2SC6410 – Data models and design schemas

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Department: CAMPUS DE RENNES
Language of instruction: FRANCAIS
Campus: CAMPUS DE RENNES
Workload (HEE): 60
On-site hours (HPE): 34,50

Description

This course allows to discover the necessary notions for building software that manipulate large quantities of data. It learns the object oriented programming using two languages, Java and Kotlin. It then present the methologie of software design with a link with the course of system modeling that introduce the different activity diagrams (activities, sequence, blocks, etc.). The course helps students to wonder about the structure of software when using different design patterns. For this, the labs that are based on the course of system modelling that occurs in parallel will be realized in inversed pedagogy.

In a second part, the course forcuses on the data manpulation. The goal is to learn the basic about database software and the theoritical problems behing them (data structuration, requests). Finally, this part is concluded with a presentation of software that helps to implement object-relation mapping.

Quarter number

ST5

Prerequisites (in terms of CS courses)

- Information System and Programming
- Algorithms and complexity

Syllabus

Object oriented programming (Java/Kotlin)

- Inheritance, encapsulation, polymorphism, dynamic dispatch
- Generiity, covariance, contravariance, invariance
- Fonctions and anonymous classes
- Types and type inference

Lab: discovering of the languages and illustrating the course notions
Personal work: go further with reflexivity, serialisation, Java NIO, JNI, Garbage collector

Software engineering

- Historical methods: V cycle, spiral circle, tests
- UML diagrams: using diagrams seen in "System Models" (use case, sequence, classes, state transition)
- Test and continuous integration

Relational databases

- Relational algebra
- Database design, normalization
- SQL language, requests, indexing
- Optimizing requests

Introduction to design patterns

Personal work: finish the lab on oriented programming + databases + software engineering

Class components (lecture, labs, etc.)
34.5 HPE: 12h of course, 3h of exercices, 18h of practical labs, 1,5 Exam

Grading
Final exam: 1h30 : 50 % Continuous control: TL software engineering, by pairs of students: 15 min of presentation, 10 minutes of questions : 50%. In case of a justified absence to one of the intermediary examinations, the grade of this latter is replaced by the grade of the final examination.

Resources
Computer labs;

- Eclipse, IntelliJ
- Database software

Learning outcomes covered on the course

- Do object oriented programming
- Choose correctly the adequate design patterns
- Know how to manipulate data in a database
- Modelise with an object-relation mapping

Description of the skills acquired at the end of the course

C1.2 Use and develop adapted models, chose the righ model scale and the hypothesis for tackle the problem

Evaluated by a written exam.

C2.2 Transfer knowledge and methodology across multiple disciplinary fields.

Validated by the introduction of the ST5 (Quizz).

C6.2 Specify, develop, and validate a complex software

Evaluated by a lab for designing a library.