ARIZONA STATE UNIVERSITY

CSE 434, SLN 87494 — **Computer Networks** — Fall 2025

Lectures (Session C): 08/21/2025–12/05/2025, Tuesday/Thursday 3:00–4:15pm, in COORL1-20

CSE 434 is an in-person course and your attendance is expected. Lectures will **not** be recorded!
You are responsible for reading this syllabus and understanding it.
All information in this syllabus, except the grading and absence policies, is subject to change.

Contact Information

Instructor:	Dr. Bharatesh Chakravarthi, <syrotiuk@asu.edu>
Office:	BYENG M1-40
TA:	Arpitsinh Vaghela, <avaghel3@asu.edu>
UGTA:	To be Updated , <To be Updated>

Office Hours

Instructor Office Hours:	Mondays, 4:30–5:30pm, in person in BYENG M1-40, and online via this Zoom link
TA/UGTA Office Hours:	TBA on Canvas by Sunday, 08/31/2025

My office hours start Monday, 08/25/2025; see also `Modules/Course Information` on Canvas for office hour information. For my office hours via Zoom you must join using your ASUrite id, *i.e.*, your `ASUrite@asu.edu`. Office hours are cancelled on days that classes are excused, *e.g.*, Labor Day, Thanksgiving.

In Fall 2025, there are two sections of CSE 434 for the first time. The sections will share the same homework sets, lab assignments, and socket project, but not quizzes or exams. This also allows us to share our TAs and office hours more effectively. The TA for the other section is Arpit Vaghela, <avaghel3@asu.edu>.

Course Description, Prerequisites and Expected Learning Outcomes

Course Description: CSE 434 is a fast-paced and intensive top-down introduction to computer networks. A selection of applications such as the web, DNS, video streaming, and content distribution, are presented. The focus at the transport layer is on connectionless (*e.g.*, UDP) and connection-oriented (*e.g.*, TCP) protocols, including TCP's congestion-, error-, and flow-control mechanisms. The network layer is responsible for routing, both intra- (*e.g.*, OSPF, RIP) and inter-domain (*i.e.*, BGP), and includes the IP and ICMP protocols. An introduction to software defined networking (SDN) shows how separating the data- and control-plane, using programmable switches, is changing networking. The data link layer deals with framing, error- and flow-control, medium access control (MAC) protocols, and local area networks (LANs). The physical layer is concerned with moving bits across a communication medium. Time permitting, wireless and mobile networking protocols and architectures, *e.g.*, Wi-Fi, WLANs, cellular networks, and mobility management, will be included.

This course emphasizes the TCP/IP protocol stack, with hands-on experience on real networking equipment. We will use the CloudLab testbed and the networking racks in BYENG 217 for labs.

In addition to Canvas, this course uses the **PrairieLearn** system for quizzes, homework sets, and exams. Links to access PrairieLearn will be provided in Canvas.

Enrollment Requirements: CSE BSE or CS BS student; CSE 230 or EEE 230, CSE 310 both with a grade of at least C; experience using Linux and competence programming in `C/C++` or `Python` is expected.

Course Objectives and Expected Learning Outcomes: ABET, the Accreditation Board for Engineering and Technology, is a non-governmental organization that accredits post-secondary education programs. ABET accredits ASU's CS and CSE programs. CSE 434 targets ABET outcome 6 related to an ability to develop and conduct experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. The lab assignments in this course address this outcome.

Students who complete CSE 434 will have a basic understanding of:

1. The ISO/OSI seven-layer reference model.
2. An overview of applications such as HTTP, FTP, and e-mail.
3. Transport layer issues including connectionless and connection-oriented protocols.
4. Network layer issues including routing, congestion control, internetworking, the IP protocol, and ICMP.
5. The data link layer, including framing, error correction and detection, and sliding window protocols.
6. Medium Access Control (MAC) protocols, *e.g.*, {T|F|C}DMA, and their performance.
7. The physical layer, including a variety of transmission media.

Grade Policies

Lab Assignments:	16%	4 of equal weight; using CloudLab and/or the networking racks in BYENG 217
Homework Sets:	15%	5 of equal weight; on PrairieLearn
Socket Project:	10%	Socket programming project (milestone 3%, full 7%), with demos
Quizzes:	9%	Best 9 of 10, of equal weight; in person, in class
Midterm Exams:	24%	2 of equal weight; Wednesday, 09/24, and 10/29, in person, in class, closed book
Final Exam:	26%	Wednesday, 12/10, 7:30–9:20am, in person, closed book, and comprehensive
	100%	

The schedules for labs, homework sets, the socket project, quizzes, and exams follow. Add these due dates to your calendar. Each lab, homework set, and the socket project is due at 11:59pm on its due date. Late work is not accepted except under restricted circumstances; see **Absence Policies**.

Labs	**Out**	**Due**	**Homework Sets**	**Out**	**Due**
L1	Sun. 08/31	Sun. 09/14	HW1	Sun. 08/24	Sun. 09/07
L2	Sun. 10/19	Sun. 11/02	HW2	Sun. 09/07	Sun. 09/21
L3	Sun. 11/02	Sun. 11/16	HW3	Sun. 10/05	Sun. 10/26
L4	Sun. 11/16	Sun. 11/30	HW4	Sun. 11/02	Sun. 11/16
			HW5	Sun. 11/16	Sun. 12/07

Socket Project:	**Out** Sun. 09/14; **milestone due:** Sun. 09/28; **full project due:** Sun. 10/19
Midterm Exams:	Th., 09/25, and Th/, 10/30 in class, in person, closed book, lockdown browser
Final Exam:	Tu., 12/09, 7:30–9:20am, in person, closed book, comprehensive, lockdown browser

Quizzes will be held **in class only** on a near weekly basis using PrairieLearn and require a computer; we may practice using a lockdown browser in some quizzes. Each quiz covers lab, homework, and/or lecture material. The planned quiz dates are:

	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**
Quizzes:	09/04	09/11	09/18	10/02	10/09	10/23	11/06	11/13	11/20	12/04

A plus/minus grade scale is used in CSE 434. The numerical grade distribution may be lower than you may be used to; despite this, the letter grade distribution will not be different, with the class average typically assigned a grade of B. See `Modules/Course Information` on Canvas for example rankings.

Any final scaling of grades takes into account the effort that you have invested in this course, *i.e.*, I expect you to have attempted **all** assigned work in this class.

Lectures

In the Fall 2025 semester lectures in CSE 434 will be given in person only. The exception may be if I need to travel to attend a conference and I am unable to find a replacement; in this case, a pre-recorded lecture may be provided. Regular lectures will not be recorded.

Ed Discussion

The use of `Ed Discussion` is planned on Canvas for questions that you may have about CSE 434. Any questions sent via e-mail will be posted to and answered in the appropriate category of `Ed Discussion`. Search before you post as your question may already have been asked. You are welcome to answer questions you feel confident answering. I expect you to read and keep up-to-date on these discussions.

Lab Assignments

Lab assignments make use of mid-scale experimental research infrastructure; CSE 434 uses the NSF supported CloudLab testbed. Details regarding how to join the CloudLab project associated with this course are provided in the first lab assignment. It is your responsibility to join the project early; requests made on a weekend may not be approved until the next business day.

Lab assignments may also make use of racks of networking equipment located in BYENG 217. The equipment in BYENG 217 is under 24/7 video surveillance, and is not connected to the internet because you have `root` access to the machines. Permission to enter BYENG 217 is granted using your ASU SUN card.

Socket Project

The socket project is an opportunity for you to design and implement a peer-to-peer application program. Your application program may be written in `C/C++` or `Python`; peer processes are required to communicate via sockets. The project has a *milestone* deadline where partial functionality of the requirements is expected, and a *full* project deadline where all requirements are expected to have been met. The project is organized in this way to help you manage your time.

Homework Sets

The goal of homework questions is to help understand the lecture and lab material and to help prepare you for exams. Homework sets will be made available on PrairieLearn; a link to each homework will be provided in Canvas.

PrairieLearn supports the ability to give different variants of parameterized questions to each student, and the opportunity to earn partial credit in case you made a mistake on earlier attempts. It also allows you to try additional variants of a question after a homework has closed, even if you answered correctly.

Quizzes

Quizzes will be conducted electronically on PrairieLearn on a near weekly basis; see the planned schedule for quiz dates under **Grade Policies**. All quizzes will be conducted in class and require a laptop computer; you will be given 15 minutes to complete the quiz. A link to access each quiz on PrairieLearn will be provided in Canvas. We will practice using a lockdown browser with some quizzes so you are familiar with its use before exams.

There are no "make-up" opportunities for missed quizzes. I will average your highest 9 of 10 quiz scores to form your grade for Quizzes.

Midterm and Final Exams

All exams will be held in-person, are closed book, and are comprehensive. The format and coverage of each exam will be provided about two weeks before the exam date. Exams will be conducted using PrairieLearn and a lockdown browser hence a laptop computer is required; you may **not** use a phone to take exams. The midterm and final exam dates are listed under **Grade Policies**. The final exam date and time is scheduled by ASU and cannot be changed.

If you miss a midterm exam due to one of the circumstances listed in section **Absence Policies**, the weight of the exam will be added onto the weight of your final exam; otherwise you will be assigned a grade of zero on the exam.

It is **mandatory** to write the final exam. If you miss the final exam, you will automatically be assigned a failing grade (E) in this course unless you miss it for one of the circumstances listed under **Absence Policies**; these will be handled on a case-by-case basis.

Course Schedule

Chapter 1: Computer Networks and the Internet: (approximately 1 week)

- What is the Internet? The network edge and core. Delay, loss, and throughput in packet-switched networks. Protocol layers and their services models.

Chapter 2: Application Layer: (approximately 1 week)

- Principles of network applications. Overview of selected client-server and peer-to-peer applications. Socket programming.

Chapter 3: Transport Layer: (approximately 3.5 weeks)

- Multiplexing and demultiplexing. Connectionless transport: UDP. Principles of reliable data transfer. Connection-oriented transport: TCP. Congestion control.

Chapter 4: Network Layer: Data Plane (approximately 2.5 weeks)

- What's inside a router? The IP protocol. Generalized forwarding and SDN.

Chapter 5: Network Layer: Control Plane (approximately 2 weeks)

- Intra- and inter-networking routing protocols *i.e.*, distance vector, link-state, and BGP. The SDN control plane. ICMP.

Chapter 6: The Link Layer and LANs (approximately 2 weeks)

- Error detection and correction. MAC protocols. Link layer addressing. ARP. VLANs. MPLS. Data center networking.

Chapter 7: Wireless and Mobile Networks (approximately 1 week)

- Wireless links and network characteristics. Wi-Fi: 802.11 WLANs. Cellular networks. Mobility management. Mobile IP.

Classroom Behaviour

You are expected to acknowledge and embrace the expectation of FSE student professionalism.

Cell phones must be turned off during class to avoid causing distractions; laptops may be used for taking notes.

The contents of this course, including lectures and other instructional materials, are copyrighted materials. Students may not share outside the class, including uploading, selling or distributing course content or notes taken during the conduct of the course.

Any recording of class sessions by students **is prohibited**, except as part of an accommodation approved by SAILS (see **Disability Accommodations**).

Generative AI

Generative AI is a technology that can often be useful in helping students learn the theories and concepts in this course. That said, the use of generative AI tools is **not** allowed in CSE 434, and may not be used to complete any portion of the homework sets, lab assignments, the socket project, quizzes or exams.

If you engage in non-allowable use of generative AI it will be considered a violation of the ASU Academic Integrity Policy. You will be sanctioned according to this policy following FSE sanctioning guidelines; see also **Academic Integrity**.

Absence Policies

Excused absences for classes will be given without penalty to the grade in the case of (1) a **documented** medical reason or emergency, (2) religious holidays (ACD 304-04), (3) a university-sanctioned event (ACD 304-02), and (4) work performed in the line-of-duty (ACD SSM 201-18). *For consideration, you must contact me well in advance of the due date, or in the case of an emergency, as soon as is possible.*

Students who request an excused absence must follow the policy/procedure guidelines. Excused absences do not relieve students of responsibility for any part of the course work required during the period of absence.

Appeals

Whenever a grade for work is available it will be posted on Canvas. Appeals regarding quizzes and homework sets should be directed to our TA within one week of the grade availability.

Appeals for any lab assignments, or the socket project, must come to me *by e-mail* within one week of the grade availability. The appeal must clearly indicate the work to review and provide a basis for the appeal. If your case warrants, I will forward your work back to our grader for consideration.

Your right to appeal is waived one week after a grade is posted.

Academic Integrity

Students in CSE 434 must adhere to ASU's Academic Integrity Policy, and the ASU Student Honour Code. You are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. If you have taken this course before, you may not reuse or submit any part of your previous assignments without the express written permission from the instructor.

All student academic integrity violations are reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). Withdrawing from this course does not absolve you of responsibility for an academic integrity violation and any sanctions that are applied. The AIO maintains a record of all violations and has access to academic integrity violations committed in all other ASU colleges/schools.

Plagiarism or any form of cheating in any course work in CSE 434 is subject to serious academic penalty; this may range from a grade of zero on the work to failure of the course. More specific guidance for this class is posted under the `Modules/Course Information/Collaboration: What is and is not permitted` on Canvas.

Student Copyright Responsibilities

You must refrain from uploading to the course shell, discussion board, or any other course forum, material that is not your own original work, unless you first comply with all applicable copyright laws. I reserve the right to delete materials from the course shell on the grounds of suspected copyright infringement.

Threatening Behaviour

Students, faculty, staff, and other individuals do not have an unqualified right of access to university grounds, property, or services; see the Student Services Manual (SSM 104-02). Interfering with the peaceful conduct of university-related business or activities, or remaining on campus grounds after a request to leave may be considered a crime. All incidents and allegations of violent or threatening conduct by an ASU student (whether on- or off-campus) must be reported to the ASU Police Department and to the Office of the Dean of Students.

Disability Accommodations

Suitable accommodations will be made for students having disabilities. Students needing accommodation must register with the ASU Student Accessibility and Inclusive Learning Services (SAILS) and provide documentation of that registration to me. Students must communicate the need for an accommodation to me in sufficient time for it to be properly arranged, preferably by the end of the first two weeks of class. See ASU ACD 304-08 policy, "Classroom and Testing Accommodations for Students with Disabilities."

It is very difficult to accommodate "flexible deadlines" in a course such as CSE 434. The schedule of work is very tight and there is no room for flexibility except under restricted circumstances; see Absence Policies. Accommodation delays the release of solutions to other students, potentially impacting their learning.

Harassment and Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, colour, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counselling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at Sexual Violence Awareness, Prevention, and Response.

Mandated sexual harassment reporter: As an employee of ASU, I am a mandated reporter and therefore obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counselling Services is available if you wish to discuss any concerns confidentially and privately. ASU online students may access 360 Life Services.

Photo Requirement

Arizona State University requires each enrolled student and university employee to have on file with ASU a current photo that meets ASU's requirements (your "Photo"). ASU uses your Photo to identify you, as necessary, to provide you educational and related services as an enrolled student at ASU. If you do not have an acceptable Photo on file with ASU, or if you do not consent to the use of your photo, access to ASU resources, including access to course material or grades (online or in person) may be negatively affected, withheld, or denied.

How Long Students Should Wait for an Absent Instructor

Your time obligation to wait for me should I be late for class is 15 minutes (this is standard for class sessions lasting 90 minutes or less, *i.e.*, for CSE 434).