Course Syllabus

Course	CS 6378.001.24S
Course Title	Advanced Operating Systems
Professor	Ravi Prakash
Term	Spring 2024
Meetings	Tuesdays, Thursdays, 8:30 am – 9:45 am GR 2.530

Professor's Contact Information

Office Phone	972-883-2289
Other Phone	972-883-2185 (CS Department Phone Number)
Office Location	ECS South 4.210
Email Address	ravip@utdallas.edu
Office Hours	Mondays, Tuesdays, 12:00 noon – 1 pm, and by appointment. Office hours will be held via MS Teams. Link to the office hours MS Teams meeting will be posted on eLearning. You do not need prior appointment to meet me during the office hours. Just join the Teams meeting.
Other Information	The best way to communicate with me, outside the classroom, is through UT Dallas email. **Please do no hesitate to seek an appointment if you wish to meet me at times other than my office hours.**

General Course Information

Pre-requisites, Co-requisites, & other restrictions	CS 5343 and CS 5348 or equivalent. Must have knowledge of C, UNIX, and Socket Programming
Course Description	Concurrent processing, inter-process communication, process synchronization, deadlocks, introduction to queuing theory and operational analysis, topics in distributed systems and algorithms, checkpointing, recovery, multiprocessor operating systems.
Learning Outcomes	1. Ability to understand the concepts of concurrent and distributed execution in modern operating systems and networks of systems 2. Ability to understand the notion of time and clocks in a system with no global time-keeper 3. Ability to understand the concept of causal ordering of events and deadlocks 4. Ability to understand the concept of distributed mutual exclusion and resource management, including processor, memory and file systems 5. Ability to design new algorithms/protocols for resource management 6. Ability to understand the concept of process failure and approaches to build fault-tolerance in a distributed execution environment including check pointing, voting protocols and replication 7. Ability to design and conduct simulation experiments to quantitatively evaluate various distributed algorithms, and analyze and interpret the data 8. Ability to communicate and work as a group on a team software project
Required Texts & Materials	We will use a collection of research papers, some new and some old. The list will be distributed in class and will be available on eLearning. All papers are available at no charge to students through the university's subscription to digital content.
Suggested Texts, Readings, & Materials	None

Assignments & Academic Calendar

[Topics, Reading Assignments, Due Dates, Exam Dates

Number of Lectures	Topic
1	Introduction
4	Theoretical Foundations: Causality, logical time, scalar and vector clocks, causally ordered message delivery, snapshot collection
3	Distributed Mutual Exclusion: Lamport's algorithm, Ricart-Agrawala algorithm, Roucairol-Carvalho optimization, Maekawa's algorithm, Raymond's tree-based algorithm
3	Physical Clock Synchronization: Christian's algorithm, Berkeley algorithm, NTP, Srikanth-Toueg algorithm
3	Agreement Protocols: Byzantine Fault Tolerance (Fischer's survey paper), Practical Byzantine Fault Tolerance (time permitting)
6	Recovery and Fault Tolerance: Model for recovery, 2- and 3-phase commit, Koo-Toueg algorithm, replica consistency, static and dynamic voting
4	File Systems and Data Store: Google file system, Amazon Dynamo; MapReduce, BigTable, Chubby, etc. as time permits
2	Distributed Scheduling
1	Distributed Shared Memory
1	Software Transactional Memory
Last class meeting	May 2, 2024
Midterm Examination	March 5, in class
Final Examination	During Finals week, as per scheduled determined by the Registrar

Course Policies

Class Materials	The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course; however, these materials are for registered students' use only.

	Classroom materials may not be reproduced or shared with those not in class or uploaded to other online environments except to implement an approved AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct.
Class Attendance	The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. There will be some announced and pop quizzes held during the class. Unless there is a mitigating circumstance, those not in attendance during that time will not be able to make up the missed quiz.
Class Participation	Regular class participation is expected. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the Student Code of Conduct.
Class Recordings	Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the AccessAbility Resource Center has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved AccessAbility Resource Center accommodation. Failure to comply with these University requirements is a violation of the Student Code of Conduct. The instructor may record some meetings of this course. These recordings will be made available to all students registered for this class if the intent is to supplement the classroom experience. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law.
Grading (credit) Criteria	Midterm examination: 22.5%, Final examination: 22.5%, Programming Assignments: 25%, Quizzes: 15%, Paper review: 5%, Class participation tests: 10%
Make-up Exams	Make-up examinations will be offered only if the student has a valid medical reason and produces a doctor's letter. If a student is absent for several classes because of job related obligations, he/she will not be eligible for an incomplete grade. In such instances the student is advised to drop the course.
Extra Credit	No extra credit work will be assigned.
Late Work	Programming assignments, and paper review material submitted after the due date will be penalized at the rate of 10% of the total credit for that assignment for every day (not including weekends and holidays) by which they are late. Late submissions will not be accepted once the solution has been discussed in class or the graded submissions have been returned. No late submission accepted for class participation component.

Special Assignments	None
Classroom Citizenship	The instructor encourages students to take active part in class discussions. No question is too simple/stupid to be asked. So, do not hesitate to ask questions. A vigorous discussion of ideas in a respectful environment promotes learning.
Comet Creed	*This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:* *"As a Comet, I pledge honesty, integrity, and service in all that I do."*
Academic Support Resources	*The information contained in the following link lists the University's academic support resources for all students.* *Please go to http://go.utdallas.edu/academic-support-resources.*
UT Dallas Syllabus Policies and Procedures	*The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please review the sections regarding the credit/no credit grading option and withdrawal from class.* *Please go to http://go.utdallas.edu/syllabus-policies for these policies.*

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.