

Network Programming

CS490-004 Fall 2026 (CRN: 36645)

Welcome to CS490!

Instructor: Dr. Hiroshi Fujinoki

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Office Hours: Monday: 10:00 a.m.-12:00 p.m.

Tuesday: 10:00 a.m. -12:00 p.m.

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

Thursday: 10:00 a.m. -12:00 p.m.

Friday: no office hour

Note: The above office hour schedules do not apply to (1) Thanksgiving week, (2) the final exam week and (3) the week before the final exam week.

Class Meeting Room: EB-2170

Class Meeting Days: Tuesday and Thursday

Class Meeting Time: 12:30 - 1:45 p.m. (same time for T and R)

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

♣ Grading:	Weight:	Final Letter Grade:
Weekly Quizzes:	25%	100-90: A
Projects:	25%	89-80: B
Midterm Exam:	25%	79-70: C
Final Exam:	25%	69-60: D
		Below 60: F

♣ 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 without a prior agreement 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.

Projects (tentative plan): there will be two projects in CS490 in Fall 2026.

Quizzes:

- Quizzes will be **closed textbook** and **closed notes**.
- Absence without a prior consent from Dr. Fujinoki will result in zero point except for medical emergency (a letter from your doctor is required).
- There will be 12 quizzes during this course.
- Your lowest quiz will be dropped from grading.
- If we cancel some lectures, some quizzes may be dropped (the weight of the quizzes to the course grade is still 25%).

♣ Attendance Policy:

- Attendance will be taken at the beginning of lectures (being late more than 5 minutes will be considered absence).
- No penalty will be given up to three absences in a semester. For each absence beyond the third absence, -2 point penalty (in 100 scale) will be given to your next exam.
- The above penalty will not apply to your medical emergency (however, you need to provide a written proof of medical service to waive the penalty).

- 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 will be considered academic dishonesty and final letter grade of F can be given:

- Submitting work (such as homework assignments and projects) done by somebody else (this includes any human/electronic sources (such as web sites)).
- Watching and copying your neighbors' solutions during quizzes and exams.
- Modifying your solutions after they are graded.
- Using materials not allowed during quizzes and exams.
- Based on the policy of the School of Engineering, any academic dishonesty will be reported to the department chair and the dean of the School of Engineering.

- ♣ **Required Textbook:** There is no textbook. All the course topics will be presented by the materials prepared by Dr. Fujinoki.

Other Required Skills/Knowledge:

Proficiency in major programming languages, such as C/C++, Java, and at least one major script programming language (e.g., Java-script, and Python) are required.

♣ **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.

♣ **Other Notices:**

- (1) This course expects each of you to work nine (9) hours other than attending lectures (this is also a policy of SIUE).

- (2) Each of you is expected to check "Weekly Notices" in the web site of this course at least twice in a week. The decisions regarding which course materials are posted belong to the course instructor. If any promised course material is missing in the course home, it is your responsibility to request such material to the course instructor (the course instructor will post such materials within at most one week since the request).
- (3) Any grading problem should be reported within two weeks (14 days) after your grades are posted to the course home or the graded materials are returned in the classroom.
- (4) E-mails sent to the course instructor during weekends, holidays, and the Thanksgiving break week may not be responded.
- (5) Any special arrangement agreed between you and the course instructor (Dr. Fujinoki) should be documented. Any promises or agreements orally made between you and the course instructor may not take effect without a documentation (it is your responsibility to document any such promises and agreements).
- (6) 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).

♣ **Tentative Class Schedule (subject to change - especially the topics after the midterm exam):**

This schedule is tentative and subject to change.

Week #: Day	Planned Topics
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Week 1: August 25 (T): Introduction to CS490	• Course objectives • Course policies - Lecture attendance policies - Weekly quizzes - Exams (midterm and final exams) - The course website (https://www.cs.siu.edu/~hfujino/FA2026_CS490_004/CS490_SEC4.html) • Discussions: Network programming related career opportunity perspectives - Career opportunities and life-long career developments
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- Job security

August 27 (R): Network programming concepts

- OSI seven-layer model
- Types of network programs covered in this course
 - Low-level programming (OSI 7-layer model network and transport layer)
 - OSI 7-layer mode application layer programming
 - Application programming
 - Application architectures

Week 2: September 1 (T): **Quiz #1**, Low-level network programming (1)

- Connection-oriented (TCP) vs. connection-less communication (UDP) modes
- Unicast and multicast data transmissions
- Addressing scheme: network address and ports
- Physical address (MAC address) and logical address (IP address)

September 3 (R): Low-level network programming (2)

- Tunneling (e.g., IPv6 tunneling, telnet-tunneling, and PPP-over-IP)
- NAT (Network Address Translation) and Proxy (C&C servers as "malicious proxies")
- Promiscuous mode packet capturing and firewalls
- Concepts of network domains and VPN (virtual private networks)
- Application-layer (in OSI 7-layer model) protocols: FTP, SNMP, HTTP

Week 3: September 8 (T): **Quiz #2**, Network application architectures (1)

- Client-server and peer-to-peer application models
- Thin-client (e.g., CGI and JSP (Java Server Pages)) and rich-client (e.g., Java applets and JavaScript) network application architectures

September 10 (R): Network application architectures (2)

- Edge-computing and fog-computing
- Network-platform integration architectures (ORB: Object Request Broker)
- Web-OS

Week 4: September 15 (T): **Quiz #3**, Network application architectures (3) - integrations of network programs

- SOA (Service Oriented Architecture)
- ESB (Enterprise Service Bus), ETL (Extract · Transform · Load) and EAI (Enterprise Application Integration)
- ERP (Enterprise Resource Planning)

September 17 (R): Project #1 introduction

Week 5: September 22 (T): **Quiz #4**, Web applications (1)

- HTTP as a connection-less application level protocol

- Combination of a connection-oriented transport-layer protocol (TCP) and a connection-less application level protocol (HTTP)
- Cookies for interactive web applications
- GET/POST methods
- Combination of a connection-oriented transport-layer protocol (UDP) and a connection-less application level protocol (HTTP)

September 24 (R): Web applications (2)

- Push-mode and pull-mode web applications
- Synchronous and asynchronous client-server communication
- Major programming languages for web applications:
 - JavaScript and Java Byte-codes
 - Python and Ruby

Week 6: September 29 (T): **Quiz #5**, Web applications (3)

- Evolution of browsers and browser compatibility issues
- SOAP (Simple Object Access Protocol)
- W3C
- HTML-5
- Dynamic-HTML
- Browser compatibility testing and testing tools (ACID and Selenium)

October 1 (R): Web applications (4)

- Topics: TBA

Week 7: October 6 (T): **Quiz #6**, Security for network programs (1)

- Network security fundamentals
 - Active and passive attacks
 - Release of message contents, traffic analysis, masquerading, replays, modification of message contents, and denial of service (DoS) attacks

October 8 (R): Security for network programs (2)

- Digital signature
- Digital certificates
- IPsec and HTTPS/SFTP

Week 8: October 13 (T): **Quiz #7**, Security for network programs (3)

- SQL-injections and input sanitization
- HTTP header injection
- Cross-site scripting
- Cross Site Request Forgery (CSRF)

October 15 (R): **Midterm Exam**

Week 9: October 20 (T): **Quiz #7**, Project #2 introduction

October 22 (R): iPaaS (Integration Platform as a Service) and cloud integration

- Concepts
- Oracle Integration, IBM Cloud Pak, SAP Cloud Platform, and Dell Boomi

Week 10: October 27 (T): **Quiz #8**, Network application standards (1)

- PHP and ActionScript
 - Aptana, Eclipse, Dreamweaver (IDE for PHP)
- Flash
- XML, MXML, and Flex (and Flex Builder)

October 29 (R): network application standards (2)

- XML, DOM (Document Oriented Model), and Ajax

Week 11: November 3 (T): **Quiz #9**, Web application performance optimization (1)

- *.jar file format
- WebAssembly

November 5 (R): Web application performance optimization (2)

- CDN (Contents Distribution Networks) and streaming

Week 12: November 10 (T): **Quiz #10**, Android, C++, and Rust

November 12 (R): Other major rich-client programming tools:

- Biz/Browser
- Curl
- NexaWeb
- OpenLaszlo
- Silverlight
- Comparisons to: Flash/Flex and Ajax

Week 13: November 17 (T): **Quiz #11**, Network Programming New Trends

- Rich-client's taking over of SOA

November 19 (R): Project Presentation Day #1

TG Holiday Week: November 24 and 30: Thanksgiving Week

Week 14: December 1 (T): **Quiz #12**, Project Presentation Day #2

December 3 (R): Project Presentation Day #3

Week 15: December 8 (T): Project Presentation Day #4

December 11 (R): Project Presentation Day #5

Final Exam Week: 12:00-1:40 p.m., December 14 (Monday), 2026

- 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