Boston University Metropolitan College

Operating Systems

MET CS 575
Learn from Anywhere Course Format, Offered Simultaneously On Campus and Remote
Tuesday 6:00 PM – 8:45 PM
Fall 2020

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Office hours: after class and remote

Course Description
Overview of operating system characteristics, design objectives, and structures. Topics include concurrent processes, coordination of asynchronous events, file systems, resource sharing, memory management, security, scheduling, and deadlock problems. 4 credits. Prerequisites: MET CS 472 and (MET CS 231 or MET CS 232). Or instructor's consent.

Books
Operating System Concepts 10th Edition, Silberschatz, Galvin, and Gagne – Wiley.
The book can be purchased from Barnes & Noble and other book retailers.

Courseware
Blackboard website: https://learn.bu.edu/

Learning Outcomes
1. Explain the fundamental concepts of operating systems, including OS structures, virtualization, address space, kernel mode, interrupt, access control etc.
2. Explain the basic components in a computer system and an OS and how they interact with each other in a system.
3. Describe the kernel implementation of various OS components and functions, such as kernel mode, process/thread operations, context switch, page table, address translation, message passing, file systems, etc.
4. Compare the multi-process and multi-thread implementation of an application.
5. Evaluate and Compare different CPU scheduling algorithms.
6. Analyze the synchronization problems, identify the race condition, and properly implement synchronization in a multiple process or multi-thread application.
7. Analyze the effect of virtual memory management on the program performance.
8. Design or construct OS components such as CPU scheduler, memory management, file systems, etc.
9. Apply the OS concepts to real world OSes such as Windows and Linux.
10. Develop hands-on experience in Linux-programming.

11. Be introduced to the Linux kernel source code and simple kernel-level programming.
12. Explain the security principles and security issues in the OS design.
13. Develop the system thinking skills.

Learning Outcomes Assessment

- Assignments: LO1-LO12
- Research Project: LO1-LO13
- 2 Tests: LO1-LO8
- Final Exam: LO1-LO12

Fall 2020 COVID-19 Policies

Classroom Rotations: Classrooms on campus have new capacities that follow guidelines issued by state and local health and government authorities related to COVID-19 and physical distancing. Before the beginning of the class, and throughout the semester, I will be reaching out to students who have indicated that they want to attend the classroom in-person. Our classroom hold 12 students, and therefore we will have two rotations of students that come to class on campus alternate weeks. You will be asked to attend remotely on the week that you have rotated out the classroom.

Compliance: All students returning to campus will be required, through a digital agreement, to commit to a set of Health Commitments and Expectations including face coverings, symptom attestation, testing, contact tracing, quarantine, and isolation. The agreement makes clear that compliance is a condition of being a member of our on-campus community.

You have a critical role to play in minimizing transmission of COVID-19 within the University community, so the University is requiring that you make your own health and safety commitments. Additionally, if you will be attending this class in person, you will be asked to show your Healthway badge on your mobile device to the instructor in the classroom prior to starting class, and wear your face mask over your mouth and nose at all times. If you do not comply with these rules you will be asked to leave the classroom. If you refuse to leave the class, the instructor will inform the class that they will not proceed with instruction until you leave the room. If you still refuse to leave the room, the instructor will dismiss the class and will contact the academic Dean's office for follow up.

Boston University is committed to offering the best learning environment for you, but to succeed, we need your help. We all must be responsible and respectful. If you do not want to follow these guidelines, you must participate in class remotely, so that you do not put your classmates or others at undue risk. We are counting on all members of our community to be courteous and collegial, whether they are with classmates and colleagues on campus, in the classroom, or engaging with us remotely, as we work together this fall semester.

Class Policies

1) **Attendance & Absences** – Attendance and class participation are expected at all class meetings, and it is part of your grade. Coming to class late, leaving early, or being absent can adversely affect your final grade. You are responsible for all announcements and materials discussed in class.
2) **Assignment Completion & Late Work** – All coursework have due dates with a generous timeframe to complete them. Therefore, No extensions or exceptions will be scheduled. Do Not Wait to the last day and last hour of the due date. Your grade will be reduced by 10% per day, accomolative, for up to 3 days. No assignment will be accepted after 3 days.
3) **Assignment Submission Policy** – All coursework will be listed on the Blackboard and must be submitted on the Blackboard to be considered for grading. It is your responsibility for submitting the correct coursework under its designated item on the Blackboard to earn credit. To avoid any submission issues, it is required to download your submission after every coursework submission AND double-check to ensure it is the correct file and it has been submitted correctly. Email, paper, blank file, wrong or missing submissions without prior written authorization from the instructor, will be graded as zero. Submission of any coursework after the Final Exam will be graded as zero.
4) **Tests and Exams** – No make-up tests and exams will be given unless a compelling and verifiable reason is given in advance. The instructor reserves the right not to accept it.
5) **Assessments and Grading** – Grades are earned and the instructor reserves all the rights for his assessments. No regrading will be scheduled except in case of grading error.
6) **Bonus or Redo of Coursework** – There are No Bonus coursework, and No redo of any assignments, projects, tests, or exams. There is No additional coursework after the Final Exam to improve your grade, as this arrangement would then by fairness have to be extended to the rest of the class (an impossible situation).
7) **Incomplete and withdrawal** – An incomplete grade is rarely given. The student must meet the university's requirements plus the instructor's requirements as follows: student must have actively attended and participated throughout the semester and has completed coursework with good grades and completed majority of the coursework, but due to unforeseen circumstances toward the end of the semester, is unable to complete the last coursework. The instructor must be notified in writing before the due date of the last coursework with compelling and verifiable reason, and file for incomplete before the Final Exam week. It is the student's responsibility to observe the university's guidelines, policies, and file an official withdrawal from the class to avoid earning a failing grade.
8) **Backup of Coursework** – It is your responsibility to keep secure backups of all coursework. Make sure that you have two backup mediums and backup often. Saving data locally does not constitute as a good backup strategy.
9) **Classroom Expectations** – Please respect your classmates by turning off your phone or other electronic devices before class begins, and do not use them during class. I encourage you to participate in class discussions and ask questions.
10) **Academic Conduct Code** – Please use the following wording, or an equivalent, in your syllabus: "Cheating and plagiarism will not be tolerated in any Metropolitan College

course. They will result in no credit for the assignment or examination and may lead to disciplinary actions. Please take the time to review the Student Academic Conduct Code:

http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.

NOTE: This should not be understood as a discouragement for discussing the material or your particular approach to a problem with other students in the class. On the contrary – you should share your thoughts, questions and solutions. Naturally, if you choose to work in a group, you will be expected to come up with more than one and highly original solutions rather than the same mistakes.

Grading Policy:

The grade that a student receives in this class will be based on class participation, assignments, a research project, tests, and the final exam. The grade breakdown as shown below. All percentages are approximate and the instructor reserves the right to make necessary changes.

- 5% on class participation
- 15% on assignments
- 10% on research project
- 15% on test1
- 20% on test2
- 35% on the final exam

Letter grade/numerical grade conversion is shown below (Underlined means precision repeats):

A (95.$\underline{0}$ – 100) A- (90.$\underline{0}$ – 94.$\underline{9}$)
B+ (85.$\underline{0}$ – 89.$\underline{9}$) B (80.$\underline{0}$ – 84.$\underline{9}$) B- (77.$\underline{0}$ – 79.$\underline{9}$)
C+ (74.$\underline{0}$ – 76.$\underline{9}$) C (70.$\underline{0}$ – 73.$\underline{9}$) C- (65.$\underline{0}$ – 69.$\underline{9}$)
D (60.$\underline{0}$ – 64.$\underline{9}$) F (0.$\underline{0}$ – 59.$\underline{9}$)

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Class Meetings, Lectures & Assignments:
Lectures, Readings, Assignments, and Assessments are subject to change, and will be announced in class as applicable within a reasonable time frame.

Date	Topic	Readings Due	Assignments Due
September 8	Introduction	Chapter 1	
September 15	Operating-System Structures	Chapter 2	
September 22	Processes	Chapter 3	Assignment 1
September 29	Threads	Chapter 4	
October 6	Test 1		**Test 1 (Chapters 1, 2, 3, 4)**
October 13	Substitute Monday schedule of classes		
October 20	CPU Scheduling	Chapter 5	Assignment 2
October 27	Synchronization Deadlocks	Chapters 6-8	
November 3	Main Memory	Chapter 9	Assignment 3
November 10	Test 2		**Test 2 (Chapters 5, 6, 7, 8, 9)**
November 17	Virtual Memory Mass-Storage Structure	Chapters 10, 11	
November 24	I/O Systems Filesystems	Chapters 12-15	Assignment 4
December 1	Security & Protection	Chapters 16, 17	
December 8	Research Project Presentations		**Research Project**
December 15	Final Exam		**All covered materials**