

## **HUDSON COUNTY COMMUNITY COLLEGE**

Introduction to Operating Systems (CSC 227)

Credits: 3

Prerequisite: CSC 101 or CSC 111 or CSC 115 OR CSC 118 OR CSC 118

**Instructor:**

**Office Location:**

**Office Hours:**

**Phone:**

**E-mail:**

### **Required Text**

Operating Systems Internal and Design Principles, 9th Edition by William Stallings  
ISBN# 0-13-380591-3, 978-0-13-380591-8, 0-13-380609-X, 978-0-13-380609-0

### **Course Description**

This course is structured to explain the functions of an operating system. During the course students will be introduced to what operating systems are, what they do, how they do it, how their performance can be evaluated, and how various operating systems compare with other. The main purpose of this course is to give students a solid background in the components of the operating system, their function and goals, and how to interface and interrelate with them.

### **Course Objectives**

- Students will learn to summarize, at a top level, the key functions of operating systems.
- Students will understand the term processes and explain the relationship between processes and process control blocks.
- Students will understand the distinction between process and threads.
- Students will learn basic concepts related to concurrency, such as race conditions, operating systems concerns, and mutual exclusion requirements.
- Students will learn how deadlock occurs in operating systems
- Students will learn the principal requirements for memory management.
- Students will understand the virtual memory management mechanism in operating systems.
- Students will comprehend the differences among long-, medium-, short-term, multiprocessor, multicore, and real-time scheduling.

### **Attendance**

Regular attendance is vital. If you miss one day's lecture, it will be very difficult for you to understand the following lecture because each lecture is based on the previous one. A student who is absent more than two times will lose an entire grade (for example, if you currently have an A, you will now have an A-). Each subsequent absence will cause you to lose an additional grade. It is **your** responsibility to make up any missed work. In the event that you must miss a class, you must provide me with either a doctor's excuse, note from counselor, etc.

### **Evaluation Criteria**

Your final grade will be based on the following criteria:

<b><u>Item</u></b>	<b><u>Weight</u></b>
Two Exams	25%
Midterm Exam	20%
Final Exam	20%
Labs and Projects	35%

### **ACADEMIC INTEGRITY**

Academic integrity is central to the pursuit of education. For students at HCCC, this means maintaining the highest ethical standards in completing their academic work. In doing so, students *earn* college credits by their honest efforts. When they are awarded a certificate or degree, they have attained a goal representing genuine achievement and can reflect with pride on their accomplishment. This is what gives college education its essential value.

Violations of the principle of academic integrity include:

- Cheating on exams.
- Reporting false research data or experimental results.
- Allowing other students to copy one's work to submit to instructors.
- Communicating the contents of an exam to other students who will be taking the same test.
- Submitting the same project in more than one course, without discussing this first with instructors.
- Submitting *plagiarized* work. *Plagiarism* is the use of another writer's words or ideas without properly crediting that person. This unacknowledged use may be from published books or articles, the Internet, or another student's work.

When students act dishonestly in meeting their course requirements, they lower the value of education for all students. Students who violate the college's policy on academic integrity are subject to failing grades on exams or projects, or for the entire course. In some cases, serious or repeated instances of academic integrity violations may warrant further disciplinary action.

### **Disability Support Services**

Students with disabilities who believe that they might need accommodations in this class are encouraged to contact the Disability Support Services at 201-360-4157 as soon as possible to better ensure that such assistance can be implemented in a timely fashion. All disabilities must be documented by a qualified professional such as a physician, licensed learning disability teacher (LDTC), psychologist, psychiatric nurse, licensed social worker or licensed professional counselor, who is qualified to assess the disability that the student claims to have and note recommendations on accommodations for the student. All information provided to the Disability Support Services Program will be confidential between the program, professors involved with the student, and the individual student.

### **Classroom Recording Policy**

Hudson County Community College prohibits the audio-visual recording, transmission, and distribution of classroom sessions. Classes may only be recorded with the advance written permission of the instructor. The complete classroom recording policy is listed in the student handbook.

### **Diversity, Equity, & Inclusion Statement**

Hudson County Community College (HCCC) fosters a welcoming environment that celebrates and encourages culturally responsive curricula, respects diverse viewpoints, and values discussions without censure or hostility. Our classrooms are strengthened by embracing all student voices and identities. The President's Advisory Council on Diversity, Equity, and Inclusion (PACDEI) encourages students to review DEI resources and initiatives at the following link:

<https://www.hccc.edu/abouthccc/dei/pacdei.html>

### **Email Policy**

**Mandatory Use of HCCC Email Address:** Members of the HCCC community are required to check their official HCCC email address to stay current with college and course communications. All college business communication between faculty, students, and staff must be sent via an official HCCC email address. If an employee or student elects to forward or link his/her HCCC email to a separate and private account, that individual remains responsible for all material transmitted to that account. Employees of HCCC shall not be responsible for any material that remains undelivered, due to defects in the private non-HCCC accounts. Failure in the operations of private email accounts shall not be cause for excuse from communications between the student and the HCCC employee. Students that encounter difficulty with HCCC email should view the FAQ's section on the Website.

### **Emergency Notifications**

In case Hudson County Community College is closed due to unforeseen circumstances such as inclement weather, loss of power, etc., students are to call or check the college website and check email accounts for instructions and updates, when possible. HCCC main# (201) 714-7100 or <http://www.hccc.edu>. Alternatively, please check Canvas and your college email for important posts regarding classes and the College.

### **Financial Aid & Attendance Statement**

Federal regulations require that students earn their financial aid funds by attending class. Professors collect and report attendance information to verify financial aid eligibility. Failure to begin attending a course may negatively impact the student's financial aid enrollment level and eligibility. If you have any questions, please contact the Financial Aid office at [financial\\_aid@hccc.edu](mailto:financial_aid@hccc.edu) or 201-360-4200.

### **COVID-19 Syllabus Statement**

HCCC strongly recommends that all members of the college community get the COVID-19 vaccine and booster. Additionally, N95 masks are available at building entrance security desks for anyone who would prefer to wear one. Everyone should continue to monitor themselves for symptoms and stay home if they are sick. Please refer to the Return to Campus webpage: ([www.hccc.edu/community/returntocampus/index.html](http://www.hccc.edu/community/returntocampus/index.html)), the Return to Campus FAQs:

([www.hccc.edu/community/returntocampus/faq.html](http://www.hccc.edu/community/returntocampus/faq.html)), and all Return to Campus email communications for more information and updates.

## Weekly Calendar

### Week 1

#### Chapter 1: Computer System Overview

- Interrupts
- The Memory Hierarchy
- Cache Memory

### Week 2

#### Chapter 1 (Continues)

- Cache Memory
- Direct Memory Access
- Multiprocessor and Multicore Organization

### Week 3

#### Chapter 2: Operating System Overview

- Operating System Objectives and Functions
- The Evolution of Operating Systems
- Major Achievements
- Developments Leading to Modern Operating Systems
- Fault Tolerance
- OS Design Considerations for Multiprocessor and Multicore

### Week 4

Review

Test 1

### Week 5

#### Chapter 3: Process Description and Control

- What is a Process?
- Process States
- Process Description
- Process Control
- Execution of the Operating System

## **Week 6**

### **Chapter 4: Threads**

- Processes and Threads
- Types of Threads
- Multicore and Multithreading

## **Week 7**

### **Chapter 4 (Continues)**

- Windows Process and Thread Management
- Linux Process and Thread Management
- Android Process and Thread Management
- Mac OS X Grand Central Dispatch

## **Week 8**

### **Review**

### **Midterm Exam**

## **Week 9**

### **Chapter 5: Concurrency: Mutual Exclusion and Synchronization**

- Mutual Exclusion: Software Approaches
- Principles of Concurrency
- Mutual Exclusion: Hardware Support
- Semaphores
- Monitors
- Message Passing
- Readers/Writers Problem

## **Week 10**

### **Chapter 6: Concurrency: Deadlock and Starvation**

- Principles of Deadlock
- Deadlock Prevention
- Deadlock Avoidance
- Deadlock Detection
- An Integrated Deadlock Strategy
- Dining Philosophers Problem

**Week 11**

**Review**

**Test 2**

**Week 12**

**Chapter 7: Memory Management**

- Memory Management Requirements
- Memory Partitioning
- Paging
- Segmentation

**Week 13**

**Chapter 8: Scheduling**

- Types of Processor Scheduling
- Scheduling Algorithms
- Multiprocessor, Multicore, and Real-Time Scheduling
- Multiprocessor and Multicore Scheduling
- Real-Time Scheduling

**Week 14**

**Review**

**Week 15**

**Final Exam**