



## **COP-4610 Operating Systems Principles**

### **Course Change Justification**

During the curriculum restructuring process, two architecture specific required courses (CDA-3103 and CDA-4101) are identified with substantial overlap with other Computer Science required courses. For this reason, these two courses have been replaced with one new course (CDA-3102) effective from Spring 2020. This would allow students with one additional elective course to widen their skills in emerging technologies that would increase their career opportunities.

From Spring 2020, we will still offer CDA-4101 for students admitted prior to 2020 and have students enroll in either CDA-4101 or CDA-3102. Hence, this course change proposes to replace the current prerequisite “COP-4338 and CDA-3102” with “COP-4388 and (CDA-3102 or CDA-4101)”, which is essential to permit both streams of students to enroll in COP-4610.

## School of Computer Science

**Course Title:** Operating Systems Principles

**Date:** 9/30/19

**Course Number:** COP-4610

**Number of Credits:** 3

<b>Subject Area:</b> Computer Organization	<b>Subject Area Coordinator:</b> Nagarajan Prabakar <b>email:</b> prabakar@cis.fiu.edu
<b>Catalog Description:</b> Operating systems design principles and implementation techniques. Address spaces, system call interface, process/threads, interprocess communication, deadlock, scheduling, memory, virtual memory, I/O, file systems.	
<b>Textbook:</b> Operating System Concepts, 6 <sup>th</sup> Edition Silberschatz, Galvin, and Gagne John Wiley (ISBN: 0471250600)	
<b>References:</b>	
<b>Prerequisites Courses:</b> COP-4338 and (CDA-3102 or CDA-4101)	
<b>Corequisites Courses:</b> None	

Type: Required

Prerequisites Topics:

- CPU, cache, memory organization
- Instruction set architecture
- Multithreading
- Fundamental data structures

Course Outcomes:

1. Master the functions and structures of operating systems
2. Be familiar with issues in the design of operating systems
3. Master techniques of memory management
4. Master file and storage systems
5. Master concepts of process synchronization and communication

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**Relationship between Course Outcomes and Program Outcomes**

<b>BS in CS: Program Outcomes</b>	<b>Course Outcomes</b>
a) Demonstrate proficiency in the foundation areas of Computer Science including mathematics, discrete structures, logic and the theory of algorithms	
b) Demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems.	1,2,3,4
c) Demonstrate proficiency in problem solving and application of software engineering techniques	5
d) Demonstrate mastery of at least one modern programming language and proficiency in at least one other.	
e) Demonstrate understanding of the social and ethical concerns of the practicing computer scientist.	
f) Demonstrate the ability to work cooperatively in teams.	
g) Demonstrate effective communication skills.	

**Assessment Plan for the Course & how Data in the Course are used to assess Program Outcomes**

Student and Instructor Course Outcome Surveys are administered at the conclusion of each offering, and are evaluated as described in the School's Assessment Plan:  
<http://www.cis.fiu.edu/programs/undergrad/cs/assessment/>

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**Outline**

<b>Topic</b>	<b>Number of Lecture Hours</b>	<b>Outcome</b>
<ul style="list-style-type: none"><li>• Overview<ul style="list-style-type: none"><li>○ Operating system history</li><li>○ Computer-system organization</li><li>○ Operating-system structure</li></ul></li></ul>	6	1,2
<ul style="list-style-type: none"><li>• Process management<ul style="list-style-type: none"><li>○ Processes</li><li>○ Threads</li><li>○ CPU scheduling</li><li>○ Process synchronization</li><li>○ Deadlocks</li></ul></li></ul>	15	2,5
<ul style="list-style-type: none"><li>• Storage management<ul style="list-style-type: none"><li>○ Memory management</li><li>○ Virtual memory</li><li>○ File-system interface</li><li>○ File-system implementation</li></ul></li></ul>	9	3
<ul style="list-style-type: none"><li>• I/O systems<ul style="list-style-type: none"><li>○ I/O processing</li><li>○ Mass-storage structure</li></ul></li></ul>	6	4

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**Course Outcomes Emphasized in Laboratory Projects / Assignments**

	<b>Outcome</b>	<b>Number of Weeks</b>
1	Client-server project Process scheduling, queuing, I/O service Outcome: 1,3,5	6

**Oral and Written Communication:**

No significant coverage

**Social and Ethical Implications of Computing Topics**

No significant coverage

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**Approximate number of credit hours devoted to fundamental CS topics**

Topic	Core Hours	Advanced Hours
<b>Algorithms:</b>		<b>1.0</b>
<b>Software Design:</b>		
<b>Computer Organization and Architecture:</b>		<b>1.0</b>
<b>Data Structures:</b>		<b>1.0</b>
<b>Concepts of Programming Languages:</b>		

**Theoretical Contents**

Topic	Class time

**Problem Analysis Experiences**

1. 

Critical section analysis
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**Solution Design Experiences**

1. 

Synchronization of concurrent processes
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2. 

Access to shared resources
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**The Coverage of Knowledge Units within Computer Science Body of Knowledge<sup>1</sup>**

<b>Knowledge Unit</b>	<b>Topic</b>	<b>Lecture Hours</b>
<a href="#"><u>OS1</u></a>	Role and history of operating systems, computer-system structures, client-server systems, hand-held systems	3
<a href="#"><u>OS2</u></a>	Operating-system components, services, structure, and implementation	5
<a href="#"><u>OS3</u></a>	Critical section, semaphores, process synchronization; deadlocks detection, prevention, and recovery	6
<a href="#"><u>OS4</u></a>	Processes, threads, CPU scheduling	9
<a href="#"><u>OS5</u></a>	Memory management, virtual memory	6
<a href="#"><u>OS8</u></a>	File-system interface, file-system implementation, I/O systems, mass-storage structure	6

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<sup>1</sup>See <http://www.computer.org/education/cc2001/final/chapter05.htm> for a description of Computer Science Knowledge units