NEW YORK CITY COLLEGE OF TECHNOLOGY/CUNY
Computer Systems Technology Department

COURSE: CST2307 – Networking Fundamentals
(2 class hours, 2 lab hours, 3 credits)

Class Meetings:
Class Location:

Instructor:
Office Phone:
Email:
Office Location:
Office Hours:

Course Description

This course introduces students to fundamental networking concepts and skills. It provides instructions in networking media, physical and logical topologies, and common networking standards and protocols. Specifically, the course presents the conceptual framework of the OSI model, and its implementation with the TCP/IP and other network protocols. Communication principles over guided and unguided media are introduced as well as cloud computing, network virtualization, and network security. Both networking design and analysis methods are emphasized. Hands-on laboratory exercises and projects reinforce the material presented in the lectures and enable students to develop practical networking skills. The course also provides students with the knowledge necessary to design, install, configure, and support network infrastructure. Networking administration skills are developed for different operating systems.

Course Objectives

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

- Demonstrate understanding and correct usage of networking terminology.
- Demonstrate understanding of various networking topologies, major types of network cabling and related technical terms.
- Describe the role of a Network Interface Card (NIC) for network communications and explain how the NIC controls network communication flow.
- Demonstrate understanding of the OSI reference model layers and their relationships to the networking software and protocols.
- Demonstrate understanding of the function and structure of protocol data units (PDUs) and communication protocols in a network; discuss the layered architecture of protocols and describe the common protocols and how various network Operating Systems (NOS) use them.
- Demonstrate understanding of the TCP/IP suite and its common protocols.
- Demonstrate understanding of the functions and features of a NOS.
- Perform related network administration tasks.

- Describe the elements of an effective troubleshooting methodology and use a variety of software and hardware tools to diagnose problems.
- Demonstrate understanding of network backup and recovery strategies as well as protection of a network from viruses.
- Identify security risks in Local Area Networks (LANs) and Wide Area Networks (WANs) and understand security techniques.
- Identify features and benefits of cloud computing and network virtualization to protect networks.
- Use NOS administration techniques to provide basic security.

Course Prerequisite

CST1215 Operating System Fundamentals.

Required Class Materials

Textbook: *CompTIA Network+ Guide to Networks,* Jill West, 9th Edition, Cengage Learning, 2021, ISBN-13: 978-0357508138.

Students using older editions of the book are required to map subjects discussed in the class with sections of their books by themselves.

Technology Prerequisites

- The college provides email accounts to all City Tech-enrolled students. **All communications with students should use CityTech email accounts**. Students who had designated a personal email address as "Preferred" in CUNYFirst and Blackboard may miss important communications from the College and University.
- **iTec** (Instructional Technology and the Technology Enhancement Centers) supports students with their technology needs.

  Important contact details for iTec:

  Office Location: Room G601

  General Phone: (718)-254-8565

  Email: itec@citytech.cuny.edu

  Website: http://websupport1.citytech.cuny.edu/index.html
- **Blackboard**

  If a student needs help with Blackboard, he/she should visit: http://websupport1.citytech.cuny.edu/studentbb.html.

  Blackboard training may also be available in the open student lab located in General Building, 6th floor, room G600. The phone number for the lab is (718) 254-8565.

Attendance Policy

Our class meets in-person.

Marking student's attendance:

- Student arriving during the first 20 minutes of class and staying in the class until the end will be marked "present" for that day
- Student arriving more than 20 minutes after the beginning of class but within the first half of it will be marked "late."
- Student timely arriving but leaving more than 20 minutes before the class ending will be marked "late/partial."
- In all other circumstance, Student will be marked "absent."

Attendance and class participation are essential and excessive absences may affect the final grade.

Academic Integrity Policy

You are prohibited from sharing, submitting or posting on the Internet your or disseminating in any electronic or printed form any course materials (assignments, tests, quizzes, assignments, etc.) as well as any completed work you turn in to me. Students who reproduce exams or quiz questions, or their other completed work, are subject to an academic integrity violation according to CUNY Academic Integrity policy.

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog.

The professor of the course has the authority to give a grade of **F** if the student submits the work of another person in a manner that represents his/her work, or knowingly permits one's work to be submitted by another person without the instructor's permission (see College Catalog more details on Academic Integrity Policy). **The professor preserves the right to ask the student to defend any of his/her assignment or test if the authorship of submitted work raises questions.**

Policy against cheating:

- Any cheating attempt will not be tolerated. You will get 0 points for an exam if I suspect that you cheat, without deliberating it with a cheating student at any time.
- I will submit a Faculty Action Report (FAR) form to CityTech's Academic Integrity Office **in all circumstances where I suspect an academic dishonesty, I will write a Faculty Action Report form about the incident and provide it to the NYCCT Academic Integrity Officer.** You will have the right to contest allegations of academic dishonesty with the NYCCT Academic Integrity Officer.

College Diversity Statement

This course welcomes students from all backgrounds, experiences, and perspectives. In accordance with the City Tech and CUNY missions, this course intends to provide an atmosphere of inclusion, respect, and mutual appreciation of differences so that together we can create an environment where all students can flourish. It is the instructor's goal to provide materials and activities that are welcoming and accommodating of diversity in all of its forms, including race, gender identity and presentation, ethnicity, national origin, religion, cultural identity, socioeconomic background, sexuality, and sexual orientation, ability, neurodivergence, age, and etc. Your instructor is committed to equity and actively seeks ways to challenge institutional racism, sexism, ableism, and other forms of prejudice. Your input is encouraged and appreciated. If a dynamic that you observe or experience in the course concerns you, you may respectfully inform your instructor without fear of how your concerns will affect your grade. Let your instructor know how to improve the effectiveness of the course for you personally or for other students or student groups. We acknowledge that NYCCT is located on the traditional homelands of the Canarsie and Lenape peoples.

Blackboard Navigation

Class materials and grades can be accessed through registered student's account on Blackboard

Grading Procedure:

Exams[1]	60%
Quizzes[2]	15%
Assignments	15%
Labs and Participation[3]	10%
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TOTAL	100%

Letter Grade	A	A-	B+	B	B-	C+	C	D	F
Numerical Grade	93-100	90-92.9	87-89.9	83-86.9	80-82.9	77-79.9	70-76.9	60-69.9	<=59.9

[1] 2-3 exams covering all the material taught during the semester.

[2] Short (possibly unannounced) quizzes during the semester testing students' knowledge for each chapter.

[3] Class Participation is based on how much students engaged during our classes and labs. Students should strive to: *(i)* be part of in-class discussions, *(ii)* refrain from browsing unrelated websites or other sources during class meetings, *(iii)* keep low number of missed classes, *(iv)* keep low number of late arrivals and early departures, *(v)* actively participate in all in-class and take-home lab activities. Only students that satisfy *(i)-(v)* may obtain full percentage for their class participation.

Course Outline

Week	Topic	Chapter
1	Syllabus overview and Introduction to CST2307.	
1-2	Introduction to Networking: How Networks are Used, Controlling Network Access, Networking Hardware and Physical Topology, and The Seven-Layer OSI Model. Quiz 1 – Chapter 1	1
2-3	Infrastructure and Documentation Quiz 2 – Chapter 2	2
3-4	Addressing: How Computers Find Each Other on Networks, Overview of Addressing on Networks, How Host Names and Domain Names Work, How Ports and Sockets Work, and How IP Addresses are Formatted and Assigned. Quiz 3 – Chapter 3	3
4-5	Protocols: TCP/IP Core Protocols and Routers and How They Works. Quiz 4 – Chapter 4 **Exam 1 - Chapters 1-4**	4
5	LAB 1 Safety and troubleshooting. Use of *ipconfig*/*ipconfig*, *nslookup*, *arp*, *tracert* /*traceroute*, *route*, *route*, *ping, pathping/mtr* commends as well as Wireshark program to investigate a network and its potential problems.	1-4
5-6	Cabling: (signaling, modulation, multiplexing, bandwidth, baseband, broadband). Ethernet standards, interfaces, and cabling types (e.g., Twisted-Pair Cable and Fiber-Optic Cable. Quiz 5 – Chapter 5	5
6-7	Wireless Networking: Characteristics of Wireless Transmission, Wi-Fi WLAN Architecture, Implementing WLAN, and 802.11 Wireless Network Security. Quiz 6 – Chapter 6	6
7-8	Network Architecture: from physical architecture to virtual architecture to cloud architecture. Quiz 7 – Chapter 7	7
9-10	Segmentation: Segmentation and Subnetting, Virtualization, and Virtual Network Components. Quiz 8 – Chapter 8	8

10-11	**Exam 2 - Chapters 5-8** (and important topics from Chapters 1 -4)	
11	LAB 2 Configure and diagnose LANs. Use DHCP and static IP addressing. Implement LAN security measures, design, setup, and configure VLAN.	5-8
12	Wide Area Networks: WAN Essentials, WAN topologies, PSTN, Wireless WANs, and overview of WAN protocols and technologies. Quiz 9 – Chapter 9	9
13	Risk Management: Security Risks, Effective Security Policies, Security in Network Design, and Troubleshooting Malware Risks and Infections. (*parts*) Quiz 10 – Chapter 10	10
14	Security in Network Design (*parts*) and Performance and Recovery (*parts*)	11, 12
15	**Exam 3 - Chapters 9-Book's end** (and important topics from Chapters 1 -8)	

Assessment criteria

For the successful completion of this course a student should be able to:	Evaluation methods and criteria
1. Demonstrate understanding and correct usage of networking terminology.	1. Students will demonstrate on homework, discussions, and exams their proper understanding of the networking terminology.
2. Demonstrate understanding of major networking topologies, major types of networking cables and related technical terminology.	2. Students will demonstrate on homework, discussions, and exams how familiar they are with network topologies and cabling.
3. Describe the OSI reference model, layers, and how they relate to the networking protocols.	3. Students will demonstrate on exams and homework projects their understanding of the OSI model.
4. Demonstrate understanding of the structure of packets and functions of communications protocols; understand the layered architecture of protocols and describe the major protocol stacks.	4. Students will demonstrate on homework projects, lab exercises and exams their ability to setup protocols for Windows OS, and their understanding of major protocols.
5. Discuss and recognize major network architectures, discuss emerging networking technologies.	5. Students will demonstrate on homework, discussions, and exams their knowledge of major network architectures.
6. Demonstrate understanding of major tasks of Network Administration, and the network administrator job responsibilities.	6. Students will perform basic network administration tasks for a Windows 2003 server network, and Linux –based network on lab exercises and exams.
7. Describe TCP/IP protocol stack, its purpose, components and TCP/IP applications.	7. Students will demonstrate on homework, discussions, and exams their knowledge of TCP/IP components and demonstrate their familiarity with TCP/IP applications.
8. Demonstrate understanding of the concept of network fault tolerance and the importance of establishing a network backup system and antivirus software.	8. Students will demonstrate on homework and exams their knowledge of backup procedures and antivirus software installation and setup.
9. Demonstrate understanding of the network troubleshooting process, use hardware and software tools to resolve network problems.	9. Students will demonstrate on homework and lab projects how to handle network problems.