



# KENNESAW STATE UNIVERSITY

COLLEGE OF COMPUTING AND  
SOFTWARE ENGINEERING  
*Department of Computer Science*

## CS 3502 - Operating Systems Fall 2023

# SYLLABUS

### FACULTY AND COURSE INFORMATION

Kun Suo

Assistant Professor

Email: [ksuo@kennesaw.edu](mailto:ksuo@kennesaw.edu) (D2L email system)

Phone #719-502-6866

Home page: <https://kevinsuo.github.io>

Office: J-318

Office Hours: online. MS teams, and by appointment

Class Location and Meeting Times: D2L

Course Website: <https://kevinsuo.github.io/teaching.html>

### Required Texts or Technology Resources -

*Operating Systems: Three Easy Pieces*, <http://pages.cs.wisc.edu/~remzi/OSTEP/>

Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau

ISBN-13: 978-1985086593

Teaching/Lab Assistant: TBD

### Reference:

#### C tutorial

- <https://www.tutorialspoint.com/cprogramming/>
- <https://www.learn-c.org>
- <https://www.cprogramming.com/tutorial/c-tutorial.html>

#### Linux tutorial

- <https://ryantutorials.net/linuxtutorial/>
- <http://www.ee.surrey.ac.uk/Teaching/Unix/>
- <https://www.tutorialspoint.com/unix/>

### COURSE DESCRIPTION, CREDIT HOURS, AND PREREQUISITES

**CS 3502:** Operating Systems

**3 Class Hours 0 Laboratory Hours 3 Credit Hours**

**Prerequisite:** (CS 3503 and CS 3503L) and (CS 3305 and CS 3305L)

This course introduces the fundamental concepts and principles of operating systems. Topics covered include system performance, processes and threads, multiprogramming, scheduling, memory management, synchronization, deadlocks, file systems, Input/output systems. Additional topics: security and protection, network and distributed OS.

## **COURSE LEARNING OUTCOMES**

Students will be able to:

1. Demonstrate the understanding of the conceptual workings and design fundamentals of operating systems.
2. Demonstrate the understanding and be able to evaluate the features offered by various types of operating systems.
3. Demonstrate the understanding and be able to evaluate performance issues of computer systems, by running and analyzing simulation models (in course assignments).
4. Write short reports on the performance of various aspects of operating systems.
5. Develop a program (in Java and/or C++) that uses calls to the OS system functions, using threads and synchronization to demonstrate the understanding of threads and synchronization.
6. Describe some potential operating systems level security problems and some ways to mitigate these problems.

## **TEACHING PHILOSOPHY AND INSTRUCTION METHODS**

As computer science and technology are becoming the backbone of today's world and developing so rapidly, a successful education comes from not only providing students with solid knowledge and existing skills, but also teaching them the thinking of solving new problems and passion to explore the unknown. First, interest is the best teacher for everyone, and I will seek to make the courses interesting and motivate the students engaging in learning. Second, I will not only teach the fundamental concepts and basic knowledge, but also work with my students on the cutting-edge problems and explore the connections between these issues with what we learnt. Last and most importantly, my goal is to guide students to help them develop the ability to find problems, conduct research, design solutions and collaborate with others.

## **COURSE CONTENT AND REQUIREMENTS/GRADING SCALE**

### **Hardware Requirement**

Due to the COVID-19, all courses, homework and projects will be moved onto D2L and the webcam is not required for the students.

### **Course Topics and Outline**

- Introduction to OS
- Process, thread and CPU scheduling
- Parallel programming and deadlock
- Memory management
- File, storage and I/O
- Virtualization and Cloud

**Final Exam:** TBD

Week/Date	Topic	Chapters	Assignment	Project
1	Introduction and OS overview	1,2		
2	Processes	4, 5		
3	Thread	26, 27		
4	System call	5		Project 1

5	IRQ	29, 30, 31		
6	CPU scheduling	7, 10		
7	Deadlock and Pthread	28, 29, 30, 31	HW1	Project 2
8	Mid-term exam			
9	Memory	13, 14, 15, 16		
10	Page design and implementation	18, 19, 20, 21, 22		
11	File system	39, 40		
12	Storage	37, 41, 42, 43, 44		
13	I/O	36		
14	Virtualization and Cloud	23	HW2	Project 3
15	Conclusion	11, 24, 34, 51		
16	Final exam			

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.

### Grading Scale and Course Policies

Homework, quizzes, project, and exams will be given numerical scores. These scores will be averaged at the end of the semester using the following weighting:

Item	Points, percentage or measurement
Homework	10%
Projects	40%
Midterm exam	20%
Final exam	30%

**Homework Submission:** Copying or paraphrasing codes from other sources or other students will be considered a violation of the Student Code of Conduct. Due dates for homework assignments will be specified on the homework themselves. **No late submission is accepted.**

Letter grades will be determined by ranking the numerical averages of all students in the class. Cut-off points for grades will depend on the performance of the class as a whole; however, they will be no higher than 90 (A), 80 (B), 70 (C), and 60 (D).

Your final weight average will be used to determine your final letter grade using the table below:

Grade	Points, percentage or measurement
A	90-100
B	80-89
C	70-79
D	60-69
F	0-60

### Course Policies:

**Feedback in a Timely Manner:** The instructor will ONLY reply to e-mails that are sent using D2L email system. Please allow your instructor 24-48 hours before replying back to your email.

**Attendance Policy:** Regular attendance is expected; please notify me in advance if you will be unable to attend because of business travel or other valid reason. If a student misses 2 or more than 2 classes, the student's final grade may be decreased.

**Quiz/Exam Policy:** Two exams will be given throughout the semester. Students who are late to class on a day when an exam is administered will not be given extra time to complete the exam. Makeup exams **WILL NOT** be given.

**Electronic Devices and Classroom Behavior Policy:** In order to minimize the level of distraction, all beepers and cellular phones must be on quiet mode during class meeting times. Students who wish to use a computer/PDA for note taking need prior approval of the instructor since key clicks and other noises can distract other students. Recording of lectures by any method requires prior approval of the instructor. Students using a laptop in class should not check their email, browse the web, or in other way detract from the focus of the class.

Students are reminded to conduct themselves in accordance with the Student Code of Conduct ([KSU Student Code of Conduct, Section III](#)), as published in the Undergraduate and Graduate Catalogs. Every KSU student is responsible for upholding the provision. Students who are in violation of KSU policy will be asked to leave the classroom and may be subject to disciplinary action by the University.

**Tutoring:** The College of Computing and Software Engineering offers some tutoring services for certain courses. If this applies to your course, you may want to include this resource for your students. Tutoring info can be found here: <http://ccse.kennesaw.edu/ccselabs/ccse-tutoring.php>

## **COURSE WITHDRAWAL**

Check the [eCore calendar](#) for the late registration/add period and the drop period of the session you are enrolled in.

Students may withdraw from one or more courses up to one week prior to the last day of class. Summer withdrawal dates vary according to the part of term in which the student is enrolled. As of fall 2004, students will be allowed a maximum of eight total withdrawals if they enter KSU as a freshman. Transfer students will be allowed one withdrawal per fifteen credit hours attempted, for a maximum of eight. Students who choose to pursue a second degree at KSU will be allowed two additional withdrawals and consult with the Registrar's Office. Students who entered KSU before fall 2004 will be allowed one withdrawal per fifteen credit hours attempted for a maximum of eight after the institution of this policy. As part of the consolidation process between Kennesaw State University and Southern Polytechnic State University, SPSU students will have eight withdrawals available beginning Fall Semester 2015.

Students who exceed the maximum number of withdrawals will receive a grade of 'WF' for any subsequent withdrawals. To completely or partially withdraw from classes at KSU, a student must withdraw online through Owl Express.

Students who officially withdraw from courses before the last day to withdraw without academic penalty will receive a grade of 'W' and receive no credit. Students who officially withdraw after the last day to withdraw without academic penalty and before the last week of classes during the semester or who have exceeded the maximum number of withdrawals will receive a grade of 'WF,' which will be counted as an 'F' in the calculation of their grade point average.

The only exceptions to these withdrawal regulations will be for instances involving unusual circumstances, which must be fully documented. Students may appeal to the Academic Standing Committee for consideration of unusual circumstances. Exact withdrawal dates are published in the official academic calendar. Students will receive refunds only when they withdraw from ALL their classes and only by the schedule outlined in the University System refund policy.

## **ASSISTANCE OUTSIDE OF CLASS**

You may seek assistance outside of class from the instructor.

When you seek help it is important that you bring the necessary materials with you so that we can effectively advise you. If you are seeking help with classroom work bring your text and your classroom notes. If you are seeking help with pencil and paper exercises bring your text, your classroom notes, and whatever attempts you have made with the exercises. If you are seeking help with a program, make sure you bring your code with the most current versions of files. Bring paper listings of these files. If you were getting error messages, record them as accurately as you can. Again, bring your most current versions of your work. The ability to help you is GREATLY reduced without the current versions.

## **STUDENT COURSE EVALUATION**

A standard questionnaire (described below) will be administered during the last two weeks of the semester in all classes. Additional questions developed by the college or instructor(s) may be included as well. It is important that each student provide meaningful feedback to the instructor(s) so that changes can be made in the course to continually improve its effectiveness. We value student feedback about the course, our teaching styles, and course materials, so as to improve our teaching and your learning. At a minimum, the following two questions will be asked: 1) Identify the aspects of the course that most contributed to your learning (include examples of specific materials, exercises and/or the faculty member's approach to teaching and mentoring), and 2) Identify the aspects of the course, if any, that might be improved (include examples of specific materials, exercises and/or the faculty member's approach to teaching and mentoring).

## **ACQUIRING FINAL GRADES**

In an effort to better utilize our technology resources, Kennesaw State University has instituted the reporting of end of term grades by phone. This is in addition to the web version of grades, which has been in effect for several terms. Students may call 770-420-4315 and select Option Number 4 to secure their end of term grades. With this new development, printed grade reports will not be mailed at the end of the term. Students needing verification of grades or enrollment should request either an official transcript or an enrollment verification through the Office of the Registrar.

## **ACADEMIC INTEGRITY**

Every KSU student is responsible for upholding all provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. The Code of Conduct includes the following:

- Section II of the Student Code of Conduct addresses the University's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation/falsification of University records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement.
- Students involved in off-campus activities shall not act in a disorderly or disruptive fashion, nor shall they conduct any dangerous activity.
- Students involved in off-campus activities shall not take, damage or destroy or attempt to take, damage

or destroy property of another.

Frequently students will be provided with “take-home” exams or exercises. It is the student’s responsibility to ensure they fully understand to what extent they may collaborate or discuss content with other students. No exam work may be performed with the assistance of others or outside material unless specifically instructed as permissible. If an exam or assignment is designated “no outside assistance” this includes, but is not limited to, peers, books, publications, the Internet and the WWW. If a student is instructed to provide citations for sources, proper use of citation support is expected. Additional information can be found at the following locations:

- <http://www.apa.org/journals/webref.html>
  - <http://bailiwick.lib.uiowa.edu/journalism/cite.html>
  - <http://www.indiana.edu/~wts/wts/plagiarism.html>
  - <http://www.virtualsalt.com/antiplag.htm>
- 

## **CAMPUS POLICIES**

Confidentiality and Privacy Statement (FERPA):

Kennesaw State University adheres to the Family Educational Rights & Privacy Act of 1974 - FERPA. See the following link for more information:

[http://usg.edu/information\\_technology\\_handbook/section9/tech/9.5\\_privacy\\_and\\_security](http://usg.edu/information_technology_handbook/section9/tech/9.5_privacy_and_security)

University - Student Rights & Responsibilities:

Students of Kennesaw State University are entitled to an environment that is conducive to learning and individual growth. To this end, students enrolling at Kennesaw State University assume a responsibility to abide by the policies and regulations expressed in this section. By doing so, students may fulfill their responsibilities and enjoy the exercise of their own rights while also respecting the rights of others.

<http://catalog.kennesaw.edu/content.php?catoid=27&navoid=2263>

Ethics Statement:

All students are responsible for knowing the information, policies and procedures outlined in the Kennesaw State University Codes of Conduct. The KSU Codes of Conduct include: the general Student Code of Conduct, the Residential Code of Conduct, and the Code of Academic Integrity. Kennesaw State University reserves the right to make changes to this code as necessary and once those changes are posted online, they are in effect. Students are encouraged to check online for the updated versions of all policies.

<http://scai.kennesaw.edu/codes.php>

Sexual Misconduct Policy:

Kennesaw State University is committed to providing programs, activities, and educational environment free from all forms of sex discrimination. For more information click here. KSU issues this statement of policy to inform the community of the University's comprehensive plan addressing sexual misconduct, educational programs, and procedures that address sexual assault, domestic violence, dating violence, and stalking, whether the incident occurs on or off campus. This policy generally covers faculty, students, and staff of the University, as well as third parties. Third parties include but are not limited to guests, vendors, contractors, retirees, and alumni.

<http://scai.kennesaw.edu/procedures/sexual-misconduct.php>

Course Accessibility Statement (ADA Statement):

<http://catalog.kennesaw.edu/content.php?catoid=27&navoid=2263&hl=FERPA&returnto=search#ADA>

## **ADDITIONAL STUDENT RESOURCES**

For CCSE Student resources:

<http://ccse.kennesaw.edu/student-resources.php>

KSU Service Desk:

The KSU Service Desk is your portal to getting assistance or access to University IT Services. Students call: 470-578-3555 or email [studenthelpdesk@kennesaw.edu](mailto:studenthelpdesk@kennesaw.edu)

For Academic Advising information and to schedule appointments:

<http://ccse.kennesaw.edu/advising/index.php>

Links to frequently used and helpful services:

<http://www.kennesaw.edu/myksu/>

Department of Career Planning & Development

<https://careers.kennesaw.edu>

Counseling and Psychological Services

<https://counseling.kennesaw.edu>

Center for Health Promotion and Wellness

<https://wellness.kennesaw.edu>

Student Health Services

<https://studenthealth.kennesaw.edu>