

Organization And Introduction

CS 422: Computer Networks

Instructor: Vamsi Addanki

TAs: Youngsuk Kim, Xiao Luo, Albert Vo

General Information

Course page and announcements

- Schedule & course syllabus:
<https://stygianet.cs.purdue.edu/courses/2026fallcs422.html>
- Content: Brightspace
 - Materials
 - Assignments
 - Grading
- Discussions: Piazza
 - Polls
 - Q&A
 - Debates?

General Information

Timings

- Lecture: LWSN 1142
 - Monday/Wednesday/Friday 13:30 – 14:20
 - ~10 minutes for a break or questions in every class
- PSO: HAAS G050
 - Wednesday 10:30 – 11:30
 - Thursday 15:30 – 16:20
 - Thursday 16:30 – 17:20
 - No PSO/office hours in the first week
- Office hours: Zoom
 - Please check the course website & Piazza

Team

- Lectures: Vamsi Addanki: <https://stygianet.cs.purdue.edu/>
- Teaching Assistants:
 - Youngsuk Kim: kim5689@purdue.edu
 - Xiao Luo: luo448@purdue.edu
 - Albert Vo: vo105@purdue.edu

Prerequisites

Programming

- C, C++, Python, and Bash
 - All assignments will require a combination of the above
- Understanding of Linux operating systems
 - User-space, kernel-space
- Strong background in data structures and algorithms

Overall structure

- Class participation: 5%
- Assignments: 45%
- Mid-term: 20%
- Final exam: 30%

Assignments

- Groups: 5 students per group
 - = 5 is desirable; > 5 or < 3 not allowed
- Assignment submissions should always be per-group
 - Every submission involves a single PDF document on Brightspace
 - Code must be attached as a Github link within the PDF, and pasting the relevant pieces within the PDF
 - Detailed instructions will be posted in each assignment sheet
- Grading is per-group & entirely based on an oral exam
 - PDF submission is a prerequisite for the oral exam
 - We will randomly select one student and ask questions orally e.g., “explain this part of the code” → repeated 5 times, and the grading depends on the average performance
 - It is intended that group members collaborate and split the implementation work, but all group members should understand the full assignment content

Mid-term and Final exam

- In-person, paper & pen format
 - Open book
 - Use of Tablets/Laptops/Phones not allowed
- All questions will be Multiple-choice format
- Potentially negative marking for wrong answers
- 50 minutes exam duration
- Location: LWSN 1142

Final Exam

- Two dates – two attempts
- Grade depends only on the final attempt
- Scenario 1: If a student attends first exam with score X , and does not attend second exam, then the final score is X .
- Scenario 2: If a student does not attend first exam, and attends second exam with score Y , then the final score is Y .
- Scenario 3: If a student attends first exam with score X , and attends second exam with score Y , then the final score is Y .

Participation

- Attendance will be taken during each class
- 6 absences are allowed during the semester
- Late arrival: ≤ 10 minutes
 - Please arrive on-time. Late arrival policy is intended mainly for DRC accommodations

Late Submissions

- Grace period: 3 days (72 hours) for each assignment
- After the grace period, 25% off for every 24 hours late, rounded up

Contact

- Email: Please add all three TA's email addresses in the recipient list
 - Please do not send emails directly to the instructor

Use of AI

- **You can use AI tools**
 - ChatGPT, Copilot, Claude, Perplexity, DeepSeek.... any tool you like
 - We expect you to use AI tools, including the AI tutor on the textbook's website
- There are no restrictions on the use of AI in assignment submissions
- Explicitly acknowledge the tools used and the nature of use e.g., generating full or part of the code, polishing or fully generated descriptions/writing in the PDF submission
 - Use of AI is not penalized
 - Lack of acknowledgements → Much deeper and hard questions during grading

Use of AI

- You can use AI tools **but please** make sure you are learning the fundamentals. Grading depends on:
 - Your ability to build functional tools, debug & understand code
 - What you learn (questions during grading sessions)
 - It is great if AI can speedup the process, but cannot be a replacement

Accommodations

The following applies to all students. ★ Indicates that a formal request is required for specific scenarios.

- Deadline extensions: 72-hour grace period for all assignments
- Attendance: 6 days absences during the semester,
- Late arrival: ≤ 10 minutes
- Feel free to step outside for a 10-minute break anytime
 - We will anyway plan a 10-minute break during each lecture

Continued...

DRC Accommodations

The following applies to all students. ★ Indicates that a formal request is required for specific scenarios.

- Mid-term / Final exam

- ★ Location: LWSN 2142 or LWSN 2150 if you request a distraction-free location. Please email the instructor (cc TAs) for location requests.

- ★ Time: 50 minutes exam duration + 25 minutes extension for 150% (or 37m 30s for 175%) depending on your request

- ★ Access to medical devices is allowed during the exams. This does not grant access to browsing and use of other applications that may be available on the medical device.

- ★ Access to smartphone and a headphone is allowed. This does not grant access to browsing, phone calls, and use of other applications that may be available on the device.

- ★ Leaving the exam space is allowed. This does not extend the exam duration

- [All students] Food and drinks are allowed during the exams and lectures

- ★ One exam date during the semester can be rescheduled for medical reasons

Please do not hesitate to send us an email or discuss with the instructor directly if you have any further requests at any time, or if the current accommodations have not addressed your requests.

Academic Integrity & Honor Code

- You are responsible for reading the pages linked below and will be held accountable for their contents
- Integrity:
 - <http://spaf.cerias.purdue.edu/integrity.html>
 - <http://spaf.cerias.purdue.edu/cpolicy.html>
- Honor code:
 - <https://www.purdue.edu/odos/osrr/honor-pledge/index.php>
 - *"As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue."*

Course Topics

1. Introduction and OSI architecture
2. Network Latencies, Packet Switching, and Circuit Switching
3. Application layer, including HTTP and DNS
4. Transport layer: TCP, UDP, and congestion control
5. IP layer: Addressing, subnets, NAT, and routing protocols
6. Multi Commodity Flows: Max flow and Concurrent flow, ECMP and Load balancing
7. Packet Classification
8. Datacenter Networks Introduction
9. Network Topologies
10. DNN Training and Collective Communication
11. Kernel bypass, and RDMA
12. Network Buffering
13. Datacenter Congestion Control
14. Back to circuit switching: Photonic Interconnects
15. Wireless Networks (Optional)
16. Satellite Networks (Optional)

We may spend more time on 1-7 depending on the class progress, and skip few advanced topics 8-14.

Course Content

- Lecture content will be posted by noon before each lecture on Brightspace and Piazza

Assignments

Overview

- <https://stygianet.cs.purdue.edu/courses/2026fallcs422.html>
- Assignment 1: Ping experiments
- Assignment 2: Socket programming and TCP socket statistics
- Assignment 3: Building a kernel module / NS3 implementation
- Assignment 4: Optimization problem on network topologies
- Assignment 5: Torch/MPI allreduce and broadcast algorithms
- Dates will be announced by next week
- Lectures or PSOs will not teach/cover the tools/frameworks used in the assignments
 - Students are expected to learn by themselves
 - Web search, online materials, LLMs are all allowed and encouraged for use
 - Why? We will teach the fundamental concepts in the class. Our goal with assignments is to train you to learn by yourself and to test how well you can apply the concepts and extrapolate them.

Textbook and Resources

First part of the course (~ until mid-October)

- Computer Networking A Top-Down Approach, 9th edition Published by Pearson (June 20, 2025) © 2026.
 - Authors: James F. Kurose, Keith Ross
- (Optional) Network Algorithmics: An Interdisciplinary Approach to Designing Fast Networked Devices
 - Author: George Varghese

Textbook and Resources

Second part of the course (~ after mid-October)

- Research papers are the primary resources, accessible via digital libraries with Purdue login

Auditing

- Always welcome to join!
- Please check with the grad office yourselves and happy to approve audit requests
- Required: Attending classes and participating in discussions

Compute

- A basic laptop is sufficient for all assignments
 - Linux operating system
- CS machines are also accessible for general use

THAT'S ALL FOLKS!

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