CO1003 Program Design

Credits: *20*   **Convenor:** *Dr. R. van Stee*   **Semester:** *1ˢᵗ*

Prerequisites: *none*

Assessment: *Coursework: 100%*

Lectures:	*29*	*hours*				
Surgeries:	*10*	*hours*	**Class Tests:**	*1*	*hours*	
Laboratories:	*20*	*hours*	**Private Study:**	*90*	*hours*	

Subject Knowledge

Aims   This module teaches the basic principles of object-oriented programming and design.

Learning Outcomes   Students should be able to demonstrate understanding of: the basic components of an object-oriented program including methods and attributes, the distinction between classes and instances, the structures required to write basic algorithms, and the components of simple text and graphics based interfaces. They should be able to undertake design using basic object-oriented design notation and demonstrate the applicability and effectiveness of various basic software testing techniques.

Methods   Class sessions, recommended textbook, worksheets, automated feedback and extensive web support.

Assessment   Marked coursework, written examination.

Skills

Aims   Produce written work in a number of different formats; analyse problems, formulate strategies to solve them, design a plan, carry out the required research, implement and evaluate the solution; recognise the need for information, and then locate and access that information.

Learning Outcomes   Students will be able to develop object-oriented programs to satisfy simple problems. This will involve analysis of the problem and the development and implementation of suitable solution strategies. Students will also be able to produce simple design diagrams for the code they produce.

Methods   Class sessions, worksheets with automated feedback system.

Assessment   Marked coursework (with automated feedback system), written examination.

Explanation of Prerequisites   Strongly motivated students will have no problems even if they have no previous experience of programming. The module assumes knowledge of mathematics up to GCSE level.

Course Description   Programming and programming skills build part of the foundation of every computer science degree. Many of the ideas and concepts are shared between different programming languages. In this module we focus on Java 1.8. The programming language Java is an object-oriented language. The object-oriented concepts build the backbone of this module. Starting with the fundamental ideas of classes, attributes and methods we develop many practical examples. Many ideas introduced in this modules will be extended on in the 2nd semester module CO1005. Throughout the module we not only focus on the implementation but also on the design and design techniques of larger software products. Step by step we use the UML notations and diagrams to represent and reason about different design options.

Detailed Syllabus

1. Basic Java concepts: Java virtual machine, byte-code; applications and applets; source, editors, compilers, development environments.

2. Fundamentals of Java programming: types; classes; objects; packages; assignment.

3. Structured programming: methods and parameters; for-loops, while-loops, do-loops.

4. Interactive input.

5. Selection with if-else; the switch statement.

6. Structured data-types: arrays.

7. Strings and string handling, formatting.

8. Overview of design and development concepts; requirements analysis; basic notions of specification.

9. Fundamentals of object-oriented design.

10. Software problems : errors, faults, and failures.

11. Testing.

Reading List

[A] C. Thomas Wu, *An Introduction to Object-Oriented Programming with Java, 5th (international) edition; ISBN: 978-0071283687,* McGraw-Hill.

[C] R. Pressman and D.Ince, *Software Engineering — a Practitioner's Approach, European 6th edition; ISBN: 0071238409,* McGraw-Hill.

[C] I. Sommerville, *Software Engineering, 7th edition; ISBN: 0321210263,* Addison-Wesley.

Resources   Departmental web page, text book web site, automated feedback and assessment tool (JACK), study guide, worksheets, handouts, lecture rooms computer projection facilities and OHPs, past examination papers.

Module Evaluation   Course questionnaires, course review.