UNIVERSITY OF GOTHENBURG

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIT954 Object-oriented Programming and Design, 7.5 credits

Objektorienterad programmering och design, 7,5 högskolepoäng

First Cycle

Confirmation

This course syllabus was confirmed by Department of Computer Science and Engineering on 2020-12-18 to be valid from 2022-01-17, spring semester of 2022.

Field of education: Science 100%
Department: Department of Computer Science and Engineering

Position in the educational system

The course is a compulsory course in the Computer Science, Bachelor's Programme. The course is also a single subject course at the University of Gothenburg.

The course can be part of the following programme: 1) Computer Science, Bachelor's Programme (N1COS)

Main field of studies	*Specialization*
Computer Science	G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Entry requirements

Successfully completed the course DIT012 Imperative programming with basic object-orientation, 7,5 hp, or equivalent. In addition, the student should have completed additional 7,5 hp in programming, for example, DIT440 Introduction to functional programming.

Learning outcomes

After completion of the course, the student is expected to be able to:

Knowledge and understanding

- describe and explain object-oriented design principles.
- recognize and explain different object-oriented design patterns, including their purpose and effect.

Competence and skills

- use and explain basic object-oriented concepts, such as classes and objects, primitives and references, methods and constructors, variables and fields, etc.
- use and explain more advanced langugage mechanisms and techniques, such as exceptions, generics, lambda expressions, defensive copying, etc.
- use and explain inheritance and parametric types, and associated mechanisms, to achieve polymorphism and code reuse.
- apply design principles and design patterns to achieve sound object-oriented design.
- design implement and modify object-oriented programs for a given domain in a sound manner with respect to correctness, modifiability and reusability.
- perform and describe testing of object-oriented programs.

Judgement and approach

- analyse and evaluate code according to sound object-oriented design and implementation principles.

Course content

The course presents the object-oriented programming paradigm and places great emphasis on program construction and design.

The concepts and techniques are expanded and deepened: methods, objects, abstract and anonymous classes, initialisation, polymorphism, overloading, implementation and inheritance, use of generic types, construction of simple generic classes, exceptions, immutability and defensive copying, simple use of anonymous functions (lambada expressions), user interfaces, testing, etc..

Handling of states, modifiability, dependencies, modular programs, programming techniques, design principles, design patterns and the MVC model.

To communicate design, basic parts of the Unified Modelling Language (UML) is used.

Sub-courses

1. **Oral exam** *(Muntlig tentamen),* 3 credits
   Grading scale: Pass with distinction (5), Pass with credit (4), Pass (3) and Fail (U)
2. **Computer assignments** *(Datorlaborationer),* 3 credits
   Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)

3. **Written report** *(Skriftlig rapport),* 1.5 credits
   Grading scale: Pass with distinction (5), Pass with credit (4), Pass (3) and Fail (U)

Form of teaching
Exercises, lectures and computer assignments.

Language of instruction: Swedish

Assessment
The course is examined by an individual oral exam (3 hp), computer assignments (3 hp), and a written report (1.5 hp). The computer assignments and the report are typically carried out in groups of 3.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In cases where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year from the last time the course was given.

Grades
The grading scale comprises: Pass with distinction (5), Pass with credit (4), Pass (3) and Fail (U).
The grading scale comprises Fail (U), 3, 4 or 5.
In order to be awarded the grade Pass (3) for the full course, the student needs to pass all mandatory components. In order to be awarded the grade 4 or 5 for the full course, the student needs to recieve the corresponding grade on all compulsory components.

Course evaluation
The course is evaluated through meetings both during and after the course between teachers and student representatives. Further, an anonymous questionnaire can be used to ensure written information. The outcome of the evaluations serves to improve the course by indicating which parts could be added, improved, changed or removed.

Additional information

The course replaces DIT952 Programming, advanced course, 7,5 hec. The course cannot be included in a degree which contains DIT952. Neither can the course be included in a degree which is based on another degree in which the course DIT952 is included.

Course literature to be announced the latest 8 weeks prior to the start of the course.