CS 316: Introduction to Operating Systems and Computer Networks, Fall 2025

Section 1

Meeting schedule

Mondays, Wednesdays, and Fridays, 11:00-11:50am

Instructor

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Course Description

Investigation on the basic concepts, models, mechanisms, and programming techniques in computer operating systems and computer networks. Topics include processes and threads, processor scheduling algorithms, synchronization primitives, network layering principles, the client-server model and socket programming, and the end-to-end forwarding process.

Prerequisites

CS 230 with a C- or better

Course Objectives

This course aims to introduce the computer science majors to the fundamental concepts of computer networks and operating systems. By completing this course, a student will be able to:

- **Describe** the general architecture of an operating system and the layered architecture of the Internet.
- **Describe** the important systems abstractions such as processes, threads, virtual memory, TCP and UDP sockets, etc.; **explain** how these abstractions simplify programming large and networked software systems.
- **Describe** the naming and addressing schemes used on a single computer and on the Internet, such as process IDs, thread IDs, port numbers, IP addresses, hostnames, and domain names; **describe** the DNS mechanism for translating between domain names and IP addresses.
- **Compare** and **contrast** TCP and UDP programming models.
- **Demonstrate** the application of concurrent and parallel programming that utilizes multi-threading, multi-processing, and synchronization primitives.

- **Design** and **implement** client/server application protocols such as online file transfer, remote terminal, Internet time service, etc.

Course Topics

- The purpose, functionality, and architecture of an operating system
- Processes, threads, kernel, and system calls
- Multi-threading and multi-processing
- The critical section problem, synchronization primitives
- The history, organization, and layered architecture of the Internet
- Naming and addressing schemes (port numbers, IP addresses, hostnames, domain names, etc.), DNS
- TCP and UDP socket programming
- The client/server model

Important Dates

- **August 24, 2025:** Add/drop ends
- **August 25, 2025:** Web withdrawal begins
- **September 1, 2025:** Labor Day – no classes
- **October 6-7, 2025:** Fall break – no classes
- **October 27, 2025:** Web withdraw ends
- **November 26-30, 2025:** Thanksgiving break – no classes
- **December 11, 2025, 9:45-10:45am:** Final exam (in person, closed book, and paper based)

Course Materials

Textbook

This course uses two open-source textbooks (both are freely available online):

- **Computer Networks: A Systems Approach**. Larry Peterson and Bruce Davie. https://book.systemsapproach.org/
- **Operating Systems: Three Easy Pieces**. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau. https://pages.cs.wisc.edu/~remzi/OSTEP/

Computer Requirements

As for all computer science courses, a laptop computer is required for this class, either Windows or Mac, which is capable of using modern development tools. Frequently, you will be required to bring your computer to class.

Software Requirements

The first project uses Wireshark, a free & popular packet capturing and analysis tool.

The other projects are programming projects and they all use Java; a Java IDE such as IntelliJ (the free Community version) is highly recommended.

Course Assignments and Assessments

- Five projects: **500** points in total (100 points each)
- Midterm exam: **100** points
- Final exam: **100** points
- Homework: **100** points in total

Grading scale: the final letter grade will be determined by the *percentage* of the total points obtained, using the following scheme:

A	93% of the total points obtained, or higher
A-	90%
B+	87%
B	83%
B-	80%
C+	77%
C	73%
C-	70%
D+	67%
D	63%
D-	60%
F	less than 60% of the total points obtained

Assignment details, including instructions, relevant readings, due dates, and grading criteria/rubrics will be posted and updated on Canvas. Please check Canvas regularly to stay informed and on track.

Late Assignment Policy: You will receive partial credit for submitting work late, on the following scale:

- 90% for work submitted up to 24-hour late
- 75% for work submitted up to one-week late
- 0% for work submitted more than one-week late (such submissions will *not* be accepted or graded)
- Non-penalty extensions will be given to students who are unable to complete an assignment due to valid reasons (you must let the instructor know *before* the assignment due date).

Make-up Exam Policy: In order to be eligible to take a make-up exam, you must contact the instructor *before* the exam.

University Policies and Statements

We are committed to ensuring that all members of the community are welcome, through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse. If you need course adaptations or accommodations because of a disability, please contact the instructor of

record as soon as possible. Ball State's Disability Services Office coordinates services for students with disabilities; documentation of a disability needs to be on file in that office before any accommodations can be provided. Disability Services can be contacted at 765-285-5293 or dsd@bsu.edu.

Freedom of Expression: In this course, we are committed to fostering a learning environment that values intellectual diversity, encourages free expression, and promotes open inquiry. As members of the Ball State Community, we treat each person in the Ball State community with civility, courtesy, compassion, and dignity and respect and learn from differences in people, ideas, and opinions. Please review Ball State University's Statement on Freedom of Expression, the resources on Ball State's Freedom of Expression webpage, and Ball State's Beneficence Pledge.

Attendance: The course is structured around weekly activities, quizzes, projects, and other assignments to help you build a strong understanding of the course material over time. The best way to succeed is to come prepared for each class and actively participate in activities, so attendance at each session is expected. If you miss a class meeting, you should consult with trusted classmates to ensure you are caught up. You are responsible for your learning regardless of attendance.

Title IX

Ball State University is committed to providing a safe and inclusive learning environment for all students. If you or someone you know has experienced sexual harassment—including sexual assault, dating violence, domestic violence, or stalking, please know that you are not alone. The University offers support services and resources. For more information or to report an incident, please visit **www.bsu.edu/titleix** or contact the Title IX Coordinator at 765-285-1545 or at **titleix@bsu.edu**.

As your instructor, I am a mandatory reporter under the Title IX policy and required to report any information I receive about possible sexual harassment. This includes information shared in class discussions, assignments, or private conversations.

What happens after I report? The Title IX Coordinator will email the person who experienced sexual harassment (complainant) and invite them to schedule a meeting. If the complainant chooses to meet with the Title IX Coordinator,

- Title IX Coordinator will offer supportive measures (e.g., counseling, extensions on deadlines, course-related adjustments, changes to work or class schedules, and/or referrals to campus offices), review the policy, and discuss options to move forward.
- If a complaint is filed by the complainant or the University, an investigation will begin following University policy.

University Grade Appeal Policy: If you believe you received a final course grade that does not reflect your performance due to fairness or a procedural issue, you have the right to file an appeal within 5 school days after final grades are posted by the Office of the Registrar. Review the University Grade Appeal Policy and Process.

The Learning Center

The Learning Center offers free Tutoring and Academic Coaching for many courses at Ball State. Students can make appointments for online (Zoom) or in-person (NQ 350) appointments. To make an appointment, visit myballstate.bsu.edu and click on "Navigate" in the Academic Tools section, or just go directly to bsu.navigate.eab.com.

Testing accommodations for students with disabilities are available for students who have received the appropriate documentation from Disability Services. Tests may be administered in the Learning Center.
Supplemental Instruction is available in select courses. If you have an SI leader for your course, that person will provide students with information the first week of school regarding weekly study sessions. For more information about Learning Center programming, visit bsu.edu/learningcenter or call 765-285-1006. Follow us on Instagram: BallStateLC.

Ball State Academic Ethics Policy: Honesty, trust, and personal responsibility are fundamental attributes of the university community. Academic dishonesty and other forms of academic misconduct threaten the foundation of an institution dedicated to the pursuit of knowledge and will not be tolerated. To maintain its credibility and reputation, and to equitably assign evaluations of scholastic and creative performance, Ball State University is committed to maintaining a climate that upholds and values the highest standards of academic integrity. Visit the VPAA's academic integrity website (Students tab) for resources on understanding academic integrity, citing sources properly, and avoiding inadvertent academic dishonesty. To learn about BSU's academic integrity expectations and students' rights, please read the University Student Academic Ethics Policy.

Course Academic Ethics and Plagiarism Policy

When completing assignments for this class, the intent is that you are learning how to program, and need to practice in order to improve. All resources that you need to complete the solutions are covered in the course, and assignments are scaffolded to help you build your understanding. When you use online solutions, AI assistants, or others to complete your work for you, you are doing yourself a disservice and not really learning the material. Using these resources is considered academic dishonesty and plagiarism. **For this course, the use of online solutions and AI assistants such as Gemini or ChatGPT are prohibited**. Use of such resources violates the course Academic Ethics policy and may result in failing the course.

You are probably familiar with how plagiarism applies to written work, such as essays. For a programming class, plagiarism is similar – your "essay" is your code. There are many different ways to successfully solve each programming problem, and so code that is independently written is usually different than other work submitted by your classmates. You *can* discuss with each other in general terms how to approach solving a problem, but should never share specific code, either verbally or in written form. Unless otherwise indicated for all assignments, you must work independently by

yourself. Never email or directly share your code with other students, post it online, or otherwise disseminate solutions to assignments.

Potential Violations

Examples of academic integrity violations include but are not limited to:

- Working with another person on any assignment.
- Sharing or allowing others to access your files, whether done with permission or not.
- Use or possession of a file created by someone else.
- Reusing work from another semester, course, or section.
- Soliciting others to complete work for you, both human and AI assistants such as ChatGPT, Gemini, or other LLM-based tool.