COURSE SYLLABUS

CSC10007 – OPERATING SYSTEM

1. GENERAL INFORMATION

Course name:	Operating System
Course name (in Vietnamese):	Hệ điều hành
Course ID:	CSC10007
Knowledge block:	Basic
Number of credits:	4
Credit hours for theory:	45
Credit hours for practice:	30
Credit hours for self-study:	90
Prerequisite :	C/C++
Prior-course :	Computer Systems
Instructors	Thái Hùng Văn

2. COURSE DESCRIPTION

In the theory part, students learn basic concepts, general architecture and main components of the operating system such as process (and thread) management, memory management, file management, I/O management. In the practice part, students learn how to implement some functionalities of an OS such as process operations, semaphore to synchronize multiple threads, file system management.

3. COURSE GOALS

ID	Description	Program LOs
G1	Work on a personal and team level to present and solve a number of operating system (OS) - related problem.	2.1.1, 2.1.8, 2.2, 2.3.1
G2	Know and explain English terminology related to OS.	2.4.3, 2.4.5
G3	Able to analyze and think systematically for practical problems.	4.1, 4.3
G4	Explain the basic concepts, terminology, and basic ethical principles ... related to the OS.	1.3.2, 3.3.1
G5	Describe the organization and operation of the basic components of the OS	1.3.2, 1.4
G6	Apply general operating system knowledge to implement some examples of the basic components of the OS.	5.3.2, 5.3.3, 6.2.1

4. LEARNING OUTCOMES (LOs)

ID	Description	I/T/U
G1.1	Establishment, organization, operation and management of the group.	U, I
G1.2	Participate in discussions on subjects.	U
G1.3	Technical analysis, synthesis and writing.	U, I
G2.1	Know and understand specialized English terminology of the subject.	I
G2.2	Read and understand English documents related to lectures.	I
G3.1	Able to analyze and think at the system level for problems: synchronization, file organization on disk, process coordination, memory organization.	T
G4.1	Explain the basic concepts of an operating system: file system, process / thread, synchronization, user / system mode, system call, etc.	I, T
G4.2	Understand essential knowledge about protection and security mechanism in an OS	I, T
G4.3	Know how to update new knowledge, self-study, self-development and adaptation.	I
G5.1	Present concepts, process structures, threads, process coordination algorithms: FCFS, Round Robin, Priority, Multi-queue, ...	U, T
G5.2	Describe synchronization mechanisms such as mutex, critical sector, semaphore, monitor. Solve some classic synchronization problems: Dining Philosophers, Consumer and Producer, Readers and Writers	T
G5.3	Present the models of organization, allocation and management of main memory. Explain the mechanism, virtual memory operation.	T
G5.4	Present roles, models, FS structure. Describe FAT and INODE structure.	T
G5.5	Present the organization model, how to access the input and output devices.	U,T
G6.1	Able to use basic Linux operating system as basic commands	I, T
G6.2	Able to develop some simple examples of essential OS components such as process management (e.g. creation, communication), thread synchronization, ... in Linux environment. From there, better understand the communication mechanism and operate the above components.	T

5. TEACHING PLAN

5.1. THEORY PLAN

Week	Topic	LOs	Teaching	Evaluation
1	Introduction to OS	G2.1, G2.2, G4.1	Lecturing	Final exam
2	Process	G2.1, G2.2, G3.1, G4.1, G4.3, G5.1	Lecturing	Final exam Midterm exam
3	CPU Scheduling	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.1	Lecturing Discussion	Final-Midterm exam, Exercise#1
4	Thread and synchronization	G2.1, G2.2, G3.1, G4.1, G4.3, G5.2	Lecturing Discussion	Final exam Midterm exam
5	Deadlocks	G2.1,G2.2, G3.1, G4.1,G4.3	Lecturing	Final exam

Week	Topic	LOs	Teaching	Evaluation
6	Memory management	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.3	Lecturing Discussion	Final exam Exercise#2
7	Virtual memory	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.3	Lecturing Discussion	Final exam Exercise#3
8	File management	G2.1, G2.2, G3.1, G4.1, G4.3, G5.4	Lecturing Discussion	Final exam Exercise#4
9	Implement file system	G2.1, G2.2, G3.1, G4.1, G4.3, G5.4	Lecturing Discussion	Final exam
10	I/O management	G2.1, G2.2, G4.1, G4.3, G5.5	Lecturing	Final exam Exercise#5
11	Protection and security	G2.1, G2.2, G4.1, G4.2, G4.3, G5.5	Self-learning	Final exam

5.2. PRACTICE PLAN

ID	Topic	LOs	Teaching/Learning	Evaluation
1	Command line	G6.1	Practice	Lab exam + project
2	Process operations	G6.2	Practice	Lab exam + project
3	Threads	G6.2	Practice	Lab exam + project
4	Semaphores	G6.2	Practice	Lab exam + project
5				

6. ASSESSMENTS

ID	Topic	Description	LOs	Ratio
Exercises				**10%**
Exercise#1	CPU scheduling	Solve examples of scheduling algorithms (e.g. FCFS, Round Robin, Priority, Multi-queue).	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.1	2%
Exercise#2	Main memory	Solve examples of memory management techniques (e.g. paging, segmentation, partition). Analyze problems of fragmentation.	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.3	2%
Exercise#3	Virtual memory	Solve examples of page replacement algorithms (e.g. FIFO, LRU, second change).	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.3	2%
Exercise#4	File system	Describe file allocation techniques (e.g. indexed allocation, linked allocation). Read FAT structure and INODE file structure.	G2.1, G2.2, G3.1, G4.1, G4.3, G5.4	2%
Exercise#5	IO system	Solve examples of I/O management	G2.1, G2.2, G3.1, G4.1, G4.3, G5.4	2%
Midterm examination (*process, thread, scheduling and synchronization*)				**25%**
Final examination (*all topics*)				**35%**
Lab				**30%**

7. RESOURCES

- ***Operating System Concepts***, *10th Edition, Abraham Silberschatz, Peter B. Galvin & Greg Gagne, 2018*

- ***Modern Operating Systems***, *4th Edition, Andrew Tanenbaum.*

- ***Giáo trình Hệ điều hành***, *Khoa CNTT, ĐH KHTN*

8. GENERAL REGULATIONS AND POLICIES

- All students are responsible for reading and following strictly the regulations and policies of the school and university.

- Students who are absent for more than 3 theory sessions are not allowed to take the exams.

- For any kind of cheating and plagiarism, students will be graded 0 for the course. The incident is then submitted to the school and university for further review.

- Students are encouraged to form study groups to discuss on the topics. However, individual work must be done and submitted on your own.