

Networks and Data Communications

CS 447-002 (CRN: 16274) - Spring 2024

Welcome to CS 447!

Instructor: Dr. Hiroshi Fujinoki

Office: EB 2034

Office Phone: 650-3727

Email: hfujino@siue.edu

URL: www.siue.edu/~hfujino

Office Hours: (1) Mondays: 10:00 a.m. - 12:00 p.m.

(2) Tuesdays: 11:30 a.m. - 12:00 p.m.

(3) Wednesdays: 10:00 a.m. - 12:00 p.m.

(4) Thursdays: by appointment (should be made 24 hours in advance or the office hour will be made available based on the best-effort basis)

(5) Fridays: no office hour

Note 1: The above office hours will not be available during the final exam week and Spring Break weeks.

Note 2: The above office hours can be offered as zoom meetings, but the priority is for those who stop by Dr. Fujinoki's office in person.

Class Meeting Room: EB - 2170

Class Meeting Days: M and W

Class Meeting Time: 1:30-2:45 p.m. (for both M and W lectures)

Note: item with "♣" symbol means an important item.

♣ Course Prerequisites:

CS340 (Data Structure and Algorithms) and CS314 (Operating Systems), or the instructor's permission. If you have not taken these courses, please talk to the instructor.

♣ Course Objectives:

This course is an introduction to computer networks. There are three objectives in this course. The first objective is to acquire fundamental knowledge about underlying mechanisms in computer networks. The second objective is to become proficient in essential network programming techniques such as sockets using TCP/IP and HTML

protocols through programming projects. The third objective is to be familiar with theoretical methods to analyze system performance of various aspects of computer networks. Since this course is an introductory course, much emphasis will be put in the first two objectives. By the end of the semester, students are expected to be proficient in networking programming with an insight to the underlying network mechanism.

♣ **Grading Policy for Undergraduate Students:**

Activities:	Weight:	Final Letter Grade:	
Quizzes:	16%	100-92:	A
Project(s):	15%	91-82:	B
Midterm Exam:	29%	81-72:	C
Final Exam:	40%	71-62:	D
		Below 62:	F

♣ **Grading Policy for Graduate Students:**

Activities:	Weight:	Final Letter Grade:	
Quizzes:	15%	100-92:	A
Project(s)* ³ :	10%	91-82:	B
Paper Review:	10%	81-75:	C
Midterm Exam:	30%	74-70:	D
Final Exam:	35%	Below 70:	F

Note 3: A total of two projects are planned (subject to change) in this course. The grading weight for the two projects are 70% (the first project) and 30% (the second project) of the project grade (this weight scheme is subject to change). For the graduate students, their distribution is 65%, 25%, and 10%.

♣ **Exams:**

- Exams will be **closed textbook** and **closed notes**.
- Exams will cover reading assignments, the course projects, and the exercise questions posted to the course home (the course website).
- The final exam will be a cumulative exam.
- Absence from an exam or failing to submit your work by the end of an exam will result in zero point for the exam (except for medical emergencies).

- No electronic devices ((smart) phones, PCs, and etc.) can be used during the exams. Use (including manipulating or watching one) of such electronic devices during an exam will be considered academic dishonesty.
- Makeup exam will be offered only for medical emergency (with a signed doctor's letter).
- Any error regarding your graded exams should be reported to Dr. Fujinoki within two weeks (14 calendar days) after your attendance status is posted to the course web site.

♣ **Programming Projects (tentative plans - subject to change):**

- There will be two programming projects (three for the graduate students).

Project 1: Develop a multi-threaded application-level firewall using C/C++ socket.
We are going to use Winsock for Win32 environment.

Project 2: TBA

Project 3: TBA

♣ **Quizzes:**

- There will be 12 quizzes during this course. The quizzes are closed textbook, notebooks and neighbors (you are allowed to use your pens, pencils, blank papers, eraser(s) and a calculator during a quiz). A list of possible questions for each quiz will be posted in the course home page at the end of the week before each quiz. The questions will appear as posted in the list in the actual quizzes (parameters may be modified for some questions).
- Quiz schedules are subject to change, depending on the lecture progresses, severe weather, and etc.

Paper Review (only for graduate students): TBA (using another handout)

Attendance Policy:

- Attendance will be taken without prior notice at the beginning of lectures (being late more than 5 minutes will be considered absence).
- For each absence after the second absence, -2 point penalty will be applied to your exam grade (each such absence before the midterm, the penalty will be applied to your midterm exam and for those after the midterm, the penalty will be applied to the final exam).

- The above penalty will not apply to medical emergency (however, you need to provide written proof of medical service to waive the penalty).
- An attendance card will be provided to each person who attends a lecture. At the end of a lecture, each of you should return your attendance card with your SIUE ID written on the card. The attendance card should be the one provided by the course instructor or the teaching assistant for this course. Returning an attendance card that is NOT provided by either the course instructor or the teaching assistant will be considered as an act of cheating. For the first time a person violates this rule, that person will receive a warning (and it will be considered as an absence). The second time the same person violates this rule, the person will receive a failing grade for this course.
- Any error regarding your class attendance status should be reported to Dr. Fujinoki within two weeks (14 calendar days) after your attendance status is posted to the course web site.

♣ Academic Dishonesty:

Following activities (but not limited to them) will be considered academic dishonesty:

I. Exams:

- Communicating (e-mails, phone calls, and texting, but not limited to them) with anyone (except the course instructor)) during exams.
- Using materials not allowed during exams.
- Anyone committing academic misconduct above (I-(a) or (b)) will receive a failing grade for this course and reported to the department chair as well as to the dean of the school of engineering.

II. Programming Projects:

- (a) Submitting work totally or partially done by somebody else (this includes any human/electronic sources (such as web sites and even another course at SIUE) unless explicitly allowed by the course instructor).
- (b) Submitting program source code files (for the programming projects) that are developed by collaborations with other people. This includes both program designs and implementations.
- (c) Anyone committing academic misconduct above (II-(a) or (b)) can receive a failing grade for this course and reported to the department chair as well as to the dean of the school of engineering

III. Academic Dishonesty Penalties to graduate students

Academic dishonesties by graduate students will be more seriously penalized (than undergraduate students).

♣ Required Textbook:

- James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach" (Seventh Edition), Addison-Wesley (ISBN: 9780133594140).

Other Required Skills/Knowledge:

- Experience with C/C++ (MS .NET or MS VC++)
- Knowledge of modern operating systems

♣ Other Notices:

- Every student is expected to check "Course Notices" in CS447 home www.cs.siu.edu/~hfujino/SP2024_CS447_002/CS447_SEC2.html at least twice in a week.
- The instructor is NOT responsible for losing course credit by failing to use the information posted to the course home (including those when you do not check the CS447 home).
- Each of you is expected to regularly check your SIUE emails. Some important messages may be sent to your SIUE e-mail address.
- For any grading problem, each student is expected to contact the course instructor within 14 days after the grade is posted or returned (failing to contact within 14 days may result in being unable to fix the problem).
- E-mails sent to the course instructor during weekends, holidays, and the spring break week may not be responded.
- Any special arrangement agreed between you and the course instructor (Dr. Fujinoki) should be documented (i.e., emailed or posted to the course home). Any promises or agreements orally made between you and the course instructor may not take effect until one is documented (it is your responsibility to document any such promises and agreements).
- Ask your questions to the course instructor whenever you have anything you do not have a clear answer for. Please do not make your own assumptions (if

you do, you are responsible for any assumptions you make when they are not correct).

♣ Disability Support:

- Students who believe they may need accommodations in this class are encouraged to contact the office of Disability Support Services as soon as possible. It is the students' responsibility to alert the instructor to SIUE sanctioned accommodations. If anyone needs assistance from SIUE Disability Support Services, please contact them.

♣ Tentative Class Schedule (subject to change):

This schedule is tentative and subject to change.

Week #:	Day	Topics
Week 1:	January 8 (M): January 10 (W):	Course Introduction, circuit-switching and packet-switching networks Quiz #1 , Local-area-network (LAN), Wide-Area-Network (WAN), the Internet and intra-net Network Protocols and OSI 7-layer model
Week 2:	January 15 (M): January 17 (W):	Martin Luther King, Jr. Holiday (no lecture) Quiz #2 , Project #1 description (1), socket programming tutorial Client-server architecture IP address and TCP port number Project Phase 1 description (2)
Week 3:	January 22 (M): January 24 (W):	Quiz #3 , Circuit-switching and packet switching networks TCP error and flow control (Stop-and-Wait ARQ)
Week 4:	January 29 (M): January 31 (W):	Quiz #4 , TCP error and flow control (Selective-Reject & GBN ARQs) Internet architecture (IP address structure) Domain address, host address, CIDR-IP address
Week 5:	February 5 (M): February 7 (R):	Quiz #5 , Layer-2 and 3 switches Local Area Networks Bus, ring and star LAN, Repeaters, bridges and routers MAC address, IP address, and host name translation (DNS and ARP)
Week 6:	February 12 (M): February 14 (W):	Quiz #6 , Dijkstra and Bellman-ford algorithms, distance-vector routing protocol Transmission Control Protocol (TCP) and TCP-slow start linear-growth flow-control
Week 7:	February 19 (M): February 21 (W):	Ethernet Essential: CSMA/CD and binary back-off, one-persistent, and p-persistent Switch architecture (TDM switch, cross-bar switch and knockout switches), concept of blocking and non-blocking switches
Week 8:	February 26 (M): February 28 (W):	Midterm Exam Project #2 description
Week 9:	March 4 (M): March 6 (W):	Spring Break (no lecture) Spring Break (no lecture)

Week 10: March 11 (M): March 13 (W):	Quiz #7 , Internet routing (1) Internet routing (2)
Week 11: March 18 (M): March 20 (W):	Quiz #8 , Multimedia Support: QoS Control and DiffServ (1) Multimedia Support: QoS Control and DiffServ (2)
Week 12: March 25 (M): March 27 (W):	Quiz #9 , Wireless and cellular networks (1) Wireless and cellular networks (2)
Week 13: April 1 (M): April 3 (W):	Quiz #9 , Cloud computing: concept, implementation, and concerns Network Security (1)
Week 14: April 8 (M): April 10 (W):	Quiz #10 , Network Security (2) Hardware-based error controls: bit-errors, parity and CRC error detection
Week 15: April 15 (M): April 17 (W):	Quiz #11 , synchronous and asynchronous signal transmissions time-division and frequency-division multiplexing
Week 16: April 22 (M): April 24 (W):	Quiz #12 , Topics TBA Topics TBA

Final Exam Week: April 29 (Monday) at 12:00-1:40 P.M.: **Final Exam (comprehensive)**

- The list of the reading assignment is the minimum requirement. It is expected that each student voluntarily studies not only the required sections but other related sections or materials.
- Required reading should be done before the lecture.
- If you have any problem for the above schedule, please contact to Dr. Fujinoki as soon as possible.
- Any question regarding this syllabus should be addressed to: hfujino@siue.edu