	Universitas Negeri Surabaya Faculty of Engineering, Undergraduate Study Program in Informatics Engineering	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Operating system	5520203089	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	3	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	**Project Based Learning**
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	This course studies operating system concepts starting from function structures, operating system mechanisms (such as process and thread management, memory management, storage management, and I/O management) and an overview of various operating systems as well as demonstrating the process of implementing these materials with programming. simply.
References	**Main :**

1. Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating System, Fourth Edition. New Jersey: Pearson Prentice-Hall.
2. Silberschatz, A, et.al. 2018. Operating System Concepts, tenth Edition. New Jersey: John Wiley & Sons.
3. Love, Robert. 2007. Linux System Programming. California: O 19Reilly Media.
4. Liu, Yukun, et.al. 2011. UNIX Operating System: The Development Tutorial via UNIX Kernel Services. New York: Springer.

Supporters:

Supporting lecturer	I Made Suartana, S.Kom., M.Kom.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Students identify the concept of operating systems. Students understand the role and function of operating systems. Students identify the relationship between computer systems and operating systems	1. Students explain the definition of an operating system. 2. Students mention the position of the operating system in the computer organization system. 3. Students explain the role of the operating system. 4. Students mention the functions of the operating system.	**Form of Assessment** : Participatory Activities, Tests	Approach: Scientific Model: Cooperative Method: Lecture, Discussion, Presentation 4 X 50	Approach: Scientific Model: Cooperative Method: Lecture, Discussion, Presentation	**Material:** operating system concepts **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	5%

2	Students understand the structure of operating systems, the development of operating systems and specific operations in operating systems	1. Students can explain the differences between batch processing, multitasking and multiprogramming 2. Students can differentiate the structure of operating systems 3. Students can differentiate specific operations in operating systems	**Form of Assessment** : Participatory Activities	Model: Discovery Learning Method: Lecture, Question and Answer, Discussion 2 X 50	Model: Discovery Learning Method: Lecture, Question and Answer, Discussion	**Material:** operating system structure, **Reference:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	5%
3	Students understand the concept of process management in operating systems	1. Students can differentiate processes and life-cycle processes in operating systems 2. Students mention the PCB structure 3. Students can apply process scheduling algorithms 4. Students can explain communication between processes	**Form of Assessment** : Assessment of Project Results / Product Assessment, Practices / Performance	Model: Discovery Learning Method: Lecture, Question and Answer, Discussion 4 X 50	Model: Discovery Learning Method: Lecture, Question and Answer, Discussion	**Material:** process management concepts in operating systems **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	5%
4	Students understand the concept of threads	1. Students differentiate between processes and threads, the concept of threads 2. Students can differentiate between threads and multithreading	**Form of Assessment** : Practical Assessment, Practice/Performance	Model: Discovery Learning Method: Lecture, Question and Answer, Discussion 4 X 50	Model: Discovery Learning Method: Lecture, Question and Answer, Discussion	**Material:** thread concept **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	4%
5	Students understand process synchronization in operating systems.	1. Students explain the concept of process synchronization 2. Students can explain the concept of deadlock		Model: Problem Based Learning Method: Lecture, Question and Answer, Discussion 4 X 50	Model: Problem Based Learning Method: Lecture, Question and Answer, Discussion	**Material:** synchronization of processes in the operating system. **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	0%
6	Students understand the concept of memory management in operating systems	1. Students can explain the concept of memory allocation in operating systems 2. Students can explain the concept of paging memory in operating systems 3. Students can explain the concept of swapping memory in operating systems 4. Students can relate memory management concepts to implementations or examples of existing systems and operations	**Form of Assessment** : Practical Assessment, Practice/Performance	Model: Problem Based Learning Method: Lecture, Question and Answer, Discussion 2 X 50	Model: Problem Based Learning Method: Lecture, Question and Answer, Discussion	**Material:** memory management concepts in operating systems **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	0%
7	Students understand the concept of storage management in operating systems	1. Students explain the concept of storage and its function in the operating system 2. Students can mention the Mass-Storage structure 3. Students can differentiate scheduling in storage 4. Students can differentiate RAID structures	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance	Model: Discovery learning Method: Lecture, discussion and presentation 4 X 50	Model: Discovery learning Method: Lecture, discussion and presentation	**Material:** storage management concepts in operating systems **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	5%

8	UTS	1. Students explain the concept of storage and its function in the operating system 2. Students can mention the Mass-Storage structure 3. Students can differentiate scheduling in storage 4. Students can differentiate RAID structures	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Model: Discovery learning Method: Lecture, discussion and presentation 4 X 50	Model: Discovery learning Method: Lecture, discussion and presentation	**Material:** storage management concepts in operating systems **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	5%
9	Students understand I/O management and system files in operating systems	1. Students explain the I/O management functions in operating systems2. Students can differentiate the system file structure in the operating system	**Form of Assessment** : Participatory Activities, Tests	Presentations, discussions, questions and answers and assignments 2 X 50	Presentations, discussions, questions and answers and assignments	**Material:** I/O management and system files in operating systems **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	5%
10	Students are able to use the concepts of process management, memory storage and I/O on Linux and Windows based operating systems	1. Students are able to apply the management/administration of the Windows 2 operating system. Students are able to apply management/administration of the Linux operating system	**Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance	Presentations, discussions, questions and answers and assignments 2 X 50	Presentations, discussions, questions and answers and assignments	**Material:** concepts of process management, memory storage and I/O in Linux and Windows based operating systems. **Reader:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	5%
11	Students are able to apply process management concepts in the implementation and simulation of processes in operating systems	1. Students can create processes on Linux-based operating systems with fork()2. Students can simulate life-cycle processes using: sleep(), Wait() and exit()	**Form of Assessment** : Participatory Activities	Presentations, discussions, questions and answers and assignments 2 X 50	Presentations, discussions, questions and answers and assignments	**Material:** process management concepts in implementation and process simulation in operating systems **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	0%
12	Students are able to apply thread creation and management to operating systems	1. Students create threads on the operating system using pthread()	**Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practical Assessment	Presentations, discussions, questions and answers and assignments 2 X 50	Presentations, discussions, questions and answers and assignments	**Material:** threads on operating systems **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	25%

13	Students are able to apply the concept of interprocess communication (IPC)	1. Students create communication between processes with Pipe2. Students create inter-process communication with message parsing		Presentations, discussions, questions and answers and assignments 4 X 50	Presentations, discussions, questions and answers and assignments	**Material:** concept of interprocess communication (IPC) **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	0%
14	Students are able to apply security systems to operating systems:	1. Students apply 3 aspects of security2. Students apply network security models3. Students apply cryptography and steganography4. Students apply various viruses and their variants		Presentations, discussions, questions and answers and assignments 4 X 50	Presentations, discussions, questions and answers and assignments	**Material:** security systems on operating systems **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	35%
15	Students are able to apply virtualization technology	1. Students explain the definition of virtualization 2. Students explain the difference between physical vs virtual architecture 3. Students explain the relationship between Virtual Machine Host OS and Guest OS 4. Students apply the use of VirtualBox 5. Students apply the use of VmWare Workstation	**Form of Assessment** : Project Results Assessment / Product Assessment	Presentations, discussions, questions and answers and assignments 4 X 50	Presentations, discussions, questions and answers and assignments	**Material:** virtualization technology **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	35%
16	UAS	1. Students explain the definition of virtualization 2. Students explain the difference between physical vs virtual architecture 3. Students explain the relationship between Virtual Machine Host OS and Guest OS 4. Students apply the use of VirtualBox 5. Students apply the use of VmWare Workstation		Presentations, discussions, questions and answers and assignments 4 X 50	Presentations, discussions, questions and answers and assignments	**Material:** virtualization technology **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	22.5%
2.	Project Results Assessment / Product Assessment	41.67%
3.	Portfolio Assessment	8.33%
4.	Practical Assessment	12.83%
5.	Practice / Performance	7%
6.	Test	6.67%
		99%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.

11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.