CSCI 3435: Operating System

2022 Winter Session	
Total Class Sessions: 25	**Instructor: Staff**
Class Sessions Per Week: 6	**Classroom: TBA**
Total Weeks: 4	**Office Hours: TBA**
Class Session Length (Minutes): 145	**Language: English**
Credit Hours: 4	

Course Description:

The purpose of this course is to provide an overview of modern computer operating systems. The following topics will be covered in this course: Introduction to Operation System, Principles of Operating System, Processor, CPU Scheduling, Interrupts and Exceptions, File Systems, Process and memory Management, Deadlocks, Address Binding, Hard Disk Drive Scheduling, Security Operating Systems and Operating System attacks.Upon completion of the course, each student will gain a solid understanding of modern operating systems via a series of challenging mini-projects.

Prerequisite: Foundations of Computer Science, Data Structures and Algorithms, Computer System Organization.

Learning objectives:

Upon completion of this course, students will be able to:

- Gain experience about creating the Operating System;
- Understand the Operating system Process and designing architecture:
- Understand Process and Memory management, CPU Scheduling and Security in Operating Systems;
- Understand the Hard Disk management Scheduling and Address Binding ;
- Understand the importance of File System and Deadlocks in Operating System

Course Materials:

Operating System Concepts, 10th Edition, by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne.

Publisher: Wiley (February 9, 2021)

Language: English

ISBN-10: 1119800366

ISBN-13: 978-1119800361

The 9th Edition is also acceptable

Course Format and Requirements:

The course will take place in a computer lab and the course format including lecture, programming project, and in-class discussion.

The specific topics that will be covered in the classes are listed in the course syllabus. The class period will consist of an active learning environment. During a majority of the class time, students will be actively working on problems under the instructor's guides.

Attendance:

Attendance will not be taken but is strongly recommended. Each student will have three allowed absences and no grade deduction will be made for the first three absences. More than three unexcused absences will result in an automatic reduction in your participation grade, for instance from A- to B+. Your active participation in the class is expected and encouraged.

Course Assignments:

Quizzes: There will be 6 quizzes this semester, given during the discussion sections. Each quiz will be on the material covered that week. There will be NO make-ups for quizzes for any reason. All of the quizzes will be closed book.
Midterm Exam: The in-class, close-book and non-cumulative midterm exam will be given through this course. The midterm exam will be based on the knowledge covered in class. No excuse will be accepted if students do not have legitimate excuses for absence. Physician Statement is required for missing the exam due.
Weekly Projects : There will be four hands-on projects based on course need. It will count for 40% of your grade for the course. The projects will enrich students' knowledge on writing large programs. The score will be given based on the correctness of the program.
Final Exams: The final will be in-class, cumulative and close-book. The final exams will be based on concepts covered in class. Note that the final will not be taken during the normal class times. Exact time and location for final will be announced later.

Course Assessment:

Quizzes	15%
Weekly Projects	35%
Midterm Exams	20%
Final Exam	30%
Total	**100%**

Grading Scale (percentage):

A+	**A**	**A-**	**B+**	**B**	**B-**	**C+**	**C**	**C-**	**D+**	**D**	**D-**	**F**

98-100	**93-97**	**90-92**	**88-89**	**83-87**	**80-82**	**78-79**	**73-77**	**70-72**	**68-69**	**63-67**	**60-62**	**<60**

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Chengdu University of Technology's *Academic Conduct Code.* Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office. Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.

Course Schedule:

Week	Topics	Assignments
1	**Go through syllabus and introduction to the course** **Introduction to Operating System** ➢ Operating System Overview ➢ Computer Systems/OS Structure **Principles of Operating System** ➢ Process Concept ➢ Threads **Processer** ➢ Single Processor System ➢ Multiprocessor System ➢ Interprocess Communication **CPU Scheduling** ➢ Basic Concept ➢ Scheduling Algorithms	Quiz 1 Quiz 2 Weekly Project

	➢ Sleep and Wakeup	
2	**Process Management** ➢ Process States ➢ Process Control Block (PCB) **Interrupt System and Exceptions** ➢ Software Interrupt ➢ Hardware Interrupt ➢ Interrupt Handler **File Systems** ➢ Buffer Cache Layer ➢ Logging Layer ➢ Block allocator ➢ Directory Layer ➢ File Descriptor Layer	Quiz 3 Weekly project Midterm Exam
3	**Process Synchronization** ➢ Synchronization Hardware ➢ Semaphore ➢ Classical Synchronization **Deadlocks** ➢ Deadlocks Overview ➢ Deadlock Prevention using Static Rules ➢ Deadlock Avoidance Using Banker's Algorithm ➢ Deadlock detection and recovery **Memory management** ➢ Memory pyramid ➢ Memory Types	Quiz 4 Weekly project

	➢ Backup Memories **Review Program Processing Cycle** ➢ Dynamic Linking ➢ Dynamic Loading ➢ Logical and Physical addresses	
4	**Address Binding** ➢ Compile Time ➢ Load Time ➢ Run Time address binding **Hard Disk Drive Scheduling** ➢ Disk Space Allocation ➢ HDD Scheduling Algorithms **Security in Operating System** ➢ Security threats and aspects ➢ Security Services in OS **Operating System Attacks** ➢ Buffer Overflow on the stake ➢ Overflow on Heap ➢ Integer Overflow **Review final exam**	Quiz 5 Quiz 6 Weekly project Final Exam