



## CS 415 - Operating Systems

CRN 21835

3 Semester Hours

**Spring 2022**  
Waters N-105

**Instructor:** Adam Lewis  
**Office:** Waters Hall S103D  
**Telephone:** 256-233-6505  
**Email:** Adam.Lewis@athens.edu  
**Google:** awadelewis@gmail.com  
Class website on Blackboard

**Class times:**  
T 6:00 p.m. - 8:50 p.m.

**Office hours:**  
T: 1:30 p.m. - 5:30 p.m.  
W: 1:30 p.m. - 5:30 p.m.  
Th: 1:30 p.m. - 5:30 p.m.  
Other times by appointment.

## 1 Course Description

This course is an applied introduction to Operating Systems, appropriate for students who are interested in using and understanding computer operating systems and networks. The goal is to learn why operating systems are needed and what, at a functional level, they do. The course approaches these materials from a perspective to include experienced users who may or may not know how to program. Concepts covered include: Operating System Fundamentals, User Interfaces, File Systems, Resource Management (memory, multiprogramming, peripherals), Client/Server Information Systems. Modern commercial and open source operating systems, as well as supporting components, are also studied.

## 2 Prerequisites

Prerequisite: CS340 (Assembly Language Programming), CS372 (Data Structures), and any computer networking course.

## 3 Learning outcomes

Upon successful completion of this course, students will have the ability to:

- Understand the difference between processes and threads.
- Understand the issues and use of locks, semaphores, and monitors for synchronizing multi-threaded systems.

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- Understand the issues of scheduling of user-level processes and threads in modern operating systems.
  - Understand the issues involved to develop multithreaded programs.
  - Understand virtual memory management in modern operating systems.
  - Understand the types of security problems faced by operating systems and how to minimize these problems.
  - Understand the organization and synchronization of distributed operating systems.
  - Understand communication in distributed systems and how it can be used in remote procedure calls, remote objects, and message-oriented communication.

### 3.1 Texts and Materials

**Textbook:** **Operating Systems Concepts**, 10th. ed.  
Siblerschatz, A., Gagne, G., and Galvin, P.  
ISBN:978-1-119-32091-3

**Additional** **Lecture notes and Additional reading**  
**References:** As published on class website on Blackboard.

**The Linux Programming Interface: A Linux and UNIX System Programming Handbook**  
Kerrisk, Michael  
ISBN:978-1593272203

**Operating Systems Design and Implementation**, 3rd. ed.,  
Tannenbaum and Woodhull,  
ISBN:978-0131429383

**Mac OS X Internals: A Systems Approach**,  
Singh,  
ISBN: 978-0321278548

**Windows Internals**, 6th. ed.  
Rusinovich, Solomon, Ionescu,  
ISBN: 0735625301

**The Design and Implementation of the FreeBSD Operating System**, 2nd ed.  
McKusick, Neville-Neil, and Watson  
ISBN: 978-0321968975

## 4 Class policies

### 4.1 Department General Course Standards (GCS)

The Department of Mathematics and Computer Science is committed to a level of course rigor commensurate with those of (1) colleges and universities offering similar mathematics or computer science programs as Athens State University, (2) other Colleges within AthensState University and (3) other departments within the College of Arts and Sciences. The Department of Mathematics

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and Computer Science supports the content standards, overall quality, and academic integrity for each traditionally delivered, blended or online course within the curriculum according to the general course workload standards delineated below:

1. Reading
2. Writing
3. Course Assessments
4. Class Interaction

## 4.2 Attendance

I believe that our students are adults and are aware of the need to attend class. For Financial Aid purposes, submission of the first assignment in the course will be used to indicate that you are attending the class. Otherwise a formal roll call will not be taken in class.

If you should be absent for unavoidable reasons, you **must** check with me before I will consider allowing **any** make-up work. This includes exams, homework, and project reports.

If you miss a class, you are responsible for getting any material you may have missed.

This course will simulcast and be recorded using Zoom. Please note that participation via Zoom will be permitted as attendance for this class only with prior approval from your instructor. Permission to do this will be granted on an **EXTREMELY** limited basis. Also note that recordings will be posted to Blackboard in their raw unedited state.

## 4.3 Course Grading Scale and Evaluation

A total of 1000 points will be awarded in this course.

<b>Grading Scale:</b>	From 900 pts. or above	A
	From 800 pts. to 899 pts.	B
	From 700 pts. to 799 pts.	C
	From 600 pts. to 699 pts.	D
	Below 600 pts	F

The points will be distributed as follows:

Exam 1	150
Exam 2	125
Exam 3	125
Programming & Homework	600

Grades will be posted on Blackboard. Keep track of all your grades. It is your responsibility to make sure they are correctly posted. Any disputes concerning how an assignment has been graded must be brought to my attention no later than the class meeting following the return of the graded assignment.

As some components of your final grade will be computed on a scaled basis, the points total on Blackboard may not accurately reflect the total number of points you have collected to date. Please contact the instructor if there are any comments, questions, or concerns about this policy.

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#### 4.3.1 Exams

There will be three exams over the course of the semester: two Mid-Term Exams and a Final Exam. The final exam will *not* be cumulative; i.e., it will cover only the material presented during the final third of the class. The exams will reflect the material presented in class and programming assignments.

Students will be permitted to use one page of handwritten notes (front and back) during exams. Otherwise, all exams are closed book and closed notes.

Exams will be held at the start of the class when scheduled and you will have ninety minutes to complete the exam. Lecture and/or lab sessions will follow the exam. (GCS 1,2,3)

#### 4.3.2 Programming & Homework

There will be multiple labs and problem sets over the course of the semester. You will be asked to solve from 1 to 10 problems and review questions inspired by the material covered in the previous class. Problem sets will include programming projects. Each project will ask you to solve a problem related to the material covered in the course.

Collaboration is not permitted on these assignments.

Each assignment will be graded on a 100-point scale. Points will be assigned to each problem in a problem set, with a greater weight applied to programming problems.(GCS 1,2,3)

At the end of the semester, your programming project score for the semester will be calculated using the following formula:

$$600 * (\text{total points earned} / \text{total points assigned})$$

### 4.4 Submission of Assignments

Announced assignments **MUST** be completed on the day and time assigned. Late assignments will be accepted with a 25% deduction per day, up to 3 days late.

Corrections may be resubmitted without penalty up to 7 days past the due date if a clear and substantial attempt at completing the assignment is submitted on-time in the first place. Please **DO NOT** abuse this policy... I reserve the right to terminate this policy if evidence of abuse is found during grading of assignments.

You will submit assignments using Blackboard. Assignment files (program source, documentation, and others as required) **must** be submitted as a single PDF file containing design, source code, and documentation. Information about required content and formatting will be provided with the first assignment. Failure to correctly submit files as instructed will result in deduction of points on the assignment.

#### 4.4.1 Academic Misconduct

All acts of dishonesty in any work constitute academic misconduct. This includes, but is not limited to, cheating, plagiarism, fabrication of information, and/or abetting any of the above. Academic misconduct represents unethical behavior unbecoming to college students. **I have no tolerance for academic dishonesty in any form. Cheating on any assignment, lab, quiz, or exam will result in the student being assigned a grade of F for the course.**

If a student is suspected of cheating, the student will appear before the instructor, as well as other instructors in the computer science department, and explain the reason for the similarities of their code with other student(s) source code.

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## 4.5 Disability Accommodation Statement

If you are in need of classroom or program accommodations, contact the Counseling and Career Services Office/Disability Services, at 256-233-8285 (voice) or 1-800-522-0272, extension 285, or visit the Sandridge Student Center, Room 230 or e-mail [kari.allen@athens.edu](mailto:kari.allen@athens.edu) or the Disability Services Office so that your needs can be assessed, documentation can be obtained, and accommodations can be provided/recommended.

## 4.6 Laboratory Fee

The “lab fee” charged for some Arts and Sciences courses is a fee that provides funding to support and enhance educational opportunities available to students.

## 4.7 Other

- Check the class website on Blackboard for announcements, postings of lecture notes, quizzes, assignments & solutions, along with labs and the associated solutions.
- Please turn off all cell phones before entering the classroom. I have a very simple policy concerning cell phones: if your phone rings during class, I get to answer it. However, I am fair about this policy; if my phone should ring, I will hand it to one of you to answer for me.

You may use laptops, tablets or other computing devices in class so long as they do not create a distraction for other students.

## 4.8 In Conclusion: How to Succeed In This Course

Read this syllabus. Read the textbook, review any extra material on Blackboard, and review the lecture slides before coming to class. Be prepared to ask questions as I prefer class meetings to be a conversation rather than a monologue.

This course moves fast, so I encourage you to keep up with the reading and programming assignments. It can be difficult to catch up if you get behind. If you have any problems or questions, please come talk to me as soon as possible so that I can help.

There may be times when your background has holes relative to your classmates. In these situations, you should certainly seek extra help, but you will at times be expected to do a certain amount of reading and learning on your own.

There may be some of you for whom parts of this course are old material; if this is true, I encourage you to try some of the more advanced, optional parts of the assignments. Help each other learn. One of the best ways to ensure that you understand a concept is to explain that concept to another person.

Finally, to succeed in this course, it is very important that you learn to think for yourself. For example, you will find that certain aspects of your programming assignments will be under-specified and it will be up to you to think about what the right thing to do is.

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## 5 Appendix A: Schedule

Week	Topic
1	Introduction Relationship between hardware and the OS The Boot Process Shells and User Interface
2	Processes
3	Threads
4	Process and Thread Synchronization
5	<b>Exam 1</b>
6	Interprocess Communications and Socket Programming
7	CPU Scheduling
8	Memory: Main and Virtual
9	Mass Storage Devices
10	<b>Exam 2</b>
11	File Systems and Device I/O
12	Device I/O, Device Drivers, and Kernel Modules
13	Virtualization and Cloud Computing
14	Security
15	<b>Exam 3</b>