UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Evolution of Software Systems and Reverse Engineering

2122-2-F1801Q158

Aims

The student will learn all the principal techniques used to support software evolution and reverse engineering. The student will be able to use different tools useful for reverse engineering, program comprehension and software maintainability.

Contents

Introduction to the principal problematics of reverse engineering, software evolution and program comprehension. Deep study of some topics with different tools experimentations.

Detailed program

1 Introduction to Software evolution and Reverse Engineering. Legacy systems. Software comprehension and maintainability: principal problems.

2 Techniques and tools for Reverse Engineering and Systems Integration. Introduction and application to model-driven reverse engineering.

3 Object-oriented patterns for reverse engineering;

4 Software quality metrics and software quality assessment. Application Portfolio Management: problems, tools, techniques and metrics.

5 Modernization of legacy systems: Migration of legacy systems towards SOA architecture. Unified approach for reverse engineering of data and software.

6 Tools and techniques for design pattern detection in the code. Data mining techniques for design pattern detection. Tools for software architecture reconstruction.

7 Antipattern, code and architectural smell detection, their refactoring. Impact of refactoring techniques on the code quality.

8. Empirical analysis of different kinds: Correlation analysis among code smells and metrics, Prediction analysis of code anomalies or different other problems through machine learning techniques.

8 Techniques of hacking, decompiling and code obfuscation. Static and dynamic analysis for reverse engineering.

9. Tools and techniques for Managing Technical Debt.

Prerequisites

Knowledge of Java Language.

Knowledge of design patterns.

Teaching form

1. During the emergency of COVID-19, propbably the lessons will be given in a blended learning way (some lessons in distance learning and some lessons at the Department building).

Lessons, exercitations, students experimentatons of tools with oral presentation.

The course can be offered in Italian or in English language, according to the students attending the course.

Textbook and teaching resource

Slides, papers, online books, survey and tutorial, Master and PhD thesis

Ingegneria del Software, Sommerville, only 3 chapters

Object Oriented Reeengineering patters, Oscar Nierstrasz -available online

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

Semester

I semester

Assessment method

Final exam with a project or experimentation of some tools of reverse engineering.

Project done alone or in maximum two students. Evaluation 0-22 points.

Oral discussion on the project. Evaluation 0-8 points.

One or two tasks assigned during the course with a presentation. Evaluation 0-3 points.

Office hours

On appointment.