



General Information

Date:	3/18/21	*Effective Term:	Fall 2021
College/Department:	Engineering/Computer Science		
Course Designator and Number (Cross-listed Course Designator and Number):	CS 5204		
Title of Course:	Operating Systems		
Instructor and/or Department Contact:	Trey Mayo/Director of Graduate Programs		
Contact Phone:		Contact E-mail:	treymayo@vt.edu

Prerequisite Enforced

Enable prerequisite enforcement? Yes No

Add the following Prerequisite/Corequisites:

Background in Operating Systems required and graduate standing in the CSA program
Attach department letter of support to include a non-departmental course as a prerequisite/corequisite.

Drop the Following Prerequisites/Corequisites:

None

List Course Prerequisites/Corequisites after change:

Background in Operating Systems required and graduate standing in the CSA program

Justification (Justify prerequisite/corequisite changes and remaining prerequisites/corequisites after change)

Student must be admitted to the graduate program in CSA in order to take the course. A background in operating systems is also required for success in this course.
If adding a minimum grade as a prerequisite for a course, data must be provided to clearly show the need for that minimum grade in order to be successful in the course. Minimum grade requirements may not be used as a way to limit enrollment.

*If request is being processed for the upcoming effective term:

- Requests to **ADD** prerequisite requirements (i.e., turn enforcement **ON**, add grade restriction, add course) must be processed prior to the opening of "course request" for the applicable effective term.
- Requests to **REMOVE** prerequisite requirements (i.e., turn enforcement **OFF**, remove a grade restriction, drop course) may be completed at any time, unless the removal causes the course to be more restrictive.

Approval Signatures

Department Head/Chair		Date	3/18/2021
College Curriculum Committee Representative		Date	3/19/21
College Dean		Date	3/19/21

COMPUTER SCIENCE 5204
OPERATING SYSTEMS
(ADP TITLE: OPERATING SYSTEMS)

I. CATALOG DESCRIPTION:

5204 OPERATING SYSTEMS

Issues in the design and functioning of operating systems. Emphasis on synchronization of concurrent activity in both centralized and distributed systems. Deadlock, scheduling, performance analysis, operating system design, and memory systems including distributed file systems. ✓

Pre: 3204; (3H,3C) II.

II. LEARNING OBJECTIVES:

Having successfully completed this course, the student will be able to:

1. Use some high-level synchronization technique to arrange a desired interaction among concurrent processes in both centralized and distributed systems,
2. Apply the basic principles of the theory of concurrent and distributed systems in analyzing problems and proposed solutions,
3. Describe how distributed and/or parallel computation has affected the techniques applicable to common operating systems problems in memory systems, deadlock detection and scheduling, and
4. Identify a number of current problems in extending applicable techniques in centralized operating systems to the domain of distributed and concurrent processing operating systems.

III. JUSTIFICATION:

Some of the most fundamental concepts in applied computer science relate to the mechanisms by which computing objects (processes and data) are implemented and the ways in which these objects interact to form systems of coherent activity. Concurrent activity regulated by some synchronization method is both an important practical consideration as well as a matter of fundamental theoretical concern. The phrase "operating systems" broadly describes this collection of concepts in computer science. It is critical that students obtaining a graduate degree in computer science gain some appreciation for the concepts in the operating systems domain.

This course requires the student to employ modeling knowledge and solution techniques gained in the prerequisite courses to the more difficult problem domain of distributed and concurrent systems. Time and state characterization become more challenging and assumptions used in the undergraduate treatment of operating systems become fragile or unacceptable.

CS 5034 is removed as a prerequisite since adequate background for analyzing operating systems is covered in CS 3204 (including exposure to algebraic

models of programs and systems and queuing theory models for performance evaluation).

IV. PREREQUISITES AND COREQUISITES:

Undergraduate operating systems (3204).

V. TEXTS AND SPECIAL TEACHING AIDS:

Required text:

Singhal, Mukesh and Niranjana G. Shivaratri. **ADVANCED CONCEPTS IN OPERATING SYSTEMS**. New York, NY: McGraw-Hill, 1993. xxii, 522.

Supplemental text:

Coffman, Edward and Peter J. Denning. **OPERATING SYSTEMS THEORY**. Englewood Cliffs, New Jersey: Prentice-Hall, 1973. xvi, 331.

VI. SYLLABUS:

	Percent of Course
1. Concurrency	35%
a. High-level synchronization in centralized systems	
b. Synchronization in distributed systems	
c. Concurrency theory	
d. Deadlock	
2. Memory Systems	25%
a. Segmentation and paged virtual memory	
b. Distributed virtual memory	
c. Distributed file systems	
3. Scheduling and Performance Analysis	20%
a. Deterministic scheduling	
b. Queuing theory	
4. Operating System Design	10%
5. Contemporary Problems in Operating Systems	10%
	<hr/> 100%

VII. OLD (CURRENT) SYLLABUS:

Same as above.

VIII. CORE CURRICULUM GUIDELINES:

NA