

CS621 – Network Programming – Spring 2025

Professor: Dr. Vahab Pournaghshband (e-mail: vpournaghshband@usfca.edu)

Instructor's Webpage: vahab.cs.usfca.edu

Course Webpage: <http://cs621.cs.usfca.edu/>

Lectures: TuTh 2:40-4:25pm @ LS G12 & TuTh 4:35-6:20pm @ LS G12

Office Hours: Tu 6:20-7:00pm & W 1:40-2:30pm & Th 1:30-2:30pm (@ HR449 or via Zoom)

Teaching Assistant: Shyon Ghahghahi (e-mail: sghahghahi2@dons.usfca.edu)

Office Hours: Refer to Google Calendar on the course webpage (via Zoom or @ HR411)

Course Description. *From the Catalog:* Prerequisites: CS 601 and (CS 673 or CS 603). Network application programming. Upperlayer protocols and their interfaces. Topics to be chosen from: TCP/IP, sockets, remote procedure calls, network management, client/server programming, internet protocols (FTP, SMTP, HTTP, and SNMP), higher-level interoperability (CORBA), performance issues, and security.

Course Objectives. In this course, you will learn the fundamentals of computer networks and widely used network and transport protocols (TCP,UDP,IP,ICMP). Additionally, you will be introduced to middleboxes and various quality-of-service mechanisms. Furthermore, selected relevant security topics in Computer Networks will be discussed in this course. Through the course project, you will learn network application programming. C/C++ will be used in this course which is the standard language for system applications.

Student Learning Outcomes. On completion of this course the student should be able to accomplish the following:

1. Understand the state-of-the-art in network architecture, protocols, and networked systems.
2. Understand how the Internet works today.
3. Understand the effectiveness of existing or similar network protocols.
4. Be conversant with primitives of network programming.
5. Understand how to conduct networking research and develop innovative ideas.

Textbook:

- Computer Networks (6th Edition) - Tanenbaum.
- Beej's Guide to Network Programming - (Free online book)
- I will provide other online resources.

Course Outline. The following (tentative) topics will be covered in this course:

- Computer Networks Fundamentals
- Computer Networks Protocols (TCP/UDP/IP/ICMP/DNS)
- Quality of Service
- Middleboxes
- Network Security - threats and countermeasures
- Cryptography
- Security Analysis and Forensics
- Network Programming
- Other

Grading: Your grade will be based upon the following weighted list:

- Labs 5% (3 labs @ 2, 3, 0)% each respectively)
- Project 1 35%
- Project 2 45%
- Exam (April 15th): 15%

Your combined percentage can be converted to a letter grade using the table below. Required percentages may be slightly reduced at the instructors discretion, but it won't increase.

A	92%	A-	90%	B+	88%	B	82%	B-	80%	C+	78%
C	72%	C-	70%	D+	68%	D	62%	D-	60%	F	0%

Exams. There will be one exam in this course. There will be no final exam during the finals week. Duration of the exam is 105 minutes. The exam is cumulative and is open books and open notes, but closed electronic devices.

Labs. The labs will be posted on the course webpage along with their due dates. The students' solution to those will be submitted via Canvas. All labs must be done individually. Late submissions will not be accepted and will receive no credit.

Projects. The projects will be posted on the course webpage and discussed in lecture. Project 1 will be done individually. Project 2 may be done individually or in groups of two or three. The students' solution to projects (all deliverables: code, documents, slides, etc.) will be submitted via Canvas. Late submissions will not be accepted and will receive no credit.

Course Webpage. The URL for the course website is <http://cs621.cs.usfca.edu>. You must check the webpage for announcements at least once every other weekday. Important announcements will be posted on the course webpage. The credentials (username and password) to access the password protected sections of the webpage will be announced in the first class. You may ask the professor for this information as well.

Piazza. If you have a question, the best way to contact us is via the class Piazza site. The staff (professor and TA) will check the site regularly. If your question is not of interest to other students, please mark the question as private: select "Post to: Individual Student(s)/Instructor(s)" at the top and then type "Instructors" in the field underneath it. If you have an administrative question, then you can either use the private post on Piazza or my and your TA's emails. More information about the class Piazza site is available on the course webpage. You will receive up to 2% extra credits by actively participating in discussions in Piazza (that is, answering others' questions).

Students with Disabilities: If you are a student with a disability or disabling condition, or if you think you may have a disability, please contact USF Student Disability Services (SDS) at (415) 422-2613 within the first week of class, or immediately upon onset of disability, to speak with a disability specialist. If you are determined eligible for reasonable accommodations, please provide me with your SDS Verified Individualized Services and Accommodations (VISA) form, and we will discuss your needs for this course. For more information, visit: <http://www.usfca.edu/sds> or call (415) 422-2613.

Academic Dishonesty: As a Jesuit institution committed to *cura personalis* — the care and education of the whole person — USF has an obligation to embody and foster the values of honesty and integrity. USF upholds the standards of honesty and integrity from all members of the academic community. All students are

expected to know and adhere to the University's Honor Code. You can find the full text of the code online at <http://myusf.usfca.edu/academic-integrity/>.

Counseling and Psychological Services: Our diverse staff offers brief individual, couple, and group counseling to student members of our community. CAPS services are confidential and free of charge. Call 415-422-6352 for an initial consultation appointment. Having a crisis at 3 AM? We are still here for you. Telephone consultation through CAPS After Hours is available between the hours of 5:00 PM to 8:30 AM; call the above number and press 2.

Confidentiality, Mandatory Reporting, and Sexual Assault: As an instructor, one of my responsibilities is to help create a safe learning environment on our campus. I also have a mandatory reporting responsibility related to my role as a faculty member. I am required to share information regarding sexual misconduct or information about a crime that may have occurred on USFs campus with the University. Here are other resources: To report any sexual misconduct, students may visit the Title IX Coordinator Leighia Fleming (UC 5th floor) or see many other options by visiting our website: <https://myusf.usfca.edu/title-ix> Students may speak to someone confidentially, or report a sexual assault confidentially by contacting Counseling and Psychological Services at 415-422-6352 or speaking to a clergy member in University Ministry at 415-422-4463. To find out more about reporting a sexual assault and resources at USF, visit USFs Callisto website at: <https://usfca.callistocampus.org/>. For an off-campus resource, contact San Francisco Women Against Rape (SFWAR) (415) 647-7273 (www.sfwar.org).

Changes to Syllabus. Changes may be needed to this syllabus and to the course plan. All such changes to the syllabus will be announced on the course webpage and will be announced via e-mail. Students are responsible for this information.