

National Computing Education Accreditation Council

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DURSE DESCRIPTION FORM FAST-NUCES	The said

INSTITUTION	
PROGRAM (S) TO BE EVALUATED	BSCS
A Course Description	

A. Course Description

(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

not be more than 2-3 page	3.)					
Course Code	CS2006					
Course Title	Operating Systems					
Credit Hours	3+1					
Prerequisites by Course(s) and Topics	PF & Data Structures					
Assessment	 Semester Assessments – 20% (2 Prog. Assignments 4 + 3 Quizzes 6 + Project 10) 					
Instruments with	Midterms - 30% Late policy: 50% detection after 48 hours. No awards					
Weights	 Final Exam – 50% whatsoever after ONE WEEK after the deadline. Plagiarism punishment up to 20 weightage. 					
	Project scope limited to <u>Multithreaded Multiprocesses Interprocess communication programming</u>					
	ONLY. Proposals based on theoretical aspects and Socket programming shall not entertained.					
	Marks distribution: 5% proposal , 70 Coding (complexity + proposed outcome), 25% viva & presentation					
Course Coordinator	Dr. Nadeem Kafi Khan					
Grading Policy	Absolute grading. Student will receive grades based on predetermined cutoff levels.					
Current Catalog Description	This course aims to equip students with a solid understanding of operating systems, covering key areas such as system basics, process management, threads and concurrency, scheduling, concurrency and inter-process communication, memory allocation, and security measures. It also emphasizes practical skills like system programming and debugging and virtualization and containers in the context of operating systems. Students will gain hands- on experience through class assessments focusing on system design principles. The goal of this course is to provide students with a comprehensive understanding of operating systems, enabling them to develop efficient applications and address challenges in multi- user, multitasking, and distributed computing environments, while emphasizing practical skills.					
Textbook (or Laboratory Manual for Laboratory Courses)	Operating system Concepts by Silberchatz, 10th Edition (Please do not use Global Edition)					
Reference Material	 OPERATING SYSTEMS INTERNALS, 9th Ed. by Dr. William Stallings Modern Operating System by Abdrew S. Tannenbaum 5th Edition. 					



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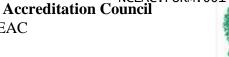
Course Goals

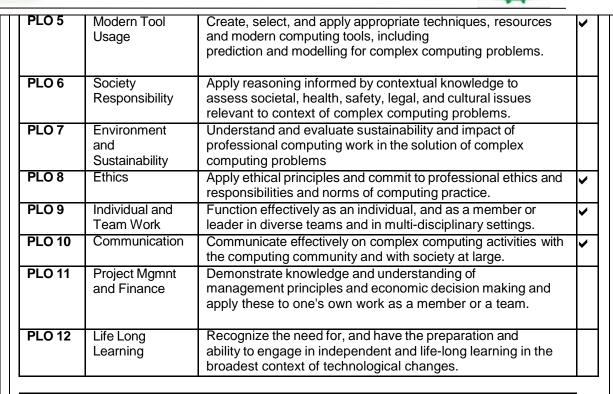
A. Course Learning Outcomes (CLOs)

CLO	Name		Domain	Taxonomy Level	Tools	S
01	Understand / Describe / discuss / Comprehend - Services provided by the operating systems - Virtualization - Concurrency - Persistence - Security					
02					A,M,F	
03	Design and Implement programs using processes and threads. For example, Simple Operating System Shell, File System Implementation, Process Scheduling Simulator, Interprocess Communication Mechanisms, System Calls Extension, Security Features Implementation, Performance Monitoring Tool.					,P
Tool: A	= Assignment, M = Midterm, F=I	Final, P = Project				
	B. Program Learning C	outcomes				
		ndicate whether this attribute enablement is little or non-ea		in this course o	or not.	
PLO 1	O 1 Computing Apply knowledge of mathematics, natural sciences,				✓	

1 20 1	Knowledge	computing fundamentals, and a computing specialization to the solution of complex computing problems.	•
PLO 2	Problem Analysis	Identify, formulate, research literature, and analyze complex computing problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences.	\
PLO 3	Design/Develop Solutions	Design solutions for complex computing problems and design systems, components, and processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	>
PLO 4	Investigation & Experimentation	Conduct investigation of complex computing problems using research-based knowledge and research-based methods	

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C. Relation between CLOs and PLOs (CLO: Course Learning Outcome, PLOs: Program Learning Outcomes)													
	PLOs												
		1	2	3	4	5	6	7	8	9	10	11	12
	1	>											
sc	2		~										
CLOs	3			>									
	4					•							





Topics Covered in Use List of Topics Chap. Contact									
he Course,	Weeks	List of Topics	#	Hours	CLO				
vith Number of ectures on	1	Introduction and OS basics	1	0.5	1				
Each Topic	2	Introduction to Operating system	1	5.5	1				
assume 15-	3	Operating system structure	2	3	1				
veek instruction and one-hour	4	Processes	3	3	1,2,3				
ectures)	5	Process Scheduling Algorithm	5	3	1,2,3	Asign 1			
,	6	Mid Term 1							
	7	Threads and Concurrency	4	3	1,2,3	Project			
	8	Process Synchronization Tools and Examples	6,7	3	2,3				
	9	Deadlocks	8	3	2,3				
	10	Main Memory	9	3	1,2	Quiz 2			
	11	Virtual Memory	10	3	1,2	Asign 2			
	12	Mid Term 2							
	13	I/O Systems, File-System Interface	12	3	1,2				
	14	Virtual Machines	18	3	1,2				
	15	Revision/completion of topics - 1	1	3	1,2	Quiz 3			
	16	Revision/completion of topics - 2							
	17	Project Presentations and Viva							
aboratory	2. Topics to be covered in Labs:								
Projects / Experiments	Lab 1: Introduction & Basic Linux Commands and Virtual Box installation								
Done in the Lab 2: Creating, Compiling and executing C/C++ programs using gcc/g++ compilers using makefile					2				
Course	Lab 3: Linux Shell Scripting (installations and configurations, system admin, task orchestration)								
	Lab 4: Sys	ab 4: System Call related to Process Management, argument arrays							
	Lab 5: POS	IX thread programming without synchronization							
	Lab 6: Inte	er-Process Communication (IPC, Named Pipes and demo	basic socl	kets program	ming)				
	Lab 7: Shared Memory and Memory Mapped Files								
	Lab 8: Mic	d Exam							
	Lab 9: Mu	Itithread Programming with synchronization primitives –	· <mark>1</mark>						
	Lab 10: M	ultithread Programming with synchronization primitives –	2 (using Fil	le-System cal	ls)				
Lab 11: The Readers and Writers Problem Lab									
-	Lab 12: OS security lab (desktop and server threats, hardening Linux OS, network security basics)								
-	Lab 13: System Configuration. Boot loader, Managing Services, System Startup Files (rc.d, rc.sysinit rc.local								
	init.d), ma	ke, configure install, Integrity Checks							
	Lab 14: Cı	reating a module in Kernel – 1							
	I oh 15. Ca	reating a module in Kernel – 2							

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Lab 16: Final Lab Exam (Lab Midterm syllabus will be 20% and rest 80%)

Lab 17: Lab Project Evaluation and Lab Final Exam Review.





Programming Assignments Done in the Course	2 in Theory and 13+ in different OS labs					
Class Time Spent	Theory	Problem Analysis	Solution Design	Social and Ethical Issues		
on (in credit hours)	20	15	6	1		
Oral and Written Communications	Every student is required to submit at least1_written report of typically _2_pages and to make _1 oral presentations of typically10 minute's duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.					

Instructor Name: Dr. Nadeem Kafi Khan

Instructor Signature:	
Date: 20 th January, 2025	