New Jersey Institute of Technology

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Fall 2024

# CS 332-103: Principles of Operating Systems

Alexandros Gerbessiotis

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# NJIT
### New Jersey's Science & Technology University

**A. V. GERBESSIOTIS**
CS332
Fall 2024    August 21, 2024
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## 1.1 CONTACT INFORMATION

**Instructor:** Alex Gerbessiotis
**E-mail:** `alexg+cs332@njit.edu`
**Tel:** (973)-596-3244
**Office:** GITC 4213, 4th floor
**@NJIT "Office" Hours:** Wed/Fri 11:00-12:00, Wed 16:10-17:30
**Assistant:** Check course web-page
**Class Hours/Place:** See Registrar course schedule
**LMS:** Learning Management System to be used is canvas.njit.edu
**Web-Page:** `http://www.cs.njit.edu/~alexg/courses/cs332/index.html`
**Web-Page:** `http://web.njit.edu/~alexg/courses/cs332/index.html`

## 1.2 COURSE ADMINISTRATION

**CourseWork:** 3 exams, 3 Homeworks (HW), SelfAssessments.

Points: 1000points= Ex1(250) + Ex2(250) + Ex3(350) + HW(90)+ SelfAssessments($\approx$60)

**HW:** Three homeworks due **before 12 o'clock noon i.e. 12PM for Canvas** and submission through canvas.njit.edu; see Calendar Sec. 1.4. for dates and Appendix 1 for further information.

**Exams:** Exam1 and Exam2 in classroom, in paper, 60min. Exam3 (final) cumulative where and when by the Registrar, in paper, and 120min. All exams closed everything; Dates in Calendar 1.4; more in Appendix D.2 and Canvas announcements Document P. A math calculator is allowed but is a waste of time. A student who leaves early without permission earns a 0 in the exam. An OARS-requested accommodation results in a paper exam at an OARS location. *In case NJIT declares an emergency (e.g. Covid), an exam will become, time permitting, a canvas exam using ProctorU Record+ for proctoring. You are thus expected* **before 18:00 of the 3rd Friday of the semester** *to either acquire ProctorU credentials or check that your existing credentials still work with NJIT, and also test that your equipment still works with the ProctorU setup. Hopefully this option will not be exercised. But you and I should be prepared for the possibility of using it! Read DocumentP about canvas and ProctorU.*
*NJIT computer policies:* https://ist.njit.edu/student-computers.

## 1.3 BASELINE COURSE SYLLABUS

**Course:** CS332. Principles of Operating Systems.

**Credits:** 3 credits.

**Prerequisites:** CS 114 or CS 116 or IT 114.

**Description:** Organization of operating systems covering structure, process management and scheduling; interaction of concurrent processes; interrupts; I/O, device handling; memory and virtual memory management and file management.

**Textbook:** [Required/Recommended, designated] Operating Systems: Internals and Design Principles, 9th edition, William Stallings, Pearson. ISBN-13: 978-0-13-467095-9, ISBN-10: 0134670957

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**Learning Outcomes:**

1. Be able to describe and discuss the basic components of a modern computer-based operating system and their interactions.

2. Be able to define and explain the operating systems concepts of process, thread, files, and file systems, synchronization etc.

3. Learn how different CPU and Disk scheduling algorithms work, compare and explain their relative merits.

4. Understand internal and external memory organization, physical and virtual memory, and be able to describe their usage and relative merits and trade offs in their usage.

**Topics (with references to chapters of the designated textbook):**

Every topic's slides are in a document known as Subject, and it is available in PDF. Every Subject has a SelfAssessment canvas-based quiz autograded by canvas that can be submitted at most ten times. For minor credit only.

**T01.** Computer system overview (chap 1)

**T02.** Operating system overview (chap 2)

**T03.** Processes (chap 3)

**T04.** Threads (chap 4)

**T05.** Scheduling (chap 9)

**T06.** Multiprocessor scheduling (chap 10)

**T07.** Memory management (chap 7)

**T08.** Virtual memory (chap 8)

**T09.** I/O Management and disk scheduling (chap 11)

**T10.** File management (chap 12)

**T11.** Process Synchronization (chap 5)

**T12.** Concurrency and deadlocks (chap 6)

**T13.** OS security (chap 13)

**Provost statement.**

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## 1.4 CALENDAR

| Week | W | R | Out | In/Comments |
|---|---|---|---|---|
| W01 | 09/04 | 09/05 | | Class starts Wed. |
| W02 | 09/11 | 09/12 | | Homeworks due Thu noon |
| W03 | 09/18 | 09/19 | HW 1 out 9/18 | |
| W04 | 09/25 | 09/26 | | |
| W05 | 10/02 | 10/03 | | HW 1 in 10/3 |
| W06 | 10/09 | 10/10 | **Exam1** | **Exam1 on 10/9** |
| W07 | 10/16 | 10/17 | | |
| W08 | 10/23 | 10/24 | HW 2 out 10/23 | |
| W09 | 10/30 | 10/31 | | HW 2 in 10/31 |
| W10 | 11/06 | 11/07 | **Exam2** | **Exam2 on 11/6** |
| W11 | 11/13 | 11/14 | | |
| W12 | 11/20 | 11/21 | HW 3 out 11/20 | |
| W13 | 11/27 | 12/28 | NO CLASS | FRIDAY SCHEDULE on WED |
| W14 | 12/04 | 12/05 | | HW 3 in 12/05 |
| W15 | 12/11 | —— | | Thursday 12/12 ReadingDay |
| W16 | 12/18 | —— | **Exam 3** | **Confirm with Registrar** |

**Any modification/deviation from the calendar and its items will be done in consultation with the attending a class students and be posted on the course web-page. It is imperative that students check the course web-page regularly and frequently. Exceptions are as announced by the Provost's Office.**

## 1.5 COURSE POLICIES

**OARS:** If you need special accommodations, contact the Office of Accessibility Resources and Services, KUPF 201, to discuss your specific needs. A Letter of Accommodation Eligibility from OARS authorizing your accommodations will be required and should be received by us at least two weeks plus two days before the first exam, if it also relates to a ProctorU exam, otherwise seven days before the first non ProctorU exam.

**MISSING:** If you miss a class, you make up for lost time. No HW extensions for any reason, medical or otherwise; submit early. If you miss an exam you MUST CONTACT the Dean of Students (DOS) within 2 working days from the day the reason for the absence is lifted with all necessary documentation and send an email of your intent and absence. Do not submit documentation to the instructor: it is a private matter between you and the Dean of Students. The maximum accommodation period will be the number of missing days to the exam date: it is imperative then that you contact DOS even before the 2 working day period has expired if the accommodation period would be shorter. For Exam1, a DOS approval will get you a scaled Exam2 plus Exam3 grade for Exam1. For Exam 2 a scaled Exam3 grade will be used. No makeup exam for a ProctorU exam.

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## 1.5 COURSE POLICIES (continued)

**Grading:** For paper exams if you use pencils to write down your answers do not complain about grading AFTER the EXAM. No Scratch paper. Work submitted will be graded for clarity, conciseness and correctness: be brief and to the point.

**Grades:** Check marks and report errors promptly. **Resolve any issues WITHIN 2 CALENDAR WEEKS and before the first Reading Day** starting from the day an exam or homework is released or returned. For the final, within 3 calendar days from the day grades are posted in canvas or Banner. Talk to the grader first, and then to the instructor. The final grade is decided on a 0 to 1000 point scale. Assuming no violation of the Collaboration policy: around 850 points or more is an A, less than 500 points is F or D, and thus 500 points or more is C or better.

**Incomplete:** A grade of I(incomplete) is given in rare cases where work cannot be completed during the semester due to documented long-term illness or absence (e.g. unexpected national guard duty). A student needs to be in good standing (i.e. passing the course before the absence). An email (in lieu of a written letter) with a timeline of what is needed to be done will be sent to the student and the Department Chairperson. Not showing up in the final will probably get you an F rather than an I.

**Collaboration:** **Collaboration of any kind (in HW, Exams, etc) is PROHIBITED. Students must turn in work that has fully been composed and written by them and no-one else. Finding an answer on the Internet, Web, on a piece of paper, or otherwise, or it is product of someone else's work, or it is (partly or fully) common with another student submission, in the same or other section/course risks punishment as outlined by the University. All parties of such interaction receive a 0 and letter grade is lowered by one or two levels. The work you submit must be the result of your own mental effort.**

**Devices:** Power down (equivalent to removing battery) and switch off (not just silence) mobile and other devices including wearables (e.g. iwatch) and place them in a zippered bag or zippered backpack or on the floor screen facing down. (See article XI, student contact code.) **IF A STUDENT GETS CAUGHT TOUCHING SUCH A DEVICE (on or off) during an exam, the exam receives a 0. DEVICES MUST BE OFF and NOT ON YOU. For ProctorU exams "ON YOU" means anywhere viewable including at a distance of less than 6ft. A not completely powered down device of yours is assumed to be "ON YOU" independently of proximity.** Note that the use of a device without the express permission of the instructor is considered cheating (Article XI).

**Email/SPAM:** Use an NJIT e-address to send email to the course email address (Appendix G).

**Canvas Note:** Canvas assigns points to non CourseWork. Ignore canvas grade aggregations. Because of canvas synchronization issues, all point-assigned material released through canvas will be of limited availability and visibility. **Make backups if needed (e.g. take screenshots)**.

**The NJIT Academic Integrity Code will be upheld with violations reported to the Dean of Students.** ∎