



EAST TENNESSEE STATE
UNIVERSITY

CSCI5150 – Distributed Systems

Credits: 3 Section: 001 Term: Fall 2026

Location and Meeting Time

Class meeting schedule:

❖ 2:55pm to 4:55pm, TR, BC 215

Contact Information

Instructor: Jeffrey Roach, Ph.D.

Email: roachj@etsu.edu

Office: BC 158

Phone: 423-439-6966

Instructor Availability

Business Hours

- Mon: 8:30am – 5:00pm
- Tue: 8:30am – 5:00pm
- Wed: 8:30am – 5:00pm
- Thu: 8:30am – 5:00pm
- Fri: 8:30am – 3:45pm

Teaching Hours

- Mon: CSCI 5220 2:55pm – 4:55pm
- Tue: CSCI 3110 10:10am – 12:10pm, CSCI 5150 2:55pm – 4:55pm
- Wed: CSCI 5220 2:55pm – 4:55pm
- Thu: CSCI 3110 10:10am – 12:10pm, CSCI 5150 2:55pm – 4:55pm

Office Hours

- MWF: 9:00am to 11:00am
 - Zoom: <https://etsu.zoom.us/j/4234396966>

Email Hours

I respond to emails Mon-Fri during business hours within 24 hours. I do not respond to emails on weekends.

Course Overview

Course Purpose and Objectives

Principles and technologies associated with distributed operating systems, distributed system programming, and common applications will be covered. Students should expect to design and write programs on various systems. Each student will demonstrate knowledge of key principles of distributed systems, network-based communication and process synchronization, file system operation, consistency, replication, fault tolerance, and security, both by writing assignments, homework problems, and programming assignments.

Expected Learning Outcomes

At the completion of this course, the student should be able to:

1. **Design and evaluate distributed systems architectures**, demonstrating the ability to construct and assess distributed applications based on foundational principles.

2. **Analyze network-based communication protocols and naming mechanisms** in distributed systems to diagnose issues and differentiate design trade-offs.
3. **Implement and evaluate distributed process synchronization strategies**, applying appropriate techniques to solve coordination problems in concurrent environments.
4. **Critically evaluate trade-offs in data replication and consistency models**, and construct systems that achieve fault tolerance under realistic failure conditions.
5. **Appraise security vulnerabilities in distributed systems and design solutions** that integrate appropriate security techniques into system development.

Prerequisites

For success in this course, you need to be able to explain the software development process, write computer software programs, and develop a software application in a team environment.

Materials

Required Textbook

- ❖ M. van Steen and A.S. Tanenbaum, Distributed Systems, 4th ed., distributed-systems.net, 2023
 - <https://www.distributed-systems.net/index.php/books/ds4/>

Chapter	Topic	Learning Outcome
Ch. 1 Introduction	Distributed systems fundamentals, goals, types	LO 1: Design and evaluate distributed systems architectures
Ch. 2 Architectures	Architectural styles, system architectures, middleware	LO 1: Design and evaluate distributed systems architectures
Ch. 3 Processes	Threads, virtualization, clients, servers, code migration	LO 1: Design and evaluate distributed systems architectures
Ch. 4 Communication	RPC, message-oriented, stream-oriented communication	LO 2: Analyze network-based communication protocols and naming mechanisms
Ch. 5 Coordination	Clock synchronization, mutual exclusion, election algorithms	LO 3: Implement and evaluate distributed process synchronization strategies
Ch. 6 Naming	Naming entities, locating mobile entities, DNS	LO 2: Analyze network-based communication protocols and naming mechanisms
Ch. 7 Consistency & Replication	Consistency models, replication protocols	LO 4: Critically evaluate trade-offs in data replication and consistency models
Ch. 8 Fault Tolerance	Process resilience, distributed commit, recovery	LO 4: Critically evaluate trade-offs in data replication and consistency models
Ch. 9 Security	Cryptography, authentication, secure channels	LO 5: Appraise security vulnerabilities and design secure distributed systems

Computing Databases Library Link

- <https://libraries.etsu.edu/az.php?s=119368>

Additional Tools

- We will use astah* (<https://astah.net/products/astah-professional/>) for our UML modeling. Email me to get a license.

Course Policies

Course Evaluation

- 3 Tests (60%)**
 - Every five weeks or so
 - Hand-written, in-class
- Term Paper (20%)**
- Term Project (20%)**

Grade Interpretations

Letter Grade	Numeric Score	Calculated As	Interpretation	GPA
A	1/.95	100/95	Exceptional - Able to define terminology, analyze topics, and synthesize information by relating topics from different domains. - Goes above and beyond the minimum requirements consistently.	4.0
A-	.91	91		3.7
B+	.88	88	Above Average - Able to define basic terminology associated with the course content and perform analysis of topics in the same domain. - Performs work toward the goals of the assignment. Occasionally goes above the minimum requirements.	3.3
B	.85	85		3.0
B-	.81	81		2.7
C+	.78	78	Average - Able to define basic terminology associated with the course work. - Performs work in assignments but does not demonstrate above average work.	2.3
C	.75	75		2.0
* C-	.71	71		1.7
* D+	.68	68	Below Average - Able to define some basic terminology associated with the course work. - Performs work in projects but does not demonstrate average work.	1.3
* D	.65	65		1.0
F	5./.4/.3/.2/.1	50/40/30/20/10	Poor Demonstrates little knowledge of course materials.	0
* U	0	0	Demonstrates no knowledge of course materials.	0
* C-, D+, D, and U are not used for final grades for graduate students. C- will be reported as C and D+, D, and U reported as F.				

Late Work and Missed Assessments Policy:

1. Assignment Deadlines:
 - If you anticipate missing a deadline, contact the professor immediately.
 - Explain your situation clearly and promptly.
 - Extensions may be granted with a grade penalty, at the professor's discretion.
2. Tests and Exams:
 - Make-up opportunities are very difficult for missed tests or exams and may not be available.
 - Attendance is mandatory for all scheduled in-class assessments.

Accommodation for Students with Disabilities:

East Tennessee State University is committed to providing equal educational opportunities for all students, including those with disabilities. If you have a **documented** disability that may impact on your performance in this course and require accommodation, please contact Disability Services (DS) as soon as possible. DS will work with you to determine appropriate accommodation and will provide me with written notification of the approved accommodation. All discussions and documentation will remain confidential. For more information, visit the Disability Services website at <https://www.etsu.edu/students/ds/> or call (423) 439-8346.

Note-Taking Policy

Research has consistently demonstrated that handwritten notes enhance learning and retention compared to typing notes on electronic devices. In a study published in *Psychological Science*, Mueller and Oppenheimer (2014) found that students who took handwritten notes performed significantly better on conceptual questions compared to laptop note-takers, even when tested a week later.

The benefits of handwritten notes include:

1. **Deeper Processing:** When taking handwritten notes, you cannot transcribe everything verbatim. This constraint forces you to actively listen, synthesize information, and record the most important concepts in your own words. This deeper processing leads to better understanding and retention of the material.
2. **Reduced Distractions:** Handwritten notes eliminate the temptation of multitasking that comes with laptop use. A study by Sana, Weston, and Cepeda (2013) found that students who multitasked on laptops during lectures had significantly lower comprehension scores.
3. **Enhanced Memory Formation:** The physical act of writing engages more regions of the brain than typing.
4. **Better Organization of Technical Content:** In computing courses, handwritten notes allow for quick sketches of diagrams, flowcharts, and mathematical notation - essential elements that are often cumbersome to create on a laptop.

Therefore, students in this course are strongly encouraged to take handwritten notes during lectures. While laptops may be used for in-class programming exercises and labs, they should not be the primary note-taking method during lectures.

Accommodation will be made for students who require the use of electronic devices for documented accessibility needs. Please contact the Disability Services Office to discuss accommodation if needed.

Related Research:

- Mueller, P. A., & Oppenheimer, D. M. (2014). *The pen is mightier than the keyboard: Advantages of longhand over laptop note taking.* *Psychological Science*, 25(6), 1159-1168.
- Sana, F., Weston, T., & Cepeda, N. J. (2013). *Laptop multitasking hinders classroom learning for both users and nearby peers.* *Computers & Education*, 62, 24-31.

Mutual Expectations:

Instructor Commitments:

- Punctual attendance and thorough preparation for each class
- Attentiveness to student needs and questions

- Proactive efforts to help students achieve course objectives
- Appropriate arrangements for any unavoidable absences

Student Responsibilities:

- Punctual attendance and active participation in class
- Timely completion of assignments
- Dedication to meeting course objectives
- Allocation of 2-3 hours of study time outside class for each in-class hour

Class Participation:

- Students are encouraged to ask questions and engage in discussions
- Seeking clarification benefits everyone – if you're confused, others likely are too
- Peer learning is valuable; you can learn much from your classmates

Electronics Use

To maintain a focused learning environment and minimize distractions, the following electronics policies apply:

Laptops and Tablets:

- Laptops and tablets are NOT permitted during lectures.
- Laptops and tablets ARE permitted during:
 - In-class programming exercises
 - Lab sessions
 - Other activities explicitly designated by the instructor
- Students with documented disabilities requiring electronic devices should contact Disability Services at <https://www.etsu.edu/students/ds/> or (423) 439-8346 to arrange appropriate accommodations.

Cell Phones:

- All cell phones must be silenced (not vibrate) and put away during class.
- Cell phones may not be placed on desks or used during class time.
- During exams, cell phones should be placed face down in front of you.

Recording:

- Audio or video recording of lectures, class discussions, or other class activities is prohibited without express written permission from the instructor.
- Students who require recording as a documented accommodation should contact Disability Services.

Enforcement:

- Students who fail to comply with this policy will be asked to comply immediately.
- Class will be paused until the student complies with the policy.
- Repeated violations may result in being asked to leave the class session.

AI Use

This course incorporates generative artificial intelligence (AI) tools to enhance your learning experience. As your professor, I will utilize AI in the following specific ways:

- To generate personalized feedback on assignments that supplements my own assessment
- To create explanations and clarifications of complex course concepts
- To assist in developing portions of tests and assignments

Important notes about AI usage in this course:

- AI will NOT be used for grading your work. All assessments and evaluations of your assignments will be conducted by me.
- The use of AI is meant to supplement, not replace, my instruction and feedback.
- I am committed to transparency regarding which materials have been AI-assisted.

Students are encouraged to ask questions about how AI is being used in specific instances. If you have concerns about AI usage in this course, please discuss them with me during office hours.

You are permitted to use AI tools for learning and understanding, but not for generating direct solutions to assignments. The work you submit must be your own original creation, demonstrating your personal understanding and application of course materials.

Example Acceptable Uses of AI

1. Concept Clarification

- 1.1. **Acceptable:** Asking an AI to explain a programming concept like recursion in different ways until you understand it.
- 1.2. **Not Acceptable:** Asking an AI to write a recursive function for your assignment.

2. Debugging Assistance

- 2.1. **Acceptable:** Asking an AI to help identify why your code isn't working or explain a specific error message.
- 2.2. **Not Acceptable:** Asking an AI to fix your code or write a working solution.

3. Learning Best Practices

- 3.1. **Acceptable:** Asking an AI about coding conventions, documentation standards, or design patterns.
- 3.2. **Not Acceptable:** Having an AI generate documented code for your assignment.

4. Practice and Preparation

- 4.1. **Acceptable:** Using AI to generate practice problems like assignment questions.
- 4.2. **Not Acceptable:** Using AI-generated solutions for actual assignment problems.

Required Disclosure

If you use AI tools, you **must** include a brief statement (one paragraph) in your submission describing:

- Which AI tools do you use?
- How did you use them?
- What specific insights or assistance have you gained?

If you did not use AI tools, simply state that you did not use any AI tools.

Academic Integrity Policy

ETSU defines academic misconduct as follows:

- **Academic Misconduct:** Any act of dishonesty in academic work in or out of the classroom. Includes plagiarism, cheating, and/or fabrication.
 - **Plagiarism:** The adoption or reproduction of ideas, words, statements, images, or works of another person as one's own without proper attribution.
 - **Cheating:** Using or attempting to use unauthorized materials, information, or aids in any academic exercise, assignment, test, or examination.
 - **Fabrication:** Unauthorized falsification or invention of any information or citation in an academic exercise.

1. Individual Work:
 - a. Submit only your own original work.
 - b. Do not copy another person's work.
 - c. Do not share your solutions with others.
 - d. AI-generated content (e.g., from ChatGPT) is considered external work and must not be submitted as your own.
 - e. Do not collaborate on individual assignments and submit them as personal work.
2. Group Work:
 - a. Only submit group work for assignments explicitly designated as teamwork.
3. External Sources:
 - a. Paraphrase and cite all external sources.
 - b. Include references for all the work cited in your papers.
 - c. Properly cite any permitted use of another person's work.
4. Permitted Collaboration:
 - a. You may discuss course material and assignments with classmates.
 - b. Helping others understand problems is allowed, provided each student has first made an honest attempt to solve the problem independently.
5. Submission Integrity:
 - a. By submitting work under your name, you affirm it is entirely your own, except where properly cited.

Policies for this course

All submitted work **MUST** be your **OWN** work! This applies to class work, papers, projects, labs, and exams. In cases of academic misconduct, the following rules will apply:

1. No credit for the assignment.
2. A report submitted to the Graduate School.
3. One letter grade decrement for each incident from the final grade.
4. Other penalties may apply.
5. The instructor reserves the right to reevaluate past assignments.

Be aware that ETSU Academic Misconduct Procedures state: "***For a second academic misconduct offense the penalty may be permanent expulsion from the University.***"

Grades and Course Content

Grades and course content will be made available through [D2L](#).

ETSU Additional Policies



[Syllabus Attachment](#)