

Department of Electrical and Computer Engineering
CPE 679WS/NIS 679WS - Computer and Information Networks

BASIC INFORMATION

Course Name:	Computer and Information Networks
Credits:	3
Classroom and Hours:	Web
Office Hours:	Mondays, 2:00 – 5:00 p.m., EST
Office Hours Zoom Link:	https://stevens.zoom.us/j/7342599424
Instructor:	Prof. Min Song
Phone:	(201) 216-5291
Email:	Msong6@Stevens.edu
Prerequisite Knowledge	C/C++/MATLAB programming

REQUIRED TEXTBOOK

Computer Networks, 6e, Tanenbaum, Feamster, and Wetherall, Prentice Hall, © 2021
Print ISBN: 9780136764052, 0136764053; eText ISBN: 9780135407981, 0135407982

Suggestion: <https://www.vitalsource.com/referral?term=9780135407981>

COURSE MATERIALS

All lecture slides and videos, homework assignments, and other reading materials will be uploaded to the course website.

COURSE DESCRIPTION

Learn the technologies that make the Internet work. The course is based on the OSI (Open Systems Interconnection) reference model and the TCP/IP reference model for data communications. Topics include transmission media, wireless transmission, from waveforms to bits, modulation, multiplexing, public switched telephone network, cellular networks, Wi-Fi networks, Ethernet, wireless LAN, Bluetooth, data link layer protocols, multiple access protocols, network layer protocols (IP), transport layer protocols (TCP/UDP), Quality of Service, error control, flow control, congestion control, bridges, routers, and cellular base stations. A focus is placed on the design and analysis of network architectures, network protocols at different layers, and networking systems performance. Cross-listed with: NIS 679.

LEARNING OBJECTIVES

The objectives are to

- Learn the basic concepts of computer and information networks and fundamental principles of data communications
- Study a variety of computer architectures
- Study network protocols at different layers
- Learn how to design simple network protocols

- Understand the fundamentals of wireless communication networks
- Learn how to design high-performance networking systems
- Learn how to identify a research problem and develop solutions for the problem.

FORMAT AND STRUCTURE

This course is comprised of weekly lectures and discussions; all will be conducted online. There will be six homework assignments, two exams, one term project, and six practice quizzes.

COURSE REQUIREMENTS

Students are required to read all lecture notes and the corresponding chapters/sections of the textbook, watch all the lecture videos provided in Canvas, actively participate in class discussions, and complete all the required work (homework assignments, exams, term-project, practice quizzes) in a timely manner.

Online Sessions. Online sessions will be arranged during the office hours. The online session includes explanations about the assignments, quizzes, and exams. All online sessions will be arranged via the Zoom video conference. The discussion board in Canvas will be a good forum to share all kinds of useful resources. Notice that participating in the online discussion with the instructor and classmates is very important for this course.

Homework Assignment. There will be six homework assignments throughout this course. Each assignment counts for 50 points, a total of 300 points. The due date of each assignment will be specified along with the assignment; it is usually two weeks after the date when the homework is assigned. Five points will be deducted each day after the due date. All homework must be submitted in WORD format; no handwriting is accepted. In addition, there will be six practice quizzes; All quizzes will be embedded in the lecture slides.

Term-project. There are three milestones for the project: *mid-stage report*, *presentation*, and *final report*. The mid-stage report summarizes the project activities and preliminary ideas. At the end of the semester, each student will give a PowerPoint presentation and submit the final report. The project topic must be related to this course. The term-project will be graded as follows:

- 3-4-page mid-stage report, IEEE format, 50 points (Due in the middle of the semester)
- Presentation, 50 points (Due in the last second week of the semester)
- 6-7-page final report, IEEE format, 200 points (Due in the last week of the semester)

Notice that the mid-stage and final report must be written in IEEE format. Please follow the templates provided at: <https://www.ieee.org/conferences/publishing/templates.html>. Reports not written in IEEE format will not be accepted. The main sections of the report are as follows,

Section 1.	Introduction	1 page
Section 2.	Problem statement	0.5-1 page
Section 3.	Solutions	2-3 pages
Section 4.	Results and analysis	2-3 pages
Section 5.	Conclusions	1/4 page
References.	Four papers published in the last five years at IEEE journals or conferences. Please do not copy and paste any single sentence from any references.	

Exams. There will be one mid-term exam and final exam; each exam counts for 300 points. The final exam covers the materials after the mid-term exam. Excused absence from any exam shall seek consent from the instructor before the exam day; rearrangement might be scheduled only if a student has a physical problem evidenced by Doctor's prescription. Both exams will be open books.

GRADING PROCEDURES

Grades will be based on:

- | | |
|------------------------|------------|
| • Homework (25 %) | 300 points |
| • Term-project (25 %) | 300 points |
| • Mid-term Exam (25 %) | 300 points |
| • Final Exam (25 %) | 300 points |

Totally 1,200 points.

ACADEMIC INTEGRITY

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline. All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at https://www.stevens.edu/sites/stevens_edu/files/Graduate-Student-Code-Academic-Integrity.pdf.

LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

DISABILITY SERVICES CONFIDENTIALITY POLICY

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies. For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/office-disability-services>. If you have any questions please contact Phillip

Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone (201) 216-3748.

INCLUSIVITY

Name and Pronoun Usage. As this course includes group work and in-class discussion, it is vitally important for the class to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement. Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements. Students in this class are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

Questions to Your Grades. You may request the instructor to reevaluate your homework, exams, term-project, and other course materials if you have any question to your course grade. Written request must be submitted to the instructor within seven calendar days after the grade was assigned.

TENTATIVE COURSE SCHEDULE

The following is a tentative course schedule. Minor changes may take place. Any changes will be communicated to students via class lecture notes in Canvas.

Weeks	Topic(s)	Readings	Assignment
Week 0	Orientation		
Week 1	Syllabus; Introduction of computer networks; Use of computer networks; Type of computer networks; Network technology	Textbook 1.1, 1.2, and 1.3	Homework 1 assigned.
Week 2	Examples of networks; Network protocols; Reference models	Textbook 1.4, 1.5, 1.6.1, 1.6.2	Term-project assigned.
Week 3	Guided transmission media; Wireless transmission; From waveforms to bits	Textbook 2.1.1-2.1.4, 2.2, 2.3, 2.4	Homework 2 assigned.
Week 4	Public switched telephone network; Cellular networks; Data link layer design issues; Error detection and correction	Textbook 2.5, 2.6, 3.1, 3.2	Homework 3 assigned.

Week 5	Elementary data link protocols; Improving efficiency	Textbook 3.3, 3.4	
Week 6	Channel allocation; Multiple access protocols; Ethernet	Textbook 4.1, 4.2, and 4.3.1-4.3.4	Homework 4 assigned.
Week 7	Wireless LAN; Bluetooth; Data link layer switching	Textbook 4.4, 4.5.1-4.5.3, 4.7	
Week 8	Mid-term exam		
Week 9	Network layer design issues; Routing algorithms in a single network	Textbook 5.1, and 5.2.1-5.2.5	Homework 5 assigned. Term-project 3-page mid-stage report due.
Week 10	Routing algorithms in a single network; Traffic management;	Textbook 5.2.6-5.2.8, and 5.3	
Week 11	Quality of service; Internetworking; Network layer in the Internet	Textbook 5.4.1-5.4.3, 5.5, and 5.7.1-5.7.4	
Week 12	Transport service; Elementary of transport protocols; Congestion control	Textbook 6.1, 6.2.1-6.2.4, and 6.3.1-6.3.2, 6.4	Homework 6 assigned.
Week 13	Transport protocols: UDP and TCP	Textbook 6.5.1-6.5.10	
Week 14	Term-project presentation		
Week 15	Term-project final report due Final exam (time TBD)		