Course Syllabus

CS 4448 Operating System

Fall 2026

10/05/2026 ~ 1/22/2027

Instructor Information

Title: Assistant Professor

Name: Byungkwan Jung

Location: MSCX132F

Phone Number(s): (334)-808-6478

Troy Email: **bjung@troy.edu (mailto:bjung@troy.edu)**

The instructor will respond to student emails or questions within 24-48 hours.

Also, I will be available through TEAMs

Office Hours:
MW 10 AM-2 PM, others by appointment.

Education: Byungkwan Jung received his B.S. degree in Accounting -- Taxation from Kyunghee University, Republic of Korea, and M.S. degree in the Dept. of Computer Science from South Dakota State University, Brookings in 2010 and 2014, respectively, and a Ph.D. degree in computer science from Texas Tech University, Lubbock, TX, USA in 2019.
He is currently an Assistant Professor with the Dept. of Computer Science at Troy University, Troy, USA. Before he joined Troy University, he was a post-doctoral research associate at Baylor University, Waco, TX, USA. His research interests include wireless networks and mobile computing, cybersecurity, image processing, and machine learning

Course Description

Course Description:

An overview of operating system functions and components. Issues include process definition, scheduling, and memory management. Various modern operating systems are compared.

Course Objectives:

- Be able to give a history of operating systems.
- Be able to describe how hardware, software and microcode contribute to the computer system.
- Be able to describe how Process Description, Control and threads contribute to the computer system.
- Be able to describe the difference between multi-programming and multiprocessing and Real-Time scheduling works.
- Be able to describe how Uni-processor Scheduling system works.
- Be able to describe how a virtual storage operating system works.
- Be able to describe the differences between and the organization and methodology of some major operating systems.
- Be able to perform the necessary system calls (API's) or use the operating system control language to complete jobs.
- Be able to describe how embedded systems works.
- Be able to describe the process of handling interrupts on a computer.
- Be able to describe how I/O works with an operating system.
- Be able to describe the importance of Computer Security systems.

Learning Outcomes:

- Describe the basic elements of a computer system and their interrelationship.
- Explain the steps taken by a processor to execute an instruction.
- Understand the concept of interrupts and how and why a processor uses interrupts.
- List and describe the levels of a typical computer memory hierarchy.
- Explain the basic characteristics of multiprocessor and multicore organizations.
- Summarize, at a top level, the key functions of an operating system (OS).
- Discuss the evolution of operating systems for early simple batch systems to modern complex systems.
- Give a brief explanation of each of the major achievements in OS research, as defined in **Section 2.3 (https://nam11.safelinks.protection.outlook.com/?url=https%3A%2F%2Fjigsaw.vitalsource.com%2Fbooks%2F9780133806175%2Fepub%2FOPS%2Fx**
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- Discuss the key design areas that have been instrumental in the development of modern operating systems.
- Define and discuss virtual machines and virtualization.
- Understand the OS design issues raised by the introduction of multiprocessor and multicore organization.
- Define the term process and explain the relationship between processes and process control blocks.

- Explain the concept of a process state and discuss the state transitions the processes undergo.
- List and describe the purpose of the data structures and data structure elements used by an OS to manage processes.
- Assess the requirements for process control by the OS.
- Understand the distinction between process and thread.
- Describe the basic design issues for threads.
- Explain the difference between user-level threads and kernel-level threads.
- Discuss basic concepts related to concurrency, such as race conditions, OS concerns, and mutual exclusion requirements.
- Understand hardware approaches to supporting mutual exclusion.
- Define and explain semaphores.
- Define and explain monitors.
- Explain the readers/writers problem.
- List and explain the conditions for deadlock.
- Define deadlock prevention and describe deadlock prevention strategies related to each of the conditions for deadlock.
- Explain the fundamental difference in approach between deadlock detection and deadlock prevention or avoidance.
- Understand how an integrated deadlock strategy can be designed.
- Analyze the dining philosophers problem.
- Understand the reason for memory partitioning and explain the various techniques that are used.
- Understand and explain the concept of paging.
- Understand and explain the concept of segmentation.
- Assess the relative advantages of paging and segmentation.
- Describe the virtual memory management mechanisms in UNIX, Linux, and Windows 7.
- Explain the differences among long-, medium-, and short-term scheduling.
- Assess the performance of different scheduling policies.
- Discuss the key design issues in multiprocessor thread scheduling and some of the key approaches to scheduling.
- Summarize key categories of I/O devices on computers.
- Discuss the organization of the I/O function.
- Explain some of the key issues in the design of OS support for I/O.
- Describe the basic concepts of files and file systems.
- Define B-trees.
- Explain file directories.
- Describe the principal design issues for secondary storage management.
- Explain the OS file systems used in Linux, UNIX, and Windows 7.
- Explain the concept of embedded system.
- Describe the architecture and key features of TinyOS.
- Describe the various approaches to virtualization.
- Understand the processor issues involved in implementing a virtual machine.

- Understand the memory management issues involved in implementing a virtual machine.
- Understand the I/O management issues involved in implementing a virtual machine.
- Explain the operation of the Linux virtual machine.
- Assess the key security issues that relate to operating systems.
- Understand the design issues for file system security.

Entrance Competencies/Course Prerequisites/Course Co-requisites

The student will look up articles related to Operating Systems and articles related to the book.

Prerequisites: CS 4445 and CS 3323 or 3330.or academic adviser's approval

Co-requisite(s): None

Required Textbooks & Supplementary Materials

(Optional) OPERATING SYSTEMS

Author: William Stallings

Publisher: Pearson (For exercises)

(Required)OPERATING SYSTEMS-Concepts | Edition: 10
Author: Abraham Silberschatz
ISBN: 978-1-119-32091-3
Publisher: Wiley

Required Textbook and Materials

This course is part of our course material delivery program, Trojan Book Bag. The bookstore will provide each student with a convenient package containing all required physical materials and all digitally delivered materials for this course will be integrated into Canvas.

You should have received an email from the bookstore confirming materials provided for each of your courses and asking you to select how you would like to receive any printed components (in-store pick up or home delivery). If you have not done so already, please confirm your fulfillment preference so the bookstore can prepare your materials.

For more information about Trojan Book Bag, please go **here** **(https://nam11.safelinks.protection.outlook.com/?**

url=https%3A%2F%2Fwww.troy.edu%2Facademics%2Facademic-resources%2Ftrojan-book-bag.html&data=05%7C02%7Cmmauldin%40troy.edu%7C47084843572b4047efec08dcf8567a6a%7C8de8

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Additional Information

To access digitally delivered materials within Canvas, please click on the Trojan Book Bag link in the navigation menu.

Method of Evaluation

The grades are weighted and you will see the running grade percentage as you complete the assignments throughout course.

25% - Test1

28% - Test2

20% - Quizzes and assignments

27 % Final project

Quizzes will contain questions taken from 1 or 2 chapters at a time. The Quizzes are there to help the student understand the chapters and to help prepare you for the midterm and final.

Make-Up Work Policy

Deadlines must be respected with no exception unless proper official written excuse is provided. If an assignment/test is missed without proper written excuse, this may prevent completion of the course or a 0 grade in the assignment. If you foresee difficulty of any type (e.g., an illness, employment change, etc.) which may prevent completion of this course, notify the instructor as soon as possible within the deadline(not a few hours before either). Failure to do so will result in failure for an assignment and/or failure of the course. If I have not heard from you by the deadline dates for assignments, exams, or forums, no make-up work will be allowed (unless extraordinary circumstances exist, such as hospitalization). Requests for extensions must be made in advance and accompanied by appropriate written documentation. **“Computer problems, internet problems, confussion busy schedule..” are not acceptable excuses. Late submissions without a proper excuse, will obtain a 0 grade even if they are one second later than the deadline. You will have plenty of time to submit your work. I strongly suggest to turn your assignments one day or at least several hours before your deadline. Please do not email the instructor for extensions if you dont have a proper official excuse.**

I grade and provide feedback on discussion board posts within 2 days. For other assignments and assessments, you will typically receive your grade and feedback within 2 to 3 days.

Incomplete grade policy

Consult the **undergraduate catalog** or **graduate catalog** for additional information.

Policies

Plagiarism/Artificial Intelligence (AI) Policy

Plagiarism (https://my.troy.edu/online/assets/documents/Plagiarism.pdf)

Artificial Intelligence (AI) Policy

AI tools may be used as **personal study aids** to support your learning in this course. For example, you may use AI to explain concepts, review course material, generate practice questions, or help you prepare for assessments.

However, unless specifically permitted by the instructor, **AI tools may not be used to complete graded work**, including quizzes, assignments, exams, or other activities designed to evaluate your individual understanding.

These assessments are intended to measure **your own knowledge, reasoning, and ability to apply course concepts**. AI-generated answers do not represent your own thought process and should not be submitted as your own work.

In short: AI may assist your learning, but it may not replace your own work when your understanding is being evaluated.

If AI use is permitted for a particular activity, specific instructions will be provided. If you are unsure whether AI is allowed, please ask the instructor before using it.

Attendance Policy

In addition to interaction via Canvas and email contact, you are required to contact the instructor via email or telephone by the first day of the term for an initial briefing. Although physical class meetings are not part of this course, participation in all interactive, learning activities is required.

Late Registration

Students who register during the first week of the term, during late registration, will already be one week behind. Students who fall into this category are expected to catch up with all of Week #1 and Week #2's work by the end of Week #2. No exceptions, since two weeks constitutes a significant percentage of the term's lessons. Students who do not feel they can meet this deadline should not enroll in the class. If they have registered, they should see their registrar, academic adviser, GoArmyEd or Military Education officer to discuss their options. Also note that late registration may mean you do not receive your book in time to make up the work you missed

in Week #1. Not having your book on the first day of class is not an excuse for late work after the deadlines in the Course Schedule.

All other TROY Online Policies and Procedures are listed under the Home Page Tab.

Disability Services/ADA

Disability Services provides assistance and accommodations to students with documented disabilities that may impede their academic progress. Services include notifying instructors about the specific accommodations to which the student is entitled. Disability Services will not alter the academic requirements of individual courses. Each student must provide recent documentation of his or her disability in order to participate.

For more information about Disability Services in Troy University (e.g. how to apply, Troy University policies, documentation guidelines and contact information), click on this **Disability Services Link (https://my.troy.edu/student-disability-services/)** .

Additional Course Information

- All lectures in forms of recording or voice recorded powerpoint slides are uploaded Monday. For each week, assignments will be given. The number of assignments may be adjusted based on course progression.
- All assignments have specific due dates. **Submit assignments and Discussions through Canvas.** Assignments and discussions submitted the day after the due date are considered one day late and will be penalized 10%. Assignments and discussions submitted on the second day after the due date are considered two days late and will be penalized 20%. Any submission later will be considered a no-submission and given 0.
- Anyone found cheating and/or copying will receive an automatic 0 for that assignment or exam or dismissal from the course. This goes for the person who copies as well as the person who allows their work to be copied. And the Dean of Students Office will be notified

Course Summary:

Date	Details	Due