

CMP 426 & CMP 697: Operating Systems Syllabus

**Department of Computer Science
Lehman College, City University of New York**

Course Information

Semester	Class Section	Class Hours	Room Number
Fall 2024	ZF81	Mo & We 6:00 pm - 7:40 pm	GI 333

Instructor Information

Instructor	Email	Office Number	Office Hours
Steven Fulakeza	steven.fulakeza@lehman.cuny.edu	GI-232	Mon & Wed 1:40 pm - 3:40 pm

CMP 426 Course Description: 4 hours, 4 credits

Operating systems and their role in various types of computer systems; the principles of multiprogramming; algorithms for resource allocation; multiple-computer systems.

CMP 697 Course Description: 4 hours, 4 credits

A study of the functions and implementation of operating systems for various sizes and types of computers. Processor, storage, and device management. Paging algorithms, thrashing. File systems, concurrency, deadlocking, semaphores, and synchronization.

PREREQ:

- **CMP 334 and CMP 338**

Course Objectives:

At the end of the course, students should be able to:

1. use the command line to interact with the operating system
2. explain operating systems and their role in various types of computer systems
3. describe the basic structure of an operating system and its components
4. describe the concept of a process, threads and how processes deal with scheduling, cooperation, and communication with other processes
5. describe CPU scheduling algorithms and be able to compare them
6. explain the classical problems in process synchronization and know several different ways to solve such problems, including semaphores, critical regions, and monitors
7. explain how to characterize and handle deadlocks, including prevention, avoidance, detection, and recovery
8. understand main memory and virtual memory and describe several different schemes for managing main memory, including swapping, virtual memory, paging, and segmentation

9. describe file/storage management
10. discuss how disks are structured and how their space is managed by the operating system

Textbook:

- A. Silberschatz, P. Galvin, and G. Gagne, *Operating System Concepts*, 10th Edition, Wiley, 2018. ISBN 978-1-119-29967-7. We are using the zyBook version of this book. Below are the details for the zyBook
 - a. Sign in or create an account at learn.zybooks.com
 - b. Enter zyBook code: CUNYCMP426CMP697FulakezaFall2024
 - c. Subscribe

Textbook Website: [text book web site](https://www.os-book.com/OS10/)

- <https://www.os-book.com/OS10/>

References:

- Lecture Notes, Blackboard, and Course Website

Course Website: <http://comet.lehman.cuny.edu/sfulakeza/>

Grading Policy:

CMP 426

Activity	Percentages
Participation Activities from the textBook and Quizzes	10%
Homework Assignments	30%
Midterm Exam	30%
Final Exam	30%

CMP 697

Activity	Percentages
Participation Activities from the textBook and Quizzes	10%
Homework Assignments	30%
Midterm Exam	25%
Final Exam	25%
Research Paper and Presentation (for graduate students only)	10%

A Make-up exam might be given only when a student's absence is unavoidable. In such a case, the student must file a formal written request.

Grading Scale for CMP 426:

Letter Grade	Ranges %
A	93 - 100
A-	90 - <93
B+	87 - <90
B	83 - <87
B-	80 - <83
C+	77 - <80
C	73 - <77
C-	70 - <73
D	60 - <70
F	< 60

Grading Scale for CMP 697:

Letter Grade	Ranges %
A	93 - 100
A-	90 - <93
B+	87 - <90
B	83 - <87
B-	80 - <83
C+	77 - <80
C	73 - <77
F	< 73

Exams:

Exam:

- Midterm Exam
- Final Exam

Exam Schedule:

- Midterm: **10/28/2024 (during class time)**
- Final Exams: **12/18/2024 06:15 pm to 08:15 pm**

Note: Missed final exam = Unofficial Withdraw (WU). WU counts as an F in calculating your GPA and has implications for financial aid.

Homework Assignments and Submission

Several homework assignments are given during lectures. Students need to work on the homework for preparing for exams but may not need to submit the homework assignments to the instructor. **Some selected homework problems will be assigned as formal assignments to be submitted for grading.** All homework will be submitted through Blackboard.

Students must work on their own assignments unless otherwise stated.

No late assignments will be accepted.

Homework assignments will include the following areas and more:

- Process creations/executions based on Linux/UNIX API and Win API
- Message based communications based on Linux/UNIX API
- Shared memory-based communications between processes based on Linux/UNIX API and WIN API
- Multithreading based on POSIX API, Win API, Java threads
- Java nexus IO (memory mapped IO), Windows memory mapped IO
- Synchronization based on UNIX System V API, POSIX API, Win API
- Linux kernel module programming/driver programming

Graduate Students Survey Research Paper - (For Graduate Students Only CMP 697):

Research Paper (12 - 15 pages double spaced in 12 fonts, Times Roman) in various contemporary research areas such as:

- Threading issues in Linux kernels,
- Fast mutual exclusions,
- Virtualization and cloud computing,
- File systems in solid state devices,
- In-memory file systems,
- In memory DBMS;

A survey paper is also known as a review paper. It is a type of academic document that provides a comprehensive and systematic overview of existing research literature in a particular field or on a specific topic. The ACM Computing Survey defines a survey paper as a paper that summarizes and organizes recent research

results in a novel way that integrates and adds understanding to work in the field. A survey article assumes a general knowledge of the area; it emphasizes the classification of the existing literature, developing a perspective on the area, and evaluating trends."

The primary goal of a survey paper is to summarize, organize, and analyze the key findings, methodologies, and contributions of a collection of related research studies. A survey paper synthesizes existing knowledge to offer readers a consolidated understanding of a given subject.

- You can visit [ACM Computing Survey](#) to see examples on survey papers.
- Paper Proposal Due (**November 06, 2024 by 11:59 pm**) via email: 1 page including extended abstract with at least 5 references.
- Research Paper Due Date: **December 11, 2024, by 11:59 pm via email**
- Research Paper Presentation Date: **December 11, 2024 at the beginning of class.**

Survey Research Paper Structure:

1. Title, name, date, course number
2. Abstract: This is a brief summary that describes your entire paper. Your abstract should contain 150 - 300 words. You have to write this last.
3. Introduction: Your introduction should provide the background problem you are researching.
4. Body of the paper and discussion
5. Conclusion that summarizes the paper and describes future work for the research
6. References: ACM = Association of Computing Machinery

Some details about research paper writing and presentation will be discussed during office hours.

Honor Code

You are encouraged to work together on the overall design of the programs and homework. However, for specific programs and homework assignments, all work must be your own. You are responsible for knowing and following Lehman's [academic integrity code](#) (available from the Undergraduate Bulletin, Graduate Bulletin, Office of Academic Standards and Evaluations, or the Smart Catalog).

All incidents of cheating will be reported to the Vice President of Student Affairs.

Expectations

Students are expected to learn the material covered in class, the material in the textbook and other assigned reading. Completing homework is an essential part of the learning experience. Students should review topics from prior courses as needed using old notes and books.

Blackboard & Communication

I will be communicating with you on a regular basis throughout the semester using the email address listed on Blackboard for this course. You are required to make sure that the email address on Blackboard is your current Lehman email address and you must check it on a regular basis. **There will be no acceptable excuse for missing an email announcement.**

Accommodating Disabilities

Lehman College is committed to providing access to all programs and curricula to all students. Students with disabilities who may need classroom accommodations are encouraged to register with the Office of Student Disability Services. For more information, please contact the Office of Student Disability Services in Shuster Hall, Room 238. Phone number: 718-960-8441, Email: disability.services@lehman.cuny.edu

Webpage: <http://www.lehman.edu/student-disability-services>

Course Outline:

Overview

Chapter 1: Introduction

Chapter 2: Operating-System Structures

Process Management

Chapter 3: Processes

Chapter 4: Threads and Concurrency

Chapter 5: CPU Scheduling

Process Synchronization

Chapter 6: Synchronization Tools

Chapter 7: Synchronization Examples

Chapter 8: Deadlocks

Memory Management

Chapter 9: Main Management

Chapter 10: Virtual Memory

Storage Management

Chapter 11: Mass-storage Structure

Java Programming Resources

- <https://www.tutorialspoint.com/java/index.htm>
- <https://codingbat.com/java>
- <https://practiceit.cs.washington.edu/>
- <https://www.learnjavaonline.org/>
- <http://www.pythontutor.com/java.html#mode=edit>

C Programming Resources

- <https://www.programiz.com/c-programming>
- <https://www.tutorialspoint.com/cprogramming/index.htm>
- <https://www.cprogramming.com/>

Other Resources

- [Computer Science from the Bottom Up](#)

Operating System Examples

- UNIX
- Linux
- MacOS
- Windows
- Android