Cryptographic	8.2
		Message Integrity and Digital Signatures	8.3
		End-Point Authentication	8.4
33,34	5-Dec	Securing Email	8.5