Department/Faculty:	Computer Science/ Computing	**Page:**	1 of 7	
Course code:	SECR 2043	**Academic Session/Semester:**		2024/2025 01
Course name:	OPERATING SYSTEMS	**Pre/co requisite:**		
Credit hours:	3			

COURSE OUTLINE

Course synopsis	This course covers introduction to operating systems, which serve as an interface between computer hardware and the user. The operating system manages and coordinates processes and shares limited computer resources. Students will be exposed to the techniques and algorithms that may be applied in designing an operating system. Topics covered include process management, concurrency and synchronisation, deadlock, memory management, file management, secondary storage management and I/O management. At the end of the course, the student shall have a clear understanding of the general concepts that underlie of an operating system.
Course coordinator	

Section	**Course Lecturers**	**Office**	**Telephone**	**E-mail**
1, 2, 5	Dr. Farkhana Binti Muchtar	N28-438-05	601156907016	farkhana@utm.my

Mapping of the Course Learning Outcomes (CLO) to the Programme Learning Outcomes (PLO), Teaching & Learning (T&L) methods and Assessment methods:

No.	CLO	PLO CODE	Weight (%)	*Taxonomies and **generic skills	T&L methods	Assessment methods***
CLO1	***Comprehend*** *the relationship of various operating system mechanisms in handling concurrent processing.*	KW	25	*A2, C2*	Lecture, Active Learning	L1, Q1, MT
CLO2	***Explain*** *how the memory is allocated to processes using different allocation schemes.*	KW	25	*A2, C4*	Lecture, Active Learning	Q2, Q3, MT, F
CLO3	***Understand*** *the fundamentals of file management and* ***differentiate*** *file mapping schemes to secondary storage*	KW	25	*A2, C4*	Lecture, Active Learning	F
CLO4	***Ability*** *to program OS-related operations or services and deliver ideas effectively to achieve common goals.*	KW	10	C3	Lab	L2, L3, PR
CLO5	***Ability*** *to lead and work effectively in a team to achieve common goals.*	TW	15	*TS1, TS4*	Project-based learning	GR

Refer * Taxonomies of Learning and ** UTM's Graduate Attributes for measurement of outcomes achievement.
*** T – Test; Q – Quiz; HW – Homework; L – Lab, GR – Group Project; PR – Personal Report; F – Final Exam etc.

Details on Innovative T&L practices:

Prepared by:

Name:	Farkhana Binti Muchtar (Course Coordinator)
Signature:	DR. FARKHANA MUCHTAR Senior Lecturer Faculty of Computing Universiti Teknologi Malaysia 81310 Johor Bahru, Johor, Malaysia email: farkhana@utm.my
Date:	14/10/2024

Certified by:

Name:	Prof. Dr. Md Asri Bin Ngadi (Director)
Signature:	
Date:	

COURSE OUTLINE

No.	Type	Implementation
1.	Active learning	Conducted through in-class activities.
2.	Project-based learning	They are conducted through a given set of case studies. Students in a group of 3 (max.) are required to create animation/simulation of algorithms in the case study with relation to the related techniques introduced in the course.

Weekly Schedule:

WEEK DATE	TOPICS	*NOTES*
PART 1: OVERVIEW		
Week 1	**Chapter 1: Introduction** 1. What Operating Systems Do? 2. Computer-System Organization 3. Computer-System Architecture 4. Operating-System Structure 5. Operating-System Operations 6. Process Management 7. Memory Management 8. Storage Management 9. Protection and Security 10. Types and Categories of Operating Systems 11. Computing Environments	
Week 2	**Chapter 2: Operating-System Structures** 1. Operating-System Services 2. System Calls 3. Type of System Calls 4. System Programs 5. Operating-System Structure 6. System Boot	
PART 2A: PROCESS MANAGEMENT		
Week 3	**Chapter 3: Processes (UNIX)** 1. Process Concepts 2. Process Scheduling 3. Operation on Processes 4. Inter-process Communication	QUIZ 1 Chapter 1 Lab 1: UNIX
Week 4	**Chapter 4: Thread** 1. Overview 2. Multicore Programming	Lab 2: fork
Week 5	**Chapter 5: Process Scheduling** 1. Basic Concepts 2. Scheduling 3. Scheduling Criteria 4. Scheduling Algorithms	
Week 6	**Chapter 6: Process Synchronization** 1. Background	QUIZ 2 Chapter 3 and 4

COURSE OUTLINE

	2. The Critical-Section Problem 3. Peterson's Solution 4. Synchronization Hardware 5. Mutex Locks 6. Semaphores	Group Project Commence
PART 2B: PROCESS COORDINATION		
Week 7	**Chapter 7: Deadlocks** 1. System Model 2. Deadlock Characterization 3. Methods for Handling Deadlocks 4. Deadlock Prevention 5. Deadlock Avoidance 6. Deadlock Detection 7. Recovery from Deadlock	Mid Test – Chapter 5 and Chapter 6
Week 8	***MID-SEMESTER BREAK***	
PART 3: MEMORY MANAGEMENT		
Week 9	**Chapter 8: Memory-Management Strategies** 1. Background 2. Swapping 3. Memory Allocation	
Week 10	**Chapter 8: Memory-Management Strategies** 4. Segmentation 5. Paging	
Week 11	**Chapter 9: Virtual-Memory Management** 1. Background 2. Demand Paging 3. Page Replacement 4. Thrashing	
PART 4: STORAGE MANAGEMENT		
Week 12	**Chapter 10: File System** 1. File Concepts 2. Directory and Disk Structure 3. Protection	Lab 3 : Unix file management
Week 13	**Chapter 11: Implementing File-Systems** 1. File-System Structure 2. File-System Implementation 3. Allocation Methods 4. Free-Space Management	
Week 14	**Chapter 12: Mass-Storage Structure** 1. Overview 2. Disk Structure 3. Disk Scheduling 4. Raid Structure	*Project presentation*

COURSE OUTLINE

Week 15	***Project Report submission***	
Week 16	***REVISION WEEK***	
Week 16	**Final Examination**	Final Exam Chapters 7,8,9,11 and 12

Transferable skills (generic skills learned in course of study which can be useful and utilised in other settings):

Thinking skills.

Student learning time (SLT) details:

Distribution of student Learning Time (SLT) Course content outline	Teaching and Learning Activities						TOTAL SLT
	Guided Learning (Face to Face)				Guided Learning Non-Face to Face	Independent Learning Non-Face to face	
CLO	**L**	**T**	**P**	**O**			
CLO1	10	1				7.5	18.5
CLO2	10	3	1			25.2	39.2
CLO3	8	2	0.5			22.8	33.3
CLO4	2		1			5	8
CLO5	2		1			5	8
Total SLT	**32**	**6**	**3.5**			**65.5**	**107**

Continuous Assessment		PLO	Percentage	Total SLT
1	Lab 1 (CLO4) **(QIU – 5%)**	PS	5	1.5

COURSE OUTLINE

2	Lab 2 (CLO4) **(QIU – 5%)**	PS	5	1.5
3	Lab 3 (CLO4) **(QIU – 5%)**	PS	5	1.5
4	Quiz 1 (CLO1) **(QIU– 5%)**	KW	5	0.5
5	Quiz 2 (CLO1) **(QIU– 5%)**	KW	5	0.5
5	Mid Test (CLO2) **(UTM 25%)**	KW	10	1.5
6	Project (Demo – CLO4) **(QIU -5%)**	CS1	10	1.5
7	Project (Report – CLO5) **(QIU – 10%)**	CS1	10	1.5
				10.00
Final Assessment			Percentage	Total SLT
1	Final Examination (CLO2) **(UTM – 35%)**	KW	10	0.5
	(QIU – 40%, UTM – 60%)			**3.0**
Grand Total SLT				**120**

Learning resources:

Main references/Textbook:
Silbershatz, Galvin, and Gagne, "Operating Systems Concepts, 9th Edition, 2013, John Wiley & Sons.

Additional references:
1. *William Stallings, Operating Systems: Internals and Design Principles, 6th Edition, 2008, Prentice-Hall.*
2. *McHoes, A.M. and Flynn, I.M., Understanding Operating System, 6th Edition, Course Technology, Cengage Learning, 2011.*
3. *H.M. Deitel, Operating Systems, 3rd Edition, Pearson Prentice Hall*
4. *Tanenbaum, Operating System: Design and Implementation, Prentice-Hall.*
5. *D M Dhamdhere, Operating System – A Concept-Based Approach. 2006, Mc Graw-Hill.*

Online:
http://elearning.utm.my

Academic honesty and plagiarism:

Assignments are individual tasks, not group activities (UNLESS EXPLICITLY INDICATED AS GROUP ACTIVITIES). Copying work (texts, lab results, etc.) from other students/groups or sources is prohibited. Brief quotations are allowed and then only if indicated as such. Existing texts should be reformulated with your own words to explain what you have read. You are returning existing texts, and acknowledging the source as a reference is unacceptable. Be warned: students who submit copied work will obtain a zero mark for the assignment and exams, and the Faculty may take disciplinary steps. It is also unacceptable to do somebody else's work, lend it to them, or make your work available to them to copy.

Other additional information (Course policy, any specific instruction etc.):

COURSE OUTLINE

1. Attendance is compulsory and will be taken in every lecture session. Students with **less than 80%** of total attendance **CANNOT** sit for the final exam.
2. Students must always behave and follow the University's dressing regulations and etiquette.
3. Exercises and tutorials will be given in class; some may be taken for assessment. Students who do not do the exercise will lose the coursework marks for the exercise.
4. Assignments must be submitted on the due dates. Some points will be deducted for late submissions. Assignments submitted **three days after** the due date will not be accepted.
5. Makeup exams will not be given, except to students who are sick and submit medical certificates confirmed by UTM panel doctors. Makeup exams can only be given **within one week** of the initial date of the exam.

		PLO1			PLO3	PLO4	
No.	**Assesments**	**CLO1**	**CLO2**	**CLO3**	**CLO4**	**CLO5**	**Total**
1	**Lab 1**				5		**5**
2	**Lab 2**				5		**5**
3	**Lab 3**				5		**5**
4	**Project Demo**					5	**5**
5	**Project report**					10	**10**
7	**Quiz 1**	5					**5**
8	**Quiz 2**	5					**5**
9	**Mid Test**	10	15				**25**
10	**Final Exam**		10	25			**35**
Total		**20**	**20**	**25**	**15**	**15**	**100**

Additional Notes:

All Labs **NOT** includes in Quiz or Test.

Quiz 1 – Chapter 1 (Multiple Choice Questions, 20 questions) by QIU

Quiz 2 – Chapter 3 and 4 (Multiple Choice Questions, 20 questions) by QIU

Mid Test – Chapter 5 and Chapter 6 (Structured Questions) by UTM

Final Test – Chapters 7,8,9,11 and 12