CMP 426 (section A01) CMP 697 (section A01): Operating Systems Syllabus

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

Course Information

Semester	Class Section	Class Hours	Room Number
Fall 2021	H81	T & TH 6:00 pm - 7:40 pm	Online (sometimes in Gillet Hall, Room 333)

Instructor Information

Instructor	Email	Office Number	Office Hours
Steven Fulakeza	steven.fulakeza@lehman.cuny.edu	GI-232	Mo 12:20 pm - 2:20 pm & Tu 10:40 am -12:50 pm

Lecture & Office Hours Location:
https://zoom.us/j/99709812033?pwd=VlV5SGNpQXhxMTRiek8ycXF6aGp0Zz09

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

Textbook Website: text book web site

- **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**
Homework Assignments and Blackboard Quizzes	30%
Projects	10%
Midterm Exam	30%
Final Exam	30%

CMP 697

Activity	**Percentages**
Homework Assignments and Blackboard Quizzes	30%
Project	10%
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.

The exams will consist of two parts:

- A multiple-choice part that will be completed on Blackboard
- A written part, which will be posted on Blackboard. This part of the exam will be done at the scheduled time of the class and the exam must be submitted on Blackboard. **No emailed work will be accepted**.

Exam Schedule:

- Multiple Choice Midterm Exam (**open on Blackboard on 10/25/2021 at 12:00 am and close on 10/26/2021 at 11:59 pm**).
- Midterm Written Exam Date: **10/26/2021 6:00 pm - 7:40 pm**
- Multiple Choice Final Exam: (**open on Blackboard on 12/20/2021 at 12:00 am and close on 12/21/2021 at 11:59 pm**).
- Final Exam Written Exam Date: **12/21/2021 6:15 pm - 8:15 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;

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."

- You can visit ACM Computing Survey to see examples on survey papers
- Paper Proposal Due (**November 04, 2021**): 2-3 pages including extended abstract with at least 5 references.
- Research Paper Due Date: **December 16, 2021**

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. Acknowledgement (If necessary)
7. 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

Recording of Remote Classes
Students who participate in this class with their camera on or use a profile image are agreeing to have their video or image recorded solely for the purpose of creating a record for students enrolled in the class to refer to, including those enrolled students who are unable to attend live. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live.

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/