	Universitas Negeri Surabaya **Faculty of Engineering** **, Information Technology Education Undergraduate Study Program**	**Document Code**

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Operating system	8320702113		**T=2**	**P=0**	**ECTS=3.18**	1	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Drs. Bambang Sujatmiko, M.T.	.....	Drs. Bambang Sujatmiko, M.T.

Learning model	**Project Based Learning**	
Program Learning Outcomes (PLO)	**PLO study program which is charged to the course**	
	PLO-8	Mastering the concepts and implementation in developing software engineering, games, intelligent multimedia, and network computer engineering.
	PLO-12	Able to implement science, technology, engineering, and mathematics (STEM) and informatics knowledge into research in education.
	Program Objectives (PO)	
	PO - 1	able to explain the general equipment of a computer system
	PO - 2	Able to explain the basic concepts of operating systems
	PO - 3	Be able to explain the structure of the operating system
	PO - 4	Able to explain process management in operating systems
	PO - 5	Able to explain the concept of concurrency
	PO - 6	Able to explain the concept of memory management in operating systems
	PO - 7	Able to explain scheduling in operating systems
	PO - 8	Able to explain the concept of I/O and DISK management
	PO - 9	Able to explain the concept of file management in operating systems
	PO - 10	Able to explain the concept of security and security in operating systems
	PLO-PO Matrix	

P.O	PLO-8	PLO-12
PO-1		
PO-2		
PO-3		
PO-4		
PO-5		
PO-6		
PO-7		
PO-8		
PO-9		
PO-10		

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
PO-1																
PO-2																
PO-3																
PO-4																
PO-5																
PO-6																
PO-7																
PO-8																
PO-9																
PO-10																

Short Course Description	This course studies the application of process and thread management, memory management, storage management, as well as demonstrating the process of implementing these materials in a simple way in several operating systems.
References	**Main :**
	1. Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating System, Fourth Edition. New Jersey: Pearson Prentice-Hall. 2. Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth 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	Drs. Bambang Sujatmiko, M.T. Aditya Prapanca, S.T., M.Kom. Harun Al Rosyid, S.T., M.T.

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 can identify operating system concepts and students understand the role and function of operating systems.	1. explains the definition of an operating system. 2. states the position of the operating system in the computer organization system. 3. Describe the role of the operating system. 4. Mention the functions of the operating system.	**Form of Assessment** : Participatory Activities, Portfolio Assessment	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** explains the definition of an operating system, states the position of an operating system in a computer organization system, explains the role of an operating system, and states the function of an operating system. **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	2%

2	Students understand the use of operating systems well.	1. Students are able to analyze various interfaces in operating systems. 2. Students demonstrate operating systems through several types of interfaces.	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities, Portfolio Assessment	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** analyze various interfaces in operating systems and demonstrate operating systems through several types of interfaces. **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	3%
3	Students understand the concept of system calls in operating systems. Students understand the structure of operating systems.	1. Students are able to analyze the concept of system calls in operating systems well. 2. Students are able to mention the structure of an operating system.	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** Analyze the concept of system calls and mention the structure in the operating system **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	3%
4	Students understand the concept of system calls in operating systems. Students understand the structure of operating systems.	1. Students are able to analyze the concept of system calls in operating systems well. 2. Students are able to mention the structure of an operating system.	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** Analyze the concept of system calls and mention the structure in the operating system **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	3%
5	Students evaluate processes in operating systems in general. Students understand process management in operating systems.	1. Students mention the concept of process. 2. Students explain operations in the process. 3. Students explain the scheduling process. 4. Students synthesize and stop the process 5. Students demonstrate the fork() process	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities, Practice/Performance	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** 1. State the concept of process; 2. explain operations in the process, process scheduling; 3. Synthesize and terminate processes; 4. demonstrate the fork() process. **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	3%

6	Students evaluate processes in operating systems in general. Students understand process management in operating systems.	1. Students mention the concept of process. 2. Students explain operations in the process. 3. Students explain the scheduling process. 4. Students synthesize and stop the process 5. Students demonstrate the fork() process	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities, Practice/Performance	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** 1. State the concept of process; 2. explain operations in the process, process scheduling; 3. Synthesize and terminate processes; 4. demonstrate the fork() process. **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	2%
7	Students briefly evaluate threads in the operating system	1. Students mention the concept of threads. 2. Students mention the use of threads. 3. Students show threads in User Space in general. 4. Students show threads in Kernel Space in general.	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 40	**Material:** Mentions 1. the concept of threads, 2. use of threads; shows 1.threads in User Space in general, and threads in Kernel Space in general; **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	3%
8	Master some of the competencies in the Operating Systems course	Master some of the competencies in the Operating Systems course	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities	Sub Summative Exam 2 X 50	Online Sub Summative Exam	**Material:** Mastering some of the competencies in the Operating Systems course. **Library:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	20%
9	Students are able to apply memory management	1. 1. Students are able to apply memory management functions 2. 2. Students are able to apply memory classification 3. 3. Students are able to apply static and dynamic partitioning strategy methods 4. 4. Students are able to apply developments in memory technology	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** 1. implementing memory management functions, 2. memory classification, 3. static and dynamic partitioning strategy methods, and 4. development of memory technology. **Reference:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	5%

10	Students are able to apply I/O device management	1.1. Students are able to apply several classifications of I/O devices 2.2. Students are able to apply interconnections between I/O 3.3. Students apply various I/O management techniques 4.4. Students apply various I/O algorithms 5.5. Students apply developments in I/O device technology.	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** Applying 1. several classifications of I/O devices, 2. interconnections between I/O, 3. various I/O management techniques, 4. various I/O algorithms, 5. developments in I/O device technology. **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	5%
11	Students are able to apply the file management process	1.1. Students apply problems related to files 2.2. Students are able to differentiate between types of files 3.3. Students are able to apply how to protect files 4.4. Students are able to apply how to share files 5.5. Students apply the directory structure in Windows and Linux 6.6. Students can apply various types of file locking	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** Applying 1. problems related to files 2. how to protect files, 3. how to share files, 4. directory structure in Windows and Linux, 5. various types of file locking; and Differentiating types of **library files:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	5%
12	Students are able to apply storage media processes	1.1. Students explain the development of storage technology 2.2. Students are able to explain the structure of the disk 3.3. Students apply HAS technology 4.4. Students apply NAS technology 5.5. Students apply RAID technology	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** Explains the development of storage technology and disk structure; Implement 1. HAS technology, NAS technology, and RAID technology; **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	5%

13	Students are able to apply security systems to operating systems	1.1. Students apply 3 aspects of security 2.2. Students apply network security models 3.3. Students apply cryptography and steganography 4.4. Students apply various viruses and their variants.	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Form of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** Applying 1. three aspects of security, 2. network security models, 3. cryptography and steganography, 4. various viruses and their variants. **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	5%
14	Students are able to apply virtualization technology	1.1. Students explain the definition of virtualization 2.2. Students explain the difference between physical vs virtual architecture 3.3. Students explain the relationship between Virtual Machine HostOS and Guest OS 4.4. Students apply the use of VirtualBox 5.5. Students apply the use of VmWare Workstation	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Practice / Performance	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** Explains 1. the definition of virtualization, 2. the difference between physical vs virtual architecture, 3. the relationship between Virtual Machine Host OS and Guest Os; and Implement 1. use of VirtualBox, and 2. use of VmWare Workstation; **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	0%
15	Students are able to apply virtualization technology	1.1. Students explain the definition of virtualization 2.2. Students explain the difference between physical vs virtual architecture 3.3. Students explain the relationship between Virtual Machine HostOS and Guest OS 4.4. Students apply the use of VirtualBox 5.5. Students apply the use of VmWare Workstation	**Criteria:** Cognitive Values, Character Values, and Psychomotor Values **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Practice / Performance	Scientific approach; Model: Project Based Learning; Method: Discussion, Presentation 2 X 50	Scientific approach; Model: Project Based Learning; Method: Discussion, online presentation 2 x 50	**Material:** Explains 1. the definition of virtualization, 2. the difference between physical vs virtual architecture, 3. the relationship between Virtual Machine Host OS and Guest Os; and Implement 1. use of VirtualBox, and 2. use of VmWare Workstation; **References:** *Tanenbaum, S. & Bos, Herbert. 2008. Modern Operating Systems, Fourth Edition. New Jersey: Pearson Prentice Hall.*	5%
16	Summative Exam / Final Semester Exam	Summative Exam / Final Semester Exam	**Criteria:** Summative Exam / Final Semester Exam **Forms of Assessment** : Participatory Activities, Project Results Assessment / Product Assessment, Tests	Summative Exam / Final Exam Semester 2 X 50	Online Summative Exam / Final Semester Exam 2 x 50	**Material:** All material that students have studied and mastered. **References:** *Silberschatz, A, et.al. 2013. Operating System Concepts, Ninth Edition. New Jersey: John Wiley & Sons.*	30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	50.09%
2.	Project Results Assessment / Product Assessment	25.09%
3.	Portfolio Assessment	9.09%
4.	Practice / Performance	4.75%
5.	Test	10%
		99.02%

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.