

Syllabus

Course Number: CS 431

Course Title: Operating Systems Analysis/Design

Course Description

CS 431 – OPERATING SYSTEMS ANALYSIS/DESIGN (3). Studies basic facilities provided in modern operating systems including processor scheduling, memory management, and file systems. Topics include: deadlock detection, paging, concurrency, thread, disk scheduling, caching, and virtual machines.

Prerequisite Course

CS310 – Data Structures

or

CS362 – Data Structures

or

CS435 – Data Structures (traditional Regis College students only)

Course Overview

An operating system (OS) is a set of programs on a computer that provide services to the user and to user processes, and acts as the interface between the hardware and the user. CS431 examines how operating systems work in general, rather than concentrating on a specific operating system or coding an operating system. Consequently, the course focuses on tradeoffs encountered in designing an operating system, and how those tradeoffs impact various types of applications running under the operating system.

The course will start with a brief historical perspective of the evolution of operating systems, and then cover the major components of most operating systems. Particular emphasis will be given to OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), file systems, and operating system support for virtualization and distributed systems.

Course Outcomes:

Upon completion of this course, learners should be able to:

1. Identify and list the goals and major elements of an operating system.
2. Explain the implications of concurrent processing on an operating system.
3. Define and explain the difference between buffering and spooling.
4. Define multi-programming and explain how it is accomplished.

5. Evaluate the need for protection and describe where and how it can be accomplished.
6. Describe the implications of CPU scheduling and evaluate the performance of alternative algorithms for scheduling different types of applications.
7. Define deadlock; list methods to identify system deadlock; and identify and distinguish between the pros and cons of deadlock prevention, avoidance, and detection.
8. Identify the purposes behind, and distinguish between methods of, memory management.
9. Explain virtual memory and its relationship to paging.
10. Describe methods of secondary file management and the effects on the performance of the operating system.
11. Explain the interaction between the operating system and the structure used for file systems.
12. List the implications of distributed hardware on the operating system.
13. Evaluate the tradeoffs in placing the burden of supporting system functions in hardware, the operating system, the application software, and on the user.
14. Describe the basics of an operating system and determine the environment in which this operating system would best perform.

Course Materials:

Required Texts:

Silberschatz, A., Galvin, P., & Gagne, G. (2013). *Operating System Concepts*. (9th edition). New York, NY: Wiley & Sons. ISBN: 978-1-118-06333-0.

Technology Tools:

1. A PC-compatible computer system running Windows.
2. Microsoft Office or similar suite
3. Microsoft PowerPoint® (part of Microsoft Office) or the free PowerPoint Viewer

Pre-Assignment:

Read the following chapters in your text: Chapters 1 and 2

Be *prepared to ask questions* on unclear areas and to *respond to questions* about information in the assigned reading.

Online Format: Sign on to worldclass.regis.edu and become familiar with the course navigation of the Web Curriculum. Complete assignments above.

Classroom-based Format: Complete assignments above by the first night of class.

Course Assignments and Activities:

	Topics	Textbook Readings	Activities Assignments and Associated Points*
1	<ul style="list-style-type: none"> Operating Systems Overview Operating System Components & Services 	Ch. 1 & 2	Chapter Exercises 25% for entire course Participation in Discussions 25% for entire course Final Project – Submit your top 2 selections
2	<ul style="list-style-type: none"> Process Concepts Threads Job and Processor Scheduling 	Ch. 3, 4, & 6	Chapter Exercises Discussions - Final Project Research Quiz #1 6.25%
3	<ul style="list-style-type: none"> Concurrent Process Synchronization Process Deadlocks 	Ch. 5 & 7	Chapter Exercises Discussions - Final Project Research Final Project Outline
4	<ul style="list-style-type: none"> Memory Organization and Management Virtual Memory Management 	Ch. 8 & 9	Chapter Exercises Discussions Quiz #2 6.25%
5	<ul style="list-style-type: none"> File System Interface File System Implementation 	Ch. 11 & 12	Chapter Exercises Discussions 3.125%
6	<ul style="list-style-type: none"> I/O Subsystems Secondary Storage Organization & Management 	Ch. 10 & 13	Chapter Exercises Discussions Quiz #3 6.25%
7	<ul style="list-style-type: none"> Protection Concepts Operating System Security 	Ch. 14 & 15	Chapter Exercises Discussions Final Project 25%
8	<ul style="list-style-type: none"> Virtual Machines Distributed Systems 	Ch. 16 & 17	Chapter Exercises Discussions – Final Project Feedback Quiz #4 6.25% Classroom: Oral Presentations
		Total	100%

*†**Note to Classroom sections only:** Exact dates for reading assignments and homework assignments may be one week earlier or later than indicated in the above Course Assignments and Activities grid. Your instructor's faculty syllabus, handed out the first night of class, will indicate any changes.

Summary of CS431 Assignments and Percentage Weight towards course grade

Assignment	Value (percent of overall course grade)
Chapter Exercises (8 at 3.125% each)	25 %
Quizzes (4 at 6.25%)	25 %
Final Project	25 %
Discussion Participation (8 at 3.125% each)	25 %
Course Total	100 %

Course Policies and Procedures

Adding this course during the Drop/Add Period

If you added this course during the drop/add period, after class began on Monday, you are responsible for **immediately** notifying the instructor that you joined the course late. None of the course due dates will be extended for you. Even if a due date already passed when you added the course, late points will still be deducted.

Repeating the course

If you are repeating this course (due to a previous withdraw or low grade), you are responsible for **immediately** notifying the instructor. Course assignments that you submitted when you last took the course cannot be repeated -- you will be required to complete alternate assignments.

Late Assignment Policy

Late assignments will be graded and then 3% will be deducted for each day the assignment is late, **up to 1 week late**.

No assignment will be accepted more than 1 week after the official due date. Therefore, any assignment turned in more than **1 week** late will be given a grade of **zero**, and no feedback will be given.

Plagiarism

Plagiarism includes submitting anything that was obtained from another person, a publication, or any internet web source. **All work submitted in CS430 must be your own.**

In cases of suspected cheating or plagiarism, the instructor will discuss the matter with the student(s) involved. The instructor reserves the right to question any student orally or in writing about any assignment, and to use the evaluation of the student's understanding of the assignment and of the submitted solution as evidence of cheating.

All cheating incidents will be reported to the Computer Science department, and may also be reported to the Academic Integrity Board for further action.

CC&IS Grading Scale

Letter Grade	Percentage	Grade Point
A	93 to 100	4.00
A–	90 to less than 93	3.67
B+	87 to less than 90	3.33
B	83 to less than 87	3.00
B–	80 to less than 83	2.67
C+	77 to less than 80	2.33
C	73 to less than 77	2.00
C–	70 to less than 73	1.67
D+	67 to less than 70	1.33
D	63 to less than 67	1.00
D-	60 to less than 63	.67
F	Less than 60	0

Additional information about grading can be found in the latest edition of the University Catalog, available at <http://www.regis.edu/Academics/Course%20Catalog.aspx>.

CC&IS Policies and Procedures

Each of the following CC&IS Policies & Procedures is incorporated here by reference. Students are expected to review this information each term, and agree to the policies and procedures as identified here and specified in the latest edition of the University Catalog, available at <http://www.regis.edu/Academics/Course%20Catalog.aspx> or at the link provided.

- The CC&IS Academic Integrity Policy.
- The Student Honor Code and Student Standards of Conduct.
- Incomplete Grade Policy, Pass / No Pass Grades, Grade Reports.
- The Information Privacy policy and FERPA. For more information regarding FERPA, visit the [U.S. Department of Education](http://www.ed.gov).
- The HIPAA policies for protected health information. The complete Regis University HIPAA Privacy & Security policy can be found here: <http://www.regis.edu/About-Regis-University/University-Offices-and-Services/Auxiliary-Business/HIPAA.aspx>.
- The Human Subjects Institutional Review Board (IRB) procedures. More information about the IRB and its processes can be found here: <http://regis.edu/Academics/Academic-Grants/Proposals/Regis-Information/IRB.aspx>.

The CC&IS Policies & Procedures Syllabus Addendum summarizes additional important policies including, Diversity, Equal Access, Disability Services, and Attendance & Participation that apply to every course offered by the College of Computer & Information Sciences at Regis University. A copy of the CC&IS Policies & Procedures Syllabus Addendum can be found here: <https://in2.regis.edu/sites/ccis/policies/Repository/CCIS%20Syllabus%20Addendum.docx>.