

# CSC 562: Principles of Operating Systems

## Fall 2017

### Syllabus

**Instructor:** Jing Deng

**Office:** Petty Building 164

**Office Hours:** Wednesdays 10:00AM-12:00noon

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**Prerequisites:** Grades of at least C in CSC 261 and CSC 340 (or equivalent if transfer student). Successful completion of CSC 561 will be helpful. The course is designed for junior/senior-level undergraduate computer science majors and graduate students.

**Catalog Description:** Techniques and strategies used in operating system design and implementation: managing processes, input/output, memory, scheduling, file systems, and protection.

**Course Objectives:** The aim of this course is to teach the concepts and principles of modern operating systems, and to provide opportunities to relate theoretical principles with operating system implementation. Specifically,

- Learn about processes and process management
- Learn about concurrency and synchronization
- Learn about memory management schemes
- Learn about file system and secondary storage management
- Practice, through programming assignments, the use of implementation of the concepts above
- (Graduate students only) Perform paper reviews in related state-of-the-art technical literature.

**Course Outcomes:** By the end of the course, students should be able to demonstrate understanding of the basic principles and techniques of operating systems covered in the course, and should be able to implement system programs. Specifically,

- CO1: Demonstrate knowledge in fundamental operating system abstractions such as processes, threads, and process management
- CO2: Demonstrate knowledge in semaphores, monitors, conditions, deadlocks, IPC abstractions, shared memory regions, etc.
- CO3: Demonstrate knowledge in principles of memory management
- CO4: Demonstrate knowledge in file abstraction and storage management
- CO5: Be able to apply knowledge outlines in the above to design and develop system programs based on operating system abstractions and to write correct concurrent programs/software, including basic resource management techniques (scheduling or time management, space management) and considering issues such as performance and fairness objectives, and avoiding deadlocks.

- (Graduate students only) Able to identify, evaluate, and communicate information presented in the related technical literature and summarize them in technical writing.

**Class Web Page:** Canvas (you have to enroll to be able to see it)

**Textbook:**

1. “Operating System Concept,” 9<sup>th</sup> edition, Silberschatz, Galvin, Gagne: Wiley, 2012. ISBN-13: 978-1118063330, ISBN-10: 1118063333. (required)
2. “Modern Operating Systems,” 4<sup>th</sup> edition, Andrew Tanenbaum: Prentice Hall, 2014. ISBN-13: 978-0133591620, ISBN-10: 013359162X. (recommended reading)

**Other Reading:** provided through Canvas.

**Teaching Methods and Assignments:** The primary method of instruction will be two 75-minute periods per week for lecture and discussion, with students responsible for completing assigned readings, assignments, and preparing for exams. Assignments will be a mix of written analysis and applied programming. Written assignments should be turned in electronically:

- Electronic submissions in the format of MS Word (.doc or .docx files) or PDF are preferred. If you have to submit snapshots of your handwriting, please embed them into a Word or PDF file and ensure that it can be viewed clearly. Separate snapshot pictures will not be accepted.
- When source files are required to be submitted, please put all files including your word file into a single folder and zip them into a “Lastname3.zip” file, with appropriate number, and submit it.

**Tentative Grading Policy**

	Undergrad	Graduate
Pop quiz	20%	20%
Homework	20%	15%
Preliminary	30%	30%
Final	30%	30%
Technical Report	n/a	5%

Tentative scale for final grades:

A: total $\geq$ 90; B: 80 $\leq$ total $<$ 90; C: 70 $\leq$ total $<$ 80; D: 60 $\leq$ total $<$ 70; F: total $<$ 60

**Class Schedules** (tentative numbers of lectures in parenthesis)

- Course Introduction (1)
- C Programming (1)
- Introduction to OS (1)
- OS structure overview (1)
- Processes (3)
- Threads (2)
- CPU scheduling (4)
- Process synchronization (4)

- Deadlocks (1)
- Main memory (4)
- Virtual memory (2)
- Mass storage (2)

**Academic Integrity:** Students are expected to be familiar with and abide by the UNCG Academic Integrity Policy, which is online at <http://academicintegrity.uncg.edu/> Assignments in this class are for individual work, unless explicitly stated otherwise. General concepts and material covered in the class may be discussed with other students or in study groups, but specific assignments should not be discussed and any submitted work should be entirely your own. It is expected that the class textbook will be used as a reference, but if any other reference materials, especially those from the Internet, are used in preparing homework solutions they should be clearly cited. Any incidents of academic dishonesty will be handled strictly, resulting in either a zero on the assignment or an F in the class, depending on the severity of the incident, and incidents will be reported to the appropriate UNCG office. By submitting your homework or exam answer sheet, you have implicitly signed the Academic Integrity Pledge, stating that “I have abided by the UNCG Academic Integrity Policy on this assignment or submission.”

If it is found that your homework or program is the result of plagiarism from the Internet or your classmate’s work, you will be reported (so will be the classmate whose work has been plagiarized).

Students are expected to abide by the UNCG’s Academic Integrity Policy and the Student Code of Conduct:

- Student Conduct: <http://sa.uncg.edu/handbook/student-code-of-conduct/>
- Academic Integrity Policy: <http://sa.uncg.edu/handbook/academic-integrity-policy/>

**Attendance Policy:** Attendance of lectures is mandatory unless you have legitimate reasons of not coming. Prior notification through email is required if you can't make it to a lecture. Use an email subject of “CSC 562 - absence”. Pop quiz and group discussions will be given to check your attendance and participation in class. No make-up quiz or discussion will be made. Note that some of these might be at the beginning of the lecture and if you are late, no make-up quiz will be made for you either. If you are consistently late for the lectures or always leave early, we reserve the right to ask you to drop this course because your schedule does not seem to fit. Also be warned that the door might be closed or sometimes accidentally locked from inside to block out hallway noises once our lecture starts. The university allows for a limited number of excused absences for religious observances --- students who plan to take such an absence should notify the instructor at least two weeks in advance so that accommodations can be made (also see the late work policy later).

**Laptop/Cellphone Policy:** Laptops can be both a benefit and a distraction in classroom. While many students benefit from taking notes using a laptop, or having access to outside class-related resources during class, other students cannot resist the temptation of checking e-mail, social texting, or even playing games during class time. This class has a strict “no non-class related use” rule for laptops or cell phones — if you are found violating this policy, then your in-class laptop/phone privileges will be taken away. Cell phones are a distraction for everyone, and should be turned off or muted during class.

**Audio Taping Lectures:** Audio taping of our lectures is generally allowed as long as they are used solely for this course. Do not upload/distribute the recordings. No video-taping is allowed.

**E-cigarette:** Please do not smoke e-cigarette in class.

**Late Policy and Makeup Exams:** Late submissions of homework are strongly discouraged, unless advanced permission is granted under rare occasions. 50% per day of late submission penalty will be charged. If a homework assignment is too difficult or has time conflict with your other academic activities, try to speak out in Canvas forum to request a class-wide extension. Exams may be made up *only* if it was missed due to an extreme emergency and arrangements are made *before* the exam date. Exams may not be taken early or late due to personal travel plans. No make-up quiz will be given.

**On-line Lectures:** Closure of university facilities and classrooms in response to flu outbreak or other emergency does not mean that this class is halted, and students should check Canvas for announcements about how the class will proceed in the event of such an emergency. We may proceed with on-line chat or voice recording lectures in combination with slides.

**ADA Statement:** UNCG seeks to comply fully with the Americans with Disabilities Act (ADA). Students requesting accommodations based on a disability must be registered with the Office of Disability Services located in 215 Elliott University Center: (336) 334-5440.