

## 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 Architecture

#### 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, IPC (socket), semaphore to synchronize multiple threads.

#### 3. COURSE GOALS

ID	Description	Program LOs
G1	Work on a personal and team level to present and solve a number of operating system-related problem.	2.1.1, 2.1.8,

		2.2, 2.3.1
G2	Know and explain English terminology related to operating system.	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 operating system.	1.3.2, 3.3.1
G5	Describe the organization and operation of the basic components of the operating system.	1.3.2, 1.4
G6	Apply general operating system knowledge to implement some examples of the basic components of a specific 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, file system 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/Learning	Evaluation
1	Introduction to operating system	G2.1, G2.2, G4.1	Lecturing	Final exam
2	Protection and security	G2.1, G2.2, G4.1, G4.2, G5.5	Self-learning	Exercise
3	File management system	G2.1, G2.2, G3.1, G4.1, G4.3, G5.1	Lecturing	Final exam
4	File management system: FAT	G1.2, G2.1, G2.2, G4.1, G4.2, G5.1	Lecturing Discussion	Final exam Exercise
5	Process management, CPU scheduling	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.2	Lecturing Discussion	Final exam Exercise
6	Synchronization, Deadlocks	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.3	Lecturing Discussion	Final exam Exercise
7	Memory management	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.4	Lecturing Discussion	Final exam

Wee k	Topic	LOs	Teaching/Learning	Evaluation
8	Virtual memory	G1.2, G2.1, G2.2, G3.1, G4.1, G4.3, G5.4	Lecturing Discussion	Final exam
9	I/O management	G2.1, G2.2, G4.1, G5.6	Self-learning	Exercise

## 5.2. PRACTICE PLAN

ID	Topic	LOs	Teaching/Learning	Evaluation
1	Introduce to xv6:  Understand the program code  Understand the design  Implement user functions  Write a report	G1.1, G1.2, G1.3, G3.1, G4.1, G6.1, G7.1, G8.1	Practice	Lab project
2	Basic Syscall:  Write a test program to implement system calls on xv6  Write a report	G1.1, G1.2, G1.3, G3.1, G4.1, G6.1, G7.1, G8.1	Practice	Lab project
3	Paging:  Write a test program for paging on xv6  Write a report	G1.1, G1.2, G1.3, G3.1, G4.1, G6.1, G7.1, G8.1	Practice	Lab project

## 6. ASSESSMENTS

ID	Topic	Description	LOs	Ratio (%)
1	Exercises	Theory exercises	G3.1, G5.1, G5.2, G5.3	<b>20%</b>

2	Laboratories	Mini projects	G1.1, G1.2, G1.3, G3.1, G4.1, G6.1, G7.1, G8.1	<b>30%</b>
3	Final exam	Multiple-choice test. 1 A4 page document is allowed.	G2.1, G3.1, G4.1, G5.1, G5.2, G5.3, G5.4, G5.5, G5.6	<b>50%</b>
4	Bonus	Bonus		<b>10%</b>

## 7. RESOURCES

- *Modern Operating Systems, 4<sup>th</sup> Edition, Andrew Tanenbaum.*
- *Operating System Concepts, 7<sup>th</sup> Edition, Abraham Silberschatz, Peter B. Galvin & Greg Gagne.*
- *Giáo trình Hệ điều hành, Trần Trung Dũng & Phạm Tuấn Sơn.*

## 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.