SOFTWARE ARCHITECTURE AND DESIGN
Course Syllabus

1. General Information

Course name: Software Architecture and Design

Course code: INT1427_CLC

Number of credits: 3

2. Objectives

Knowledge:

The aim of this course is to provide learners with advanced knowledge and skills of software architecture and design patterns. They include types of component based software architecture and technology, design patterns and representation of patterns in UML. Learners will be able to apply these skills and knowledge to developing large scale software projects and improve their quality. In addition, learners are able to understand documents of software designs.

Skills:

On successful completion of this course a learner will be able to:

- represent architecture and design patterns in UML
- apply knowledge, technology and skills of component based architecture and patterns for developing software and improving quality
- enhance skills of team working and

Attitude:

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

3. Abstracts

On completion of this course, learners are be able to understand and apply advanced knowledge, skills and technologies of architecture and design patterns in developing large-scale software systems.

Learners are also able to understand component-based software architecture and technologies and design patterns in constructing as well as in improving software quality in reality.

4. Teaching and learning methods

Lectures:	36h
Exercises:	0h
Projects :	08h
Lab :	0h
Individual reading:	01h

5. Prerequisites:

6. Learning outcomes

After studying this course, the studier could:

[LO1]: Understand the concepts related to the architecture, components and design patterns
[LO2]: Understand the component technologies and pattern design
[LO3]: Understand the micro service architecture
[LO4]: Apply the design patterns, architectures into system design

7. Assignment criteria

Learning outcomes	Assignment criteria
[LO1]: Understand the concepts related to the architecture, components and design patterns	Chapter 1 Chapter 2
[LO2]: Understand the component technologies and pattern design	Chapter 3
[LO3]: Understand the micro service architecture	Chapter 4
[LO4]: Apply the design patterns, architectures into system design	Chapter 3 Chapter 4 Chapter 5

8. Outlines

Chapter 1 Introduction
1.1. Complexity of software
1.2. Software architecture
1.3. Related concepts
1.4. UML for design
Chapter 2 Architecture design and modeling
2.1. Architecture design process
2.2. Principles of architecture design
2.3. Architecture types
2.4. MVC architecture
2.5. Springs
2.6. Struts2
2.7. Django
2.8. Case study
Chapter 3 Architecture and design pattern
3.1. Introduction to design patterns
3.2. Creational patterns
    3.2.1. Factory method
    3.2.2. Abstract factory
    3.2.3. Builder
    3.2.4. Prototype
    3.2.5. Singleton
3.3. Structural patterns
    3.3.1. Adapter
    3.3.2. Bridge
    3.3.3. Decorator
    3.3.4. Chain of responsibility
    3.3.5. Façade
3.4. Behavioral patterns
    3.4.1. Command
    3.4.2. Strategy

3.4.3. State
3.4.4. Mediator
3.4.5. Observer
3.5. Case study

Chapter 4 Micro service architecture

4.1. Service oriented architecture
4.1.1. Server architecture
4.1.2. Client architecture
4.2. Micro service
4.2.1. Agile process
4.2.2. Features and application of micro services
4.2.3. REST
4.3. Micro services frameworks
4.3.1. Kubernetes
4.3.2. Azure
4.3.3. Springs boot
4.4. Case study

Chapter 5 Intelligent system architecture design

5.1. Intelligent system principles
5.1.1. Machine learning application
5.1.2. Game application
5.1.3. Chatbot application
5.2. Server side architecture design
5.2.1. Machine learning server
5.2.2. Game server
5.2.3. Chatbot server
5.3. Client side architecture design
5.3.1. Win-form application
5.3.2. Web application
5.3.3. Mobile application
5.4. Case study

9. Required Textbooks

[1]. L. Bass et al., Software architecture in practice, Third Edition, Edison Wesley, 2013

[2] P. Kuchana, Software architecture Design Patterns in Java, Auerbach Publisher, 2004

10. Suggested Textbooks

11. Schedule

Main contents	Duration	Specific contents
Chapter 1 Introduction	2h lecture	1.1. Complexity of software 1.2. Software architecture 1.3. Related concepts 1.4. UML for design
Chapter 2 Architecture design and modeling	8h lecture 2h project	2.1. Architecture design process 2.2. Principles of architecture design 2.3. Architecture types 2.4. MVC architecture

		2.5. Springs 2.6. Struts2 2.7. Django 2.8. Case study
Chapter 3 Architecture and design pattern	8h lecture 2h project	3.1. Introduction to design patterns 3.2. Creational patterns 3.3. Structural patterns 3.4. Behavioral patterns
Chapter 4 Micro service architecture	8h lecture 2h project	4.1. Service oriented architecture 4.2. Micro service 4.3. Micro services frameworks 4.4. Case study
Chapter 5 Intelligent system architecture design	10h lecture 2h project	5.1. Intelligent system principles 5.2. Server side architecture design 5.3. Client side architecture design 5.4. Case study

12. Grading Policy

Attendance:	10%
Exercises:	20%
Mid-term projects/exams:	20%
Final examination (lab):	50%