UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Software Quality (blended)

2122-1-F1801Q115

Aims

The course provides the knowledge necessary to understand principles, techniques and quality process, the basis for test designers, quality managers and project managers.

At the end of the course, the students will be able to define and implement a quality plan for complex software systems.

Contents

- Fundamentals of Test and Analysis
- Software Qualities

- Basic Principles

- Dependence and Data Flow Models

- Symbolic Execution and Proof of Properties
- Test Case Selection and Adequacy
- Functional Testing
- Data Flow Testing

- Model-Based Testing
- Fault-Based Testing
- Test Execution
- Scaffolding
- Test Oracles

- Program Analysis
- The Quality Process
- Monitoring the Process
- Integration Testing
- System Testing
- Acceptance Testing
- Regression Testing

Detailed program

- Fundamentals of Test and Analysis
    - Software Test and Analysis in a Nutshell
    - Engineering Processes and Verification
- Software Qualities
    - Quality Goals
    - Dependability Properties
    - Validation and Verification
    - Degrees of Freedom
- Basic Principles
- Dependence and Data Flow Models
    - Data Flow Analysis
    - Classic Analyses
    - Interprocedural Analysis
- Symbolic Execution and Proof of Properties
    - Symbolic State and Interpretation
- Test Case Selection and Adequacy
    - Adequacy Criteria
    - Comparing Criteria
- Functional Testing
    - Random versus Partition Testing Strategies
- Data Flow Testing
    - Data Flow Testing Criteria
    - The Infeasibility Problem
- Model-Based Testing
    - Deriving Test Cases from Finite State Machines
    - Testing Decision Structures
    - Deriving Test Cases from Control and Data Flow Graphs
    - Deriving Test Cases from Grammars

- Fault-Based Testing
    - Mutation Analysis
    - Fault-Based Adequacy Criteria
- Test Execution
    - From Test Case Specifications to Test Cases
    - Scaffolding
    - Generic versus Specific Scaffolding
    - Test Oracles
    - Self-Checks as Oracles
    - Capture and Replay
- The Quality Process
    - Test and Analysis Plans
    - Monitoring the Process
    - Integration Testing
    - System Testing
    - Acceptance Testing
    - Regression Testing

Prerequisites

programming, basis of software engineering

Teaching form

blended eLearning: lectures, individual study, online exercises and questionnaires discussed in class.

The course is offered in English.

During the Covid-19 emergency the course will be given in blended mode: partially in class, partially with synchronous teleconferences.

Textbook and teaching resource

material available on the eLearning platform:

- book: Mauro Pezzè and Michal Young, Software Testing and Analysis, process, principle and techniques, John Wiley 2007
- papers
- slides

- exercises
- questionnaires

Semester

second (spring) semester

Assessment method

online exercises and questionnaires and oral exam.

Exercises and questionnaires contribute to the final grade with the same weight. The oral exam amis to confirm the grade from exercises and questionnaires.

During the Covid-19 emergency oral exams will be held in teleconference mode, using WebEx. In the e-learning page of the course there will be a public link to access the exam to possible virtual audience.

Office hours

on demand