UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Evolution of Software Systems and Reverse Engineering

2425-2-F1801Q158

Aims

The students will learn all the principal techniques used to support software evolution and reverse engineering. The students 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, software quality assesment and program comprehension.
Deep study of some topics with different tools experimentations.
Software quality analysis: metrics and tools.
Object-oriented reeengineering patterns.

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. Introduction and application to model-driven reverse engineering.

3 Object-oriented patterns for reverse engineering and reengineering.

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 microservice architecture.

6 Tools and techniques for software architecture reconstruction.

7 Antipattern, code and architectural smell detection, their refactoring.
8. Impact of refactoring techniques on the code quality, on performance issues and energy consumption.

9. 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.

10. Introduction to techniques of hacking, decompiling and code obfuscation to protect code. Static and dynamic analysis for reverse engineering.

11.. Tools and techniques for Managing Technical Debt.

Prerequisites

Knowledge of Java Language.

Teaching form

The lessons will be given in presence.

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

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

5 lessons of 2 hours in presence
15 lessons of 2 hours in presence with student interactions
5 lessons with exercise and students interactions in presence

Textbook and teaching resource

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

Software Engineering, Sommerville, only 3 chapters

Object Oriented Reeengineering patters, Oscar Nierstrasz -available online

Most of the material necessary to prepare the exam will be available online.

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.

Sustainable Development Goals