DISTRIBUTED SYSTEMS

1.Thông tin về học phần (General Information)

Tên học phần (Course name): Distributed systems

Mã học phần (Course code): INT1405

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):

- Lecture room: Projector, microphone and speaker, air conditioner.
- Laboratory:

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

- Lý thuyết (Lectures): 36h
- Bài tập (Exercises): 0h
- Bài tập lớn (Projects): 9h
- Thực hành (Lab): 0h
- Tự học (Individual reading): 0h

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

- Address: Faculty of Information Technology 1 - Posts and Telecommunications Institute of Technology, Km10, Nguyen Trai Street, Ha Dong District, Hanoi.
- Phone number: (024) 33510432

2. Mục tiêu học phần (Objectives)

Về kiến thức (Knowledge):

The aims of this course are to provide learners with fundamental knowledge about distributed systems, including:

- Basic concepts and fundamentals in distributed systems
- Architectures and designs of a distributed system.

Kỹ năng (Skills):

The aims of this course are to equip learners with skills in:

- Distributed system design and coding.
- Fluency in web services, RMI, COBRA.

Thái độ, Chuyên cần (Attitude):

Learners are required to attend the classes and complete assignments/projects

3. Tóm tắt nội dung học phần (Description)

This course provides learners with backgrounds on distributed systems, including basic concepts and fundamental issues of distributed systems such as processes, communications,

synchronization, consistency, fault toleration and security. In addition, applications of distributed systems and distributed system design techniques and methods are introduced to learners.

4. Nội dung chi tiết học phần (Outlines)

Chapter 1: Introduction
1.1. Definition of a distributed system
1.2. Types of distributed systems
        1.2.1. Distributed computing systems
        1.2.2. Distributed information systems
        1.2.3. Distributed pervasive systems
1.3. Characteristics and design goals of distributed systems
1.4. Architectures of distributed systems
        1.4.1. Architectural styles
        1.4.2. System architectures
        1.4.3. Architecture versus middleware
1.5. Distributed system models
        1.5.1. Physical models
        1.5.2. Architectural models
        1.5.3. Fundamental models

Chapter 2: Fundamental issues in distributed systems
2.1. Processes
        2.1.1. Threads
        2.1.2. Virtualization
        2.1.3. Clients and Servers
2.2. Communication
        2.2.1. Fundamentals
        2.2.2. Remote procedure call
        2.2.3. Message-oriented communication
        2.2.4. Stream-oriented communication
        2.2.5. Multicast communication
2.3. Naming
        2.3.1. Names, Identifiers, Addresses
        2.3.2. Flat naming
        2.3.3. Structured naming
        2.3.4. Attribute-based naming
2.4. Synchronization
        2.4.1. Clock synchronization
        2.4.2. Logical clocks
        2.4.3. Mutual exclusion
        2.4.4. Global positioning of nodes
        2.4.5. Election algorithms
2.5. Consistency and replication
        2.5.1. Data-centric consistency models
        2.5.2. Client-centric consistency models
        2.5.3. Replica management
        2.5.4. Consistency protocols
2.6. Fault tolerance
        2.6.1. Process resilience
        2.6.2. Reliable client-server communication
        2.6.3. Reliable group communication
        2.6.4. Distributed commit
        2.6.5. Recovery

2.7. Security

       2.7.1. Secure channels

       2.7.2. Access control

       2.7.3. Security management

Chapter 3: Distributed systems in practice

3.1. Distributed object-based systems

       3.1.1. Architecture

       3.1.2. Processes

       3.1.3. Communication

       3.1.4. Naming

       3.1.5. Synchronization

       3.1.6. Consistency and replication

       3.1.7. Fault tolerance

       3.1.8. Security

3.2. Distributed file systems

       3.2.1. Architecture

       3.2.2. Processes

       3.2.3. Communication

       3.2.4. Naming

       3.2.5. Synchronization

       3.2.6. Consistency and replication

       3.2.7. Fault tolerance

       3.2.8. Security

3.3. Distributed Web-based systems

       3.3.1. Architecture

       3.3.2. Processes

       3.3.3. Communication

       3.3.4. Naming

       3.3.5. Synchronization

       3.3.6. Consistency and replication

       3.3.7. Fault tolerance

       3.3.8. Security

3.4. Distributed coordination-based systems

       3.4.1. Architecture

       3.4.2. Processes

       3.4.3. Communication

       3.4.4. Naming

       3.4.5. Synchronization

       3.4.6. Consistency and replication

       3.4.7. Fault tolerance

       3.4.8. Security

Chapter 4: Technologies and approaches for distributed systems

4.1. COBRA

4.2. RMI

4.3. Web services

4.4. Service-oriented architecture

5. Học liệu (Textbooks)

5.1. Học liệu bắt buộc (Required Textbooks)

   [1]. A. S. Tanenbaum, M. V. Steen. *Distributed Systems: Principles and Paradigms*. Prentice Hall, 2nd edition, 2007.

5.2. Học liệu tham khảo (Optional Textbooks)

[2]. G. Coulouris, J. Dollimore, T. Kinberg,G. Blair. *Distributed systems: Concept and Design*. Addison-Wesley, 5th Edition, 2012.

[3]. N.M. Josuttis. *SOA in Practice – The Art of Distributed System Design.* O'Reilly, 2007.

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
- Exercises	10%	Individual
- Mid-term projects/exams	20%	Group or individual
- Final examination	60%	Individual

Trưởng Bộ môn **(Head of Department)**	**Giảng viên biên soạn** **(Lecturer)**
Phạm Văn Cường	**Nguyễn Đình Hoá**