OPERATING SYSTEMS

1.Thông tin về học phần (General Information):

Tên học phần (Course name): Operating systems

Mã học phần (Course code): INT1319

Số tín chỉ (Number of credits): 3

Loại học phần (Course type): Compulsory

Học phần tiên quyết (Prerequisites):

Học phần trước (Previous courses):

Học phần song hành (Parallel courses):

Các yêu cầu đối với học phần (Course requirements):

- Phòng học lý thuyết (Lecture room): Projector
- Phòng thực hành (Laboratory): Virtual machine running DOS

Giờ tín chỉ đối với các hoạt động (Teaching and Learning hours):

- Lý thuyết (Lectures): 34h
- Bài tập (Exercises): 8h
- Bài tập lớn (Projects): 2h
- Thực hành (Labs): 0h
- Tự học (Individual reading): 1h

Địa chỉ Khoa/Bộ môn phụ trách học phần (Address of the Faculty/Department in charge of the course):

- Địa chỉ (Address): Khoa Công nghệ Thông tin 1 - Học viện Công nghệ Bưu chính Viễn thông, Km10, Nguyễn Trãi, Hà Đông, Hà Nội
  Faculty of Information Technology 1 - Posts and Telecommunications Institute of Technology, Km10, Nguyen Trai Street, Ha Dong District, Hanoi.
- Điện thoại (Phone number): (024) 33510432

2. Mục tiêu học phần (Objectives)

Về kiến thức (Knowledge):

The course provides the knowledge of principles and concepts of OS and operations of computer systems in general. In particular, the course investigates common structures and characteristics of OS, its roles in computer systems, process management techniques, memory management including physical memory and virtual memory, file-related problems and file management systems.

Kỹ năng (Skills):

During the course, students will get familiar with some components of OS and identify critical requirements of those components. Students can design and build some simple OS modules.

Thái độ, Chuyên cần (Attitude):

Students are required to attend at least 80% of lectures during the course and actively participated in discussions on given topics. Also, students must fulfill lab exercises and project at the end of the course.

3. Tóm tắt nội dung học phần (Description)

The operating system course is a compulsory and fundamental which equips students with knowledge of principles and concepts of OS and operations of computer systems in general. The course does not focus on a specific operating system nor OS usage but presents to students common structures and characteristics of OS, its roles in computer systems, process management techniques, memory management including physical memory and virtual memory, file-related problems and file management systems. In addition, students will get familiar with some components of OS and can build some simple OS modules.

4. Nội dung chi tiết học phần (Outlines)

Chapter 1. Introduction to OS

- 1.1. Components of computer systems
- 1.2. OS concepts
- 1.3. OS services
- 1.4. History of OS development and OS structures

Chapter 2. Process management

- 2.1. Process & Thread concepts
- 2.2. CPU scheduling
  - 2.2.1. Scheduling criteria
  - 2.2.2. Scheduling algorithms
- 2.3. Synchronization of concurrent processes
  - 2.3.1. Critical-section problem
  - 2.3.2. Dead-lock
  - 2.3.3. Peterson's Solution
  - 2.3.4. Hardware Support
  - 2.3.5. Semaphores
  - 2.3.6. Monitors
  - 2.3.7. Evaluation

Chapter 3. File systems

- 3.1. I/O principles and access methods
- 3.2. Files & directories concepts
- 3.3. Files & directories organizations
- 3.4. File allocation methods
  - 3.4.1. Contiguous allocation
  - 3.4.2. Linked-list allocation
  - 3.4.3. Indexed allocation
  - 3.4.4. Free-space management
- 3.5. Security for file systems
- 3.6. File system examples
  - 3.6.1. Linux system
  - 3.6.2. Windows system

Chapter 4. Memory management

- 4.1. Memory addressing and program memory
- 4.2. Allocation methods
  - 4.2.1. Contiguous allocation

4.2.2. Paging

4.2.3. Segmentation

4.3. Virtual memory

4.4. Page replacement

4.5. Frame allocation

Project and assignment. Students are assigned a small project and work with a group of 4 persons

1. Project requirements and guidelines is presented at the beginning of the course
2. Project outcomes are revised in the middle of the course
3. Project results are presented and graded at the end of the course

Lab exercise.

Students are required to complete Lab exercises under the provision and guidance of the lecturer

5. Học liệu (Textbooks)

5.1. Học liệu bắt buộc (Required Textbooks)

[1] Abraham Silberschatz, Greg Gagne, Peter B Galvin - Operating System Concepts (2018, Wiley)

5.2. Học liệu tham khảo (Reference Textbooks)

[2] Abraham Silberschatz, Peter B Galvin, Greg Gagne,Operating System Concepts Essentials, 2nd Edition Wiley

[3] Andrew S. Tanenbaum , Modern Operating Systems, 4th Edition Pearson

[4] Từ Minh Phương, Giáo trình hệ điều hành, Học viện CN BCVT 2013

[5] William Stallings , Operating Systems - Internals and Design Principles (2018, Pearson Education Limited)

6. Phương pháp, hình thức kiểm tra – đánh giá kết quả học tập học phần (Grading Policy)

Grading method	Percentage	Group/Individual
- Attendance	10%	Individual
- Project and Assignment	20%	Individual
- Mid-term exams	10%	Individual
- Final examination	60%	Individual

Trưởng Bộ môn
(Head of Department)

Ngô Xuân Bách

Giảng viên biên soạn
(Lecturer)

Phạm Hoàng Duy