

Spring 2020

CS 332-006: Principles of Operating Systems

Jing Li

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CS332 - 006 Principles of Operating Systems

Spring 2020



Class schedule:

Thursdays, 02:30 PM - 05:20 PM, in CKB 215

Instructor:

Jing Li, jingli@njit.edu, GITC 4106

Class Overview:

A study of operating system design including multiprogramming, time-sharing, resource scheduling, synchronization of concurrent processes, interrupts, I/O device handling, memory and virtual memory management, and file management.

Tentative schedule:

1. Overview;
2. OS concepts;
3. Scheduling (uniprocessor);
4. Scheduling (real-time);
5. Processes;
6. Threads and parallel computing;
7. Concurrency;
8. Midterm Exam;
9. Synchronization;
10. Deadlock;
11. Memory management;
12. Disk management;
13. File systems;
14. Page Replacement; Final exam review;

***Disclaimer:** The schedule of the course is subject to change based on the progress of the class, including test dates after they are announced. These changes will be announced as early as possible.*

Course format:

The course will study principles and some state-of-the-art solutions in computer operating systems. It also involves homework assignments, reading and presenting research papers.

Homework assignments:

Note that you must write your solutions by yourself, in your own words, but may work in groups of size up to three. You must cite all your collaborators (teammates) and any sources beyond the class materials that you consulted while working on a problem—for example, an "expert" consultant other than the teacher, or another text—must be given a proper scholarly citation, which you should include with your submission.

Assignments submitted on time (as determined by Canvas's receipt time stamp) do not have penalty. Assignments submitted by a week late will be given a 50% penalty. Assignments submitted after a week late will not be given credit.

Class participation – Option 1 Answer questions in class:
Students are encouraged to answer questions in class.

Class participation – Option 2 Paper presentation:

Students are encouraged to work in a team of 3 members to prepare presentations (based on research papers) and lead the discussion on the paper. Each team is responsible for presenting one paper with a 20 to 30min presentation. The presentation should:

- (1) provide enough background introduction for understanding the paper
- (2) identify paper's motivations, goals and assumptions
- (3) present contributions of the work with sufficient details, including but not limited to the design, implementation, mechanisms, evaluation and analysis of the system
- (4) give comments on the paper (i.e. strengths, limitations, possible extensions)

Class participation – Option 3 Lab presentation:

Students are encouraged to work in a team of 3 members to work on lab(s). Each team is responsible for presenting their completed lab(s) with a 5 to 15min presentation. The presentation should:

- (1) introduce concepts/techniques used in the lab
- (2) explain in enough details how the problems are solved
- (3) demonstrate the correctness of the completed lab

Midterm and final exams:

According to the NJIT policy, all final exams will be scheduled in the week 15 by the registrar (see the registrar's page: <http://www.njit.edu/registrar>). For the midterm and final exams, there will be no make up exams. You must plan your semester accordingly. If you should miss the exam(s) due to emergency, please go to the Dean of students and explain your situation as to why you had to miss. Dean's memo will be necessary but not sufficient to consider for handling your missed exam(s). This is the NJIT policy for missed exams. No other policy will be applied.

Course materials:

Textbook:

Operating Systems: Internals and Design Principles by William Stallings

Recommend books:

Operating System Concepts by Silberschatz, Galvin, and Gagne.

[*Operating Systems: Three Easy Pieces*](#) by Arpaci-Dusseau and Arpaci-Dusseau is a good introduction to operating systems, without all the complexities of Linux.

[*Understanding the Linux Kernel*](#) by Bovet and Cesati, 2006, offers a more exhaustive reference than the course textbook, covering many data structures and code snippets in detail.

Other useful references:

[LWN.net](http://lwn.net) is a news and information outlet for the open source community. They often run very high quality articles about kernel development, kernel architecture, and kernel mechanisms. When I have trouble finding a good online resource, a search for "lwn.net (my_topic)" often yields good results. However, beware of out-of-date material.

[Linux Journal](http://linuxjournal.com) is a magazine covering the Linux community. They often run very high quality articles about kernel development, kernel architecture, and kernel mechanisms. Similar to above, searching for "Linux Journal (my_topic)" often yields good results. As above, beware of out-of-date material.

[Linux Cross Reference](http://free-electrons.com) by free-electrons.com. This tool easily allows you to browse the Linux source code as well as search for identifiers. Beware that the source code on this site is not identical to the code base we are using in class, but it is still useful.

Prerequisites:

CS 114 or CS 116 or IT 114.

If in doubt about the prerequisites, please consult the instructor for permission to take the class.

Grading:

Class Participation – 5 points

Homework Assignments – 30 points

Weekly Quizzes – 5 points

Midterm Exam – 25 points

Final Exam – 35 points

Final grades will be curved according to departmental policy.

Office Hours and Contact Information:

Wednesdays and Fridays, 2:00 pm - 5:00 pm

Please make appointments by email for other times.

Jing Li: jingli@njit.edu, GITC 4106

Teaching Assistant:

Shaoze Fan, sf392@njit.edu

Office hour: GITC 4325, Wednesday 10:00AM to 11:30AM.

Homework Grader:

Yajuan Li, yl935@njit.edu

Honor Code:

The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students. You are required to read the NJIT Policy on Academic Integrity: <https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>

Modifications to syllabus:

The syllabus may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the syllabus.