



NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIVERSITY

Fall 2023 Course Syllabus

College of Engineering Computer Science

NOTE: Students are responsible for reading, understanding and following the syllabus.

Undergraduate Course Information

Course Name: Operating Systems

Course Number/Section: COMP 350

Days and Times: 4:00 pm – 4:50 pm MWF

Credit Hours: 3

Class Location: 200 M-ERIC Hall

Instructor Contact Information

Instructor: Mr. Tony Gwyn

Office Location: 317 M-ERIC Hall Email Address: tgwyn@ncat.edu

Office Phone: 336-285-3692

Teaching Assistant: Dagmawit Tadesse Aga

Office Location: N/A (Available via Zoom only)

TA's email address: daga@aggies.ncat.edu

TA Availability: 9:00 am – 11:00 am Wednesdays

Please contact your TA via email to set up any Zoom meetings during their office hours.

Communication

Faculty must notify students of the approximate time and method they can expect to receive an answer to all communications (e.g., email, phone, course messages). Excluding holidays, the response should be provided within 48 hours. The secondary point of contact is the instructor's department chair.

Student Hours

These are times students may visit the professor without an appointment to request the assistance they need. Feel free to copy the fields below, add extra fields or add your times and dates in your preferred format as long as the format is clear and easy to read.

12:30 AM ☐ / PM ☒ – 2:30 AM ☐ / PM ☒

Monday ☒ Tuesday ☐ Wednesday ☒ Thursday ☐ Friday ☐

Course Prerequisites

COMP 280 Data Structures

Course Description

This is an introduction to the theory and practice of operating system design and implementation. Algorithmic techniques are presented for implementing process management, storage management, processor management, file systems, security, distributed systems, performance evaluation, and real time systems.

Student Learning Objectives/Outcomes (SLO)

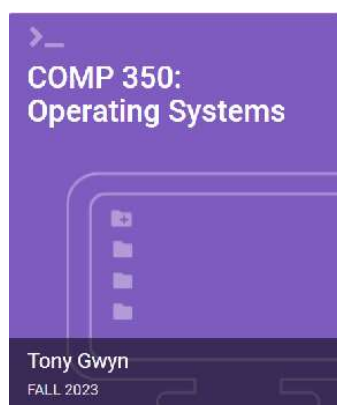
Upon completion of this course, the student should be able to:

1. Understand how a modern operating system provides the user with it's interface.
2. Understand how the operating system interacts with the computer hardware
3. Design a concurrent system that will be free of deadlock.
4. Write concurrent programs using multiple threads and processes.
5. Be able to analyze a problem and identify an appropriate concurrent programming solution.
6. Describe (simulate) process execution using various types of CPU scheduling algorithms.
7. Describe how virtual memory is addressed and managed.
8. Be able to use available tools to measure the performance of a system.

Required Textbooks and Materials

Required Texts:

Operating Systems. Zybooks.



Please provide the following instructions to your students. Copy into your syllabus, discussion board, etc.

1. Sign in or create an account at learn.zybooks.com
2. Enter zyBook code

NCATCOMP350GwynFall2023

3. Subscribe

Suggested Course Materials

Suggested Readings/Texts: [Little Book of Semaphores](#)

Grading Policy

Course Grade Scale

94% and above	A	80% - 83%	B-	67% - 69%	D+
90% - 93%	A-	77% - 79%	C+	64% - 66%	D
87% - 89%	B+	74% - 76%	C	60% - 63%	F
84% - 86%	B	70% - 73%	C-		

Grading Rubric

Programming assignments will be graded based on the following rubric:

- Proficient code: 100% (Code works flawlessly, no errors or syntax mistakes)
- Competent: 80-99%, depending on severity of errors (minor syntax or spelling errors)
- Needs Work: 50-79%, depending on severity of errors (major syntax or spelling errors, sections of the code do not work)

- Unacceptable: 0% (Assignment not turned in, entire program does not work, plagiarized work, etc.)

In addition, all programs should adhere to **basic coding standards**:

- All programs should contain a header, with information such as
 - Student Name
 - Date
 - Class / Section
 - Description of Program (Please note that this is NOT a restatement of the assignment, but instead a description of what you are trying to accomplish)
- Comments: your program should be well documented. Place a comment for each area of idea / thought, that explains the purpose of that code block.
- Variables / Identifiers: Do not use single characters; instead use descriptive words
 - X = 9 (Incorrect)
 - Age = 9 (Correct)
- Lower Camel Case: use lower camel case for variables and identifiers (ex: myUniqueVariable)
- Upper Camel Case: use upper camel case for classes and modules (ex: FooBarModule)
- Modular design (classes and modules are self-contained)

Grading Allocation

Course grades are based on a weighted grading scale of 100%. The breakdown for the course is as follows:

Category	# of Activities	Percentage Grade Weight
Participation (ZyBooks)	*	10%
Project	1 (multiple parts)	10%
Programing Assignments	10	15%
Quizzes	8	15%
Exams	3	30%
Final Exam	1	20%
Total	23*	100%

GRADED COURSE ACTIVITIES ARE SUBJECT TO CHANGE!

Course Policies

Use Of Blackboard as The Learning Management System

Blackboard is the primary online instructional and course communications platform. Students can access the course syllabus, assignments, grades, and learner support resources. Students are encouraged to protect their login credentials, complete a Blackboard orientation and log in daily to course.

[Other Course Policies]

Make-Up Exams Will be handled on a case-by-case basis. If you know you will be absent on the date of an exam, please contact your TA as SOON AS POSSIBLE. Failure to adhere to this policy will result in a 0 grade for any missed exams!

Extra Credit May be given throughout the semester at the discretion of the professor.

Late Work Assignments are expected to be turned in by 12:00 PM (midnight) on the due date. Assignments turned in after this point are considered 'late'. Assignments turned in after the due date will be penalized 10% per day that they are late. Any assignment turned in over 3 dates past the due date will not be accepted, and the student will receive a zero grade for that assignment.

Class Schedule [or Course Plan]

Date (Week #, Week Ending MM/DD)	Subject	Unit Learning Objective/Outcome	Reading, Activity, Homework, Exam
Week 1, W/E 8/25	Unit 1: Syllabus Overview, Coding Review	ULO 1: Application of coding abilities. (SLO 1-3) ULO 2: Perform Sample Quiz (SLO 1-3)	1. Acquire Textbook: <i>Operating Systems</i> . Zybook. 2. Complete: Syllabus Quiz
Week 2, W/E 9/1	Unit 2: Introduction to Operating Systems	ULO 1: Describe what is an OS. (SLO 1-3) ULO 2: Explain the role of an OS. (SLO 1-3)	1. Read Textbook: <i>Operating Systems</i> . Zybook. 2. Chapter 1, 'Introduction' 3. Complete: Quiz # 1 (ULO 1 - 3) 4. Complete: Assignment # 1 (ULO 1-3)
Week 3, W/E 9/8	Unit 3: Process, Threads and Resources	ULO 1: Describe what is a process. (SLO 1-3) ULO 2: Explain what is a thread. (SLO 1-3)	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 2 'Processes, Threads, and Resources' 2. Complete: Quiz # 2 (ULO 1 – 2) 3. Complete: Assignment # 2 (ULO 1 – 2)
Week 4, W/E 9/15	Unit 4: Scheduling	ULO 1: Describe OS scheduling. (SLO 1-3)	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 3 'Scheduling' 2. Complete: Quiz # 3 (ULO 1) 3. Complete: Assignment # 3 (ULO 1) 4. Complete: Exam # 1 (ULO 1)

Date (Week #, Week Ending MM/DD)	Subject	Unit Learning Objective/Outcome	Reading, Activity, Homework, Exam
Week 5, W/E 9/22	Unit 5: Threads	ULO 1: Explain multi-threaded applications. (SLO 1 – 3) ULO 2: Demonstrate threaded development. (SLO 1 – 3)	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 2.6 'Threads' b. Chapter 3.1 'Principles of Scheduling' c. 4.1 'Process Interactions' 2. Complete: Assignment # 4 (ULO 1 – 2)
Week 6, W/E 9/29	Unit 6: Synchronization and Locks	ULO 1: Explain the use of Semaphores and Mutex. (SLO 1-3)	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 4.1- 4.3 'Concurrency' 2. Complete: Assignment # 5 (ULO 1)
Week 7, W/E 10/6	Unit 7: Semaphores and Monitors	ULO 1: Apply the concept of concurrent programming. (SLO 1-3)	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 4.2 – 4.4 'Concurrency' (continued) 2. Complete: Assignment # 6 (ULO 1)
Week 8, W/E 10/13	Unit 8: Reader/Writer	ULO 1: Explain semaphores. (SLO 1- 3)	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 4.5 'Classic synchronization problems' 2. Complete: Quiz # 4 (ULO 1) 3. Complete: Assignment # 7 (ULO 1)
Week 9, W/E 10/20	Unit 9: Deadlocks	ULO 1: Apply the concept of thread deadlock. (SLO 1- 3)	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 5 'Deadlock' 2. Complete: Quiz # 5 (ULO 1) 3. Complete: Assignment # 8 (ULO 1) 4. Complete: Exam # 2 (ULO 1)
Week 10, W/E 10/27	Unit 10: Memory Management	ULO 1: Apply the following concepts. (SLO 1- 3) <ul style="list-style-type: none"> Memory management Paging Segmentation 	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 6 'Memory Management' 2. Complete: Quiz # 6 (ULO 1)

Date (Week #, Week Ending MM/DD)	Subject	Unit Learning Objective/Outcome	Reading, Activity, Homework, Exam
Week 11, W/E 11/3	Unit 11: Virtual Memory	ULO 1: Apply the following concepts. (SLO 1- 3) <ul style="list-style-type: none"> • LRU Algorithm • Page Replacement • Memory time and Space efficiency 	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 7 'Virtual Memory' 2. Complete: Quiz # 7 (ULO 1)
Week 12, W/E 11/10	Unit 12: File System	ULO 1: Apply the following concepts. (SLO 1- 3) <ul style="list-style-type: none"> • File Directories • File Operations • Disk Block Allocation 	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 8 'File System'
Week 13, W/E 11/17	Unit 13: Input/Output	ULO 1: Apply the following concepts. (SLO 1 – 3) <ul style="list-style-type: none"> • Buffering and Caching • Disk Scheduling • Error Handling 	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 9 'Input/Output' 2. Complete: Quiz # 8 (ULO 1)
Week 14, W/E 11/24	Unit 14: Protection and Security	ULO 1: Apply the following concepts. (SLO 1 – 3) <ul style="list-style-type: none"> • User authentication • Access control 	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 10 'Protection and Security' (Short week, Thanksgiving Holiday)
Week 15, W/E 12/1	Unit 14 (Continued)	ULO 1: Apply the following concepts. (SLO 1 – 3) <ul style="list-style-type: none"> • User authentication • Access control 	1. Read Textbook: <i>Operating Systems</i> . Zybook. a. Chapter 10 'Protection and Security' 2. Complete: Exam # 3 (ULO 1)
Week 16, W/E 12/8	Unit 15: Review	ULO 1: Review the concepts	Review Materials, Prepare for Final Exam
Week 17, W/E 12/15	Final Exam (December 11 th , 4:00 PM – 5:30 PM)	N/A	Take the Final Exam

*** These descriptions and timelines are subject to change at the discretion of the instructor!**

Important Dates

August 29th - Last day to add courses or drop a course and receive financial credit

September 4th – University Holiday (Labor Day) NO CLASS

September 5th – Last day to receive book allowance

October 9th and 10th – Fall Break NO CLASS

October 23rd – Last day to withdraw from a course without a Grade

November 22nd through 24th – University Holiday (Thanksgiving) NO CLASS

December 8th – Reading Day NO CLASS

December 11th through 14th – Final Examinations

December 11th, 4:00 PM – 5:30 PM – Final Exam for COMP 350