

**NEW YORK CITY COLLEGE OF TECHNOLOGY/CUNY**  
**Computer Systems Technology Department**

**COURSE: CST1215 Operating Systems Fundamentals**  
**(2 lecture hours, 2 lab hours, 3 credits)**

**Course Description:**

This course is designed to introduce the student to the basic concepts and structures of operating systems, and how computer operating systems allocate resources. Its goal is to provide basic working knowledge of computer operating system commands, functions, and management approaches using the DOS, Windows, Linux and UNIX operating environments. Topics include: memory management, process management, and device management, file management and operating system tools. The course introduces command structures and explores operations using GUI and Command Language Interfaces for Windows and Linux.

**Prerequisite:** (Pre/Co) CST1100 Introduction to Computer Systems  
(Pre/Co) CST1101 Problem Solving with Computer Programming

**Course Objectives:**

Upon successful completion of the course, the student should be able to:

1. Describe the basic role of the operating system.
2. Identify the differences between the batch, interactive, real-time, hybrid, and embedded operating systems.
3. Identify the basic functionality of the three memory allocation schemes.
4. Identify the paged, demand paging, segmented, and segmented/demand paged allocation schemes.
5. Identify the difference between job scheduling and process scheduling.
6. Identify deadlock, starvations, and race.
7. Identify the features of dedicated, shared, and virtual devices.
8. Identify the differences between sequential and direct access media.
9. Identify the role of data compression in file storage and compare sequential and direct file access.
10. Identify the advantages and disadvantages of contiguous, noncontiguous, and indexed file storage techniques.
11. Identify the roles of system measurement tools such as positive and negative feedback loops.
12. Identify system monitoring techniques.
13. Identify advantages and disadvantages of MS-DOS including basic commands.
14. Demonstrate proficiency with the OS Command Line of Windows and Linux which include the ability to edit, rename, copy, move, delete and create files and directories, and to navigate folders.
15. Create simple batch programs.
16. Identify the design goals of Windows operating systems.
17. Identify the use of the device, processor, and network managers in recent versions of Windows.
18. Identify the design goals for Windows vs. open source operating systems
19. Identify the services provided by operating systems.
20. Solve problems involving process control, mutual exclusion, deadlock and synchronization.
21. Identify the major components of an operating system and explain their functions individually,
22. Discuss the operating system features required for a particular target application,
23. Understand the various levels of system and application software,
24. Understand how design decisions in Operating Systems affect users of the system.

25. Compare and contrast features from different operating systems.
26. Describe processes of managing memory, processes, files, and devices.
27. Evaluate an operating system in terms of its efficiency and ease of use.
28. Create a bootable flash-drive containing the Ubuntu Linux distribution
29. Demonstrate the ability to perform network diagnostics with the command prompt

### General Education Outcomes:

- **KNOWLEDGE/Breath of Knowledge:** students will expose to value knowledge and learning.
- **SKILLS/Communication:** Students will communicate in diverse settings and groups, using written (both reading and writing), oral (both speaking and listening), and visual means.
- **INTEGRATION/Integrate learning:** Students will resolve difficult issues creatively by employing multiple systems and tools.

### Required Materials:

- Ida Flynn and McHoes, Understanding Operating Systems, Course Technology, 7th version  
ISBN-13: 978-1-4239-0160-0
- Students are required to have a flash drive for storage.

### Attendance Policy:

Attendance is expected at every class meeting. College policy sets the maximum number of permissible absences at 10% of the number of class meetings scheduled for the semester. If the class is meeting two times per week, you are permitted to be absent a total of three class sessions; if the class meets only once per week, you are permitted to miss one and one-half of the class meetings.

### Academic Integrity Policy:

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog.

### Grading Procedure:

Exams (3)	50%
Assignments /Quizzes	30%
Project	20%

Letter Grade	A	A-	B+	B	B-	C+	C	D	F
Numerical Grade	93-100	90-92.9	87-89.9	83-86.9	80-82.9	77-79.9	70-76.9	60-69.9	<=59.9

### Learning Center:

The College Learning Center, through its extensive computer labs, workshops and tutoring, offers assistance to students across the entire college population. The Learning Center is located in room G18 in the Atrium building.

### **Counseling Service Center**

The Counseling Services Center provides individual counseling services that address personal concerns, crisis intervention, educational planning and referral services to assist students in achieving their academic goals. Student privacy is respected. The Counseling Center is located in Namm Hall (N-108),

**Americans with Disabilities Act:** Any student who believes he/she is eligible for accommodations in the classroom and/or during testing due to a documented disability is encouraged to contact the Director of Student Support Services at (718) 355-5081.

### **Course Outline:**

Week	Topic
1	<b>Chapter 1 – Introducing Operating Systems</b>
2	<b>Chapter 2: Memory Management – Early Systems</b>
3	<b>Chapter 3: Memory Management – Virtual Memory</b>
4	<b>Review and discussion; Exam 1</b>
5	<b>Chapter 4: Processor Management</b>
6	<b>Chapter 5 Process Management</b>
7	<b>Chapter 6 Concurrent Processes</b>
8	<b>Chapter 7: Device Management</b>
9	<b>Chapter 8: File Management</b>
10	<b>Chapter 9: Network Organization Concepts</b>
11-12	<b>Chapter 13 – UNIX/Linux Operating Systems</b>
13-14	<b>Chapter 14 – MS-DOS Operating System</b>
15	<b>Review for the Final exam, discussion; Final Exam</b>

### **Assessment Criteria:**

<b>For the successful completion of the course, a student should be able to:</b>	<b>Evaluation methods and criteria</b>
1. Demonstrate an understanding of the components of the modern OS and the	Students will demonstrate on exams and homework projects their proper understanding of the OS components

relations between hardware components and OS components	
2. Demonstrate an understanding of the absolute and relative addressing; Word size ; Hardware/Software interfaces, Logical and Physical I/O	Students will demonstrate on exams and homework projects their proper understanding of the concepts of Word size ; Hardware/Software interfaces, Logical and Physical I/O
3. Demonstrate an understanding of the Command line vs. GUI interface; disk directory, Physical I/O and Logical I/O, disk space management , IOCS – Input/Output Control System, interrupts as logical I/O requests	Students will demonstrate on exams and homework projects their understanding of the concepts of command line vs. GUI interface; disk directory, IOCS , interrupts
4. Demonstrate an understanding of the concepts of Memory Management	Student will describe the basic functionality of the memory allocation schemes: fixed partitions, dynamic partitions, paging, segmentation , paging and segmentation and virtual memory
5. Demonstrate an understanding of Processor Management	Students will demonstrate on exams and homework projects their understanding of the concepts of multiprogramming : dispatcher, control blocks, interrupts, scheduler, time-sharing algorithms; Virtual computing concept; deadlock and starvation concepts Student will describe the role of internal interrupts and the tasks performed by the interrupt handler.
6. Demonstrate an understanding of Concurrent Processes	Describe the difference between processes and processors. Describe the connection between a process and a processor. Demonstrate the ability to use a tool such as the Windows Task-Manager and Systems Internals to identify processes that are running during a computer session. Describe the basic concept of multi-core processor technology Describe how processors cooperate when executing a job, process, or thread
7. Demonstrate an understanding of File Management	Describe the fundamentals of file management and the structure of the file management system; Students will demonstrate on exams and homework projects their understanding of the FAT and NTFS file systems; using software tools to manage file system
10. Demonstrating an understanding of the basic concepts of the MS-DOS operating system	Student will describe how to access MS-DOS emulators from other operating systems Describe how MS-DOS provided a foundation for early Microsoft Windows releases Describe the basics of command-driven systems and how to construct a simple batch file. Explain the limitations of the MS-DOS operating system Demonstrate a knowledge of the MS-DOS command line by writing the correct syntax to list the contents of a directory; change the working directory; copy a file; delete a file; rename a file; display and change a system date; create a new directory or subdirectory; find a string; search files for a string; execute a file.

	Demonstrate the ability to use the MS-DOS utility program to locate and correct disk errors. Demonstrate the ability to use system monitoring techniques.
11. Demonstrating an understanding of the basic concepts of the Windows OS	Demonstrate the ability to use Windows7 OS as multi-user Operating Systems; perform basic operations on the user's and administrator's level; setting up permissions for users in the file system
12. Demonstrate an understanding of the basic concepts of the LINUX OS	Demonstrate the ability to load and run a virtual LINUX program. Describe some of the strengths and weaknesses of LINUX Demonstrate an understanding of the LINUX command line by running/executing a file showing a listing of the filenames in a directory; showing a comprehensive directory list; change the working directory; change permissions on a file or directory; move a file or directory; print out a file; make a new directory; find a specified string in a file.

### General Education Outcomes and Assessment:

Learning Outcomes	Assessment Method
<b>KNOWLEDGE/Breath of Knowledge:</b> students will expose to value knowledge and learning.	Presentations for the final project
<b>SKILLS/Communication</b> Students will communicate in diverse settings and groups, using written (both reading and writing), oral (both speaking and listening), and visual means.	Term paper in which students will investigate different aspects in operating systems field Presentations for the final project
<b>INTEGRATION/Integrate learning:</b> Students will resolve difficult issues creatively by employing multiple systems and tools.	Programming assignments where student will write codes to solve CPU or Memory scheduling problems

### Bibliography

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5. Gillay, Carolyn, *Linux User's Guide: using the command line and Gnome with Linux Red Hat*, Franklin Beedle & Assoc., 2003
6. Leffler, S.J., Kusick, M.K., Karels, M.J., and Quateman, J.S., *The Design and Implementation of the 4.3BSD Unix Operating System*, Reading, MA, Addison-Wesley, 1989
7. Nutt, Gary J., [Operating Systems: A Modern Perspective](#), Third Edition, Addison-Wesley Pearson Education, 2003
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9. Palmer, Michael, [Guide To UNIX Using Linux](#), Course Technology, 2007
10. Palmer, Michael, Walters, Michael, Badgett, Tom, and Jonker, Niels, *Guide to Operating Systems, 8<sup>th</sup> Edition*, John Wiley & Sons, Inc, NJ, 2009

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13. Silberschatz, Abraham, Cagne, Greg, and Galvin, Peter, [\*Operating System Concepts\*](#), John Wiley & Sons Inc, 2004
14. Stallings, William, [\*Operating Systems\*](#), Prentice Hall, 2004
15. Stuart, Brian, *Principles of Operating Systems*, Thompson Course Technology, 2008
16. Tannenbaum, Andrew S., [\*Modern Operating Systems\*](#), Prentice Hall, 2007