

1. Course number and name

CMP 310 – Operating Systems

2. Credits and contact hours

3 credit hours, 4 contact hours

3. Instructor's or course coordinator's name

Dr. Rana E. Ahmed

4. Textbook, title, author, and year

W. Stallings. *Operating Systems: Internals and Design Principles*, 7th edition. Prentice Hall International, 2012.

Other supplemental materials

None

5. Specific course information

a. Brief description of content of the course (catalog description)

(Equivalent to COE 381). Introduces operating systems, process management, process scheduling, interprocess communications, memory management techniques, virtual memory, I/O management, deadlock avoidance, file system design and security issues. Employs examples of commonly used operating systems (e.g., Windows and UNIX).

b. Prerequisites or co-requisites

Prerequisites: CMP 305/COE 311 (Data Structures and Algorithms), and CMP 240 (Introduction to Computer Systems) or COE 241 (Microcontrollers: Programming and Interfacing)

c. Indicate whether a required, elective, or selected elective course in the program

Required

6. Specific goals for the course

a. Specific outcomes of instruction

This course requires the student to demonstrate the following:

1. Describe objectives and characteristics of modern operating systems.
2. Identify problems related with process management and programming of concurrent processes
3. Apply various techniques to enforce mutual exclusion and avoid deadlock in concurrent processes
4. Describe and analyze memory management concepts, including fetching, replacement and resident set management.
5. Identify the different types of processor scheduling algorithms, and evaluate major short term scheduling algorithms.
6. Explain the organization of I/O system, I/O buffering, and disk scheduling
7. Evaluate techniques for file organization and file access.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

This course contributes in a significant way to the accomplishment of the following program outcomes:

Program outcome	Emphasis in this course
(a) an ability to apply knowledge of computing and mathematics appropriate to the discipline	●
(b) an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution	◐
(c) an ability to design, implement, and evaluate a computer-based system, process, component or program to meet desired needs	◐
(d) an ability to function effectively on teams to accomplish a common goal	
(e) an understanding of professional, ethical, legal, security and social issues and responsibilities	○
(f) an ability to communicate effectively with a range of audiences	
(g) an ability to analyze the local and global impact of computing on individuals, organizations, and society	◐
(h) recognition of the need for and an ability to engage in continuing professional development	
(i) an ability to use current techniques, skills, and tools necessary for computing practice	●
(j) an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices	◐
(k) an ability to apply design and development principles in the construction of software systems of varying complexity	◐

Emphasis: ● High; ◐ Medium; ○ Low; Blank – Nothing Specific Expected

7. Brief list of topics to be covered

- i. OS Functions, Introduction to Windows/UNIX
- ii. Process states, UNIX process management
- iii. Threads, Windows threads
- iv. Concurrency, semaphores
- v. Deadlocks: avoiding & detecting. Starvation
- vi. Memory management, partitioning, paging, segmentation
- vii. Scheduling algorithms, real-time scheduling algorithms
- viii. File organization, secondary storage management
- ix. Security threats, protection, intruders