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 and was last revised on 2023-10-24 to be valid from 2024-01-15, autumn semester of 2024.

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 DIT013 Imperative programming with basic object-orientation, 7,5 hp, or equivalent.

Learning outcomes

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

Knowledge and understanding

Explain object-oriented concepts such as objects, classes, encapsulation and

polymorphism using adequate terminology.
Describe and explain object-oriented design principles (e.g., Single responsibility principle, Open-closed principle, etc.)
Explain different object-oriented design patterns, including their purpose and effect.

Competence and skills

Explain and implement basic object-oriented concepts such as classes and objects, primitives and references, methods and methods and constructors, variables and fields, etc.
Explain and implement more advanced language mechanisms and techniques, such as error handling, generics, lambda expressions, etc.
Explain and implement inheritance and parametric types, and assojciated mechanisms, to achieve polymorphism and code reuse.
Identify and implement design principles and design patterns to achieve sound object-oriented design.
Design, implement and refactor 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.
Form a clear and well-structured reasoning text, following basic principles for argumentation and discussion.
Communicate object-oriented design orally and in writing, as well as visually by using diagrams (e.g., class diagrams).
Identify and apply effective methods supporting inclusive cooperation in group work.

Judgement and approach

Argue for design and implementation choices, in accordance with principles for good object-oriented design and implementation.
Evaluate the comprehensibility and modifiability of a program, e.g., using class coupling, class cohesion and method cohesion.
Assess the impact of changes in a software design.
Reflect over different strategies promoting an inclusive cooperation in group work.

Course content

The course introduces the object-oriented programming paradigm, and a high-level object-oriented programming language with associated platforms and integrated development environments (IDE), with emphasis on object-oriented concepts applied to the creation of programs, and design of software applications.

Programming language concepts and techniques are expanded and deepened: methods, objects, types and polymorphism, inheritance and overriding, error handling, testing, etc.

Design aspects are introduced: common principles for good object-oriented design;

naming conventions, handling of dependencies, modular programs, and mutability; design patterns and the MVC model; class and object diagrams.

Sub-courses

1. **Written hall exam** *(Skriftlig salstentamen),* 3 credits
   Grading scale: Pass with distinction (5), Pass with credit (4), Pass (3) and Fail (U)
2. **Laboratory work** *(Laboration),* 3 credits
   Grading scale: Pass (G) and Fail (U)
3. **Assignments** *(Inlämningsuppgifter),* 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: English and Swedish
The course is given in Swedish but English may occur

Assessment

The course is examined by a written hall examination (3 hp), laboratory work (3 hp), and assignments (1.5 hp). The laboratory work are conducted in groups of typically 3 students.

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 is a joint course together with Chalmers.

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.