



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Software Engineering

2223-3-E3101Q119

---

#### Aims

Acquire more advanced knowledge of software development than that acquired during the II year course of software analysis and design. Know and apply architectural patterns during software development. Identify and remove code violations through the use and support provided by some tools such as SonarQube and SonarCloud Introduction to DevOps and Continuous Integration: use of Travis (distributed continuous integration service).

#### Contents

Principles, techniques and tools for software development. Architectural patterns and examples of their application in software development. Best practices in Java. Code quality evaluation through SonarQube. Examples of software projects and discussion on the issues addressed during the course

#### Detailed program

1 Presentation of the course. Objectives and contents.

Software Engineering: Introduction to Model-Driven Software Engineering, Component-Based Software Engineering, Service-Oriented Software Engineering, Distributed Software Engineering.

2 Application of design patterns in software development. Modeling a persistence framework with design patterns. Development of a resource management system with design patterns.

3 Software architectures. Software architecture design. Architectural patterns for enterprise applications. Package, component and deployment diagrams.

4 Best Practices in Java. Reflexivity in Java. Development of tools as Eclipse plug-in (Lab).

5 Self-managed and self-adaptive systems: fundamental concepts, application domains, and case studies. Model-driven engineering.

- 6 Service-oriented software engineering: fundamental concepts. Migration to micro services.
- 7 Software Quality Assessment. Software evaluation metrics. Use of the Understand tool.
- 8 . Identification and removal of code violations through SonarQube (Lab).
9. Use of Git and GitHub, team cooperation during the development of a project (Lab).
10. Software project management: basic concepts. Project planning: Gantt and PERT charts. Risk management, quality management.
- 11 . Use of Sonarcloud (Lab)
12. Introduction to DevOps
13. 13. Continuous Integration: using Travis (distributed continuous integration service)

## **Prerequisites**

Object-oriented analysis and design.

Programming in Java.

## **Teaching form**

Lessons in presence.

Lessons with slides in Italian or in English.

The lessons are in Italian Language.

## **Textbook and teaching resource**

Sommerville, Ingegneria del Software, Pearson, 8° ed, 2007.

C. Larman, Applicare UML e i Pattern – analisi e progettazione orientata agli oggetti, Pearson, 3° ed, 2005.

Most of the material to prepare the exam will be available on line.

## **Semester**

I semester

## **Assessment method**

Development of a complete project in a group of 3-4 students though also the exploitation of different tools SonarQube, Understand. Evaluation in the range 0-20.

Oral examination. Evaluation in the range 0-5.

Lab activity evaluation. Evaluation in the range 0-5.

Task assigned to each student during lessons. Evaluation in the range 0-2.

## **Office hours**

By appointment through email

## **Sustainable Development Goals**

---