2EL1520 – Object oriented software Engineering

Instructors: Paolo Ballarini, Dominique Marcadet
Department: DÉPARTEMENT INFORMATIQUE
Language of instruction: FRANCAIS, ANGLAIS
Campus: CAMPUS DE PARIS - SACLAY
Workload (HEE): 60
On-site hours (HPE): 35,00
Elective Category : Fundamental Sciences
Advanced level : Yes

Description

Software engineering (SE) is a discipline concerned with concepts, techniques and tools aimed at the production of quality software. SE can be seen as an iterative process, that, starting from a set of requirements, yields a software product through the execution of different phases, inlcuding : design, development, documentation, maintainance, testing. The quality of the produced software is evaluated with respect to different factors, typically : the compliance with the requirements, the « openness » to modifications/extensions, the ease of maintenance/testing.
This course aims at providing engineering students with an overview to the problem of software design and development by means of the object oriented programming (OOP) paradigm. By learning the Java programming language students will acquire basic skills in the software development process using a state-of-the-art Integrated Development Environment (IDE). By focusing on object-oriented modeling, the UML language, the Javadoc-based code documentation, the Junit-based development of unit-tests, students will acquire basic skills essential to the realization of industrial software.

Quarter number

SG6 in French and SG8 in English

Prerequisites (in terms of CS courses)

- 1CC1000 : Information Systems and Programming
- 1CC2000 : Algorithmics and Complexity

Syllabus

1. Introduction to object oriented programming in Java: classes, objects, encapsulation
2. Classes composition and inheritance
3. Abstract classes, interfaces
4. Exception handling, generics, collections
5. Introduction to software engineering: UML diagrams
6. Design patterns and applications
7. Devolopment of test units with JUnit framework
8. Multi-threaded programming
9. Introduction to graphical user interface programming in Java
10. Solution of a design problem through development of a final project

Class components (lecture, labs, etc.)

- Lectures: 15h00 (SG6) - 16h30 (SG8)
- Tutorial classes: 18h00 (SG6) - 16h30 (SG8)
- Project development: 24h00
- Exam: 2h00

Grading

40% on integrated project 60% on final examination (2h00)

Course support, bibliography

- Books: "Effective Java", Joshua Bloch; "Thinking in Java", Bruce Eckel.
- Lecture notes (Paolo Ballarini)
- 11 Lectures slides
- 11 Tutorials with solutions

Resources

- Lecturer: Paolo BALLARINI
- 2 Tutorial classes: Paolo Ballarini, Arnault Lapitre
- Software tools: Java JDK, Eclipse/Papyrus IDE

Learning outcomes covered on the course

At the end of this course, the students will :

- be able to apply the basic elements of object oriented programming using the Java language;

- be able to solve a mildly complex programming problem using the Java language;
- be familiar with the different phases of software development cycle and choose some appropriate tools;
- be able to chose an adequate level of abstraction when working on a specific phase;
- be able to apply the principles of UML modeling in the process of software design and development;
- know how to conceive and develop simple graphical user interface programs;
- know how to apply basic design principles for development of flexible/maintainable software solutions;
- be familiar with multi-threading programming.

Description of the skills acquired at the end of the course

C6.3 : Specify, design, develop and test software