

Course Outline

1. Course Identity

A. Course as listed in CUHK-Shenzhen

The information in this block should be exactly as approved by CUHK Senate. In case there are any differences, please explain in the table below.

Course code	CSC1003
Course title (English)	Introduction to Computer Science and Java Programming
Course title (Chinese)	计算机科学与Java程序设计导论
Units	3
Language of Instruction	English
Description (English)	The course introduces basic concepts in computer science and application development using Java language, not assuming the previous related background of the students. Topics include: 1). elements of programming: variables; assignment statements; built-in types of data; conditionals and loops; arrays; and input/output. 2). functions: highlights the idea of dividing a program into components that can be independently developed and maintained. 3). object-oriented programming: emphasizes the concept of a data type and its implementation, using Java class mechanism. 4). basic concepts in computer science: discusses a few essential algorithms, data structures, and notions in other popular languages such as Python.
Description (Chinese)	本課程介紹計算機科學基本概念及Java程序設計，內容包括：程序設計基本元素（變量、賦值、內嵌數據類型、條件和選擇語句等）、函數（強調分而治之的編寫和維護方法）、面向對象的程序設計（基於Java類機制講述和實現）、計算機科學基礎（基本數據結構、算法、其它常用語言如Python）等。

B. Corresponding course in CUHK

Please give details of the *closest* corresponding course in CUHK (as approved by CUHK Senate and listed in course list). If the course in Shenzhen maps to more than one course in CUHK, please make multiple copies of the block below.

Course code	CSCI1530
Course title (English)	Computer Principles and Java Programming
Course title (Chinese)	計算機原理及JAVA程序設計
Units	3
Description (English)	This course introduces computer programming in Java. Students will learn the functional elements of a computer system, modern

	programming concepts, problem solving and creation of computer applications. Students will be able to apply these computing skills in various disciplines. This course also provides a foundation to further study in advanced computing topics.
Description (Chinese)	本科以一種高級程序設計語言Java來介紹電腦計算機程序編寫。學生將學習計算機系統的運作單元、現代程序設計概念、解決問題方案、並親自建立應用程序。學生將能夠應用這些計算技術於不同學術領域上，也為進階的計算科學學習打好根基。

2. Prerequisites / Co-requisites

Please state prerequisites and co-requisites, in terms of courses in CUHK-Shenzhen* or any other requirements (e.g., having taken certain subjects in high school).

(* Because course codes may not yet be stable, please provide both course code and course title.)

A. Prerequisites

B. Co-requisites

3. Learning Outcomes

Comprehend, edit, compile, execute and correct Java programs (K&S);
 Use Java language elements such as variables, expressions, data types, statements, and methods comprehensively to create a complete Java program (K&S);
 Analyze, design, and implement a solution to solve a problem by programming (S&V);
 Grasp the key concepts of computer science for further studies in the area (K&V);
 Get prepared for the need of programming skills (such as Python) in future courses (V).

4. Course syllabus

1. Prologue: A Simple Machine
 - 1.1 Brief introduction
 - 1.2 Secure communication with a one-time pad

- 1.3 Linear feedback shift registers
- 1.4 Implications

- 2. Basic Programming Concepts
 - 2.1 Why programming?
 - 2.2 Program development
 - 2.3 Built-in data types
 - 2.4 Type conversion

- 3. Conditionals & Loops
 - 3.1 Conditionals: the if statement
 - 3.2 Loops: the while statement
 - 3.3 An alternative: the for loop
 - 3.4 Nesting
 - 3.5 Debugging

- 4. Arrays
 - 4.1 Basic concepts
 - 4.2 Typical array-processing code
 - 4.3 Two-dimensional arrays

- 5. Input and Output
 - 5.1 Standard input and output
 - 5.2 Standard drawing
 - 5.3 Fractal drawings
 - 5.4 Animation

- 6. Functions and Libraries
 - 6.1 Basic concepts
 - 6.2 Case study: Digital audio
 - 6.3 Application: Gaussian distribution
 - 6.4 Modular programming and libraries

- 7. Recursion
 - 7.1 Foundations
 - 7.2 A classic example
 - 7.3 Recursive graphics
 - 7.4 Avoiding exponential waste
 - 7.5 Dynamic programming

- 8. Performance
 - 8.1 The challenge
 - 8.2 Empirical analysis
 - 8.3 Mathematical models
 - 8.4 Doubling method
 - 8.5 Familiar examples

- 9. Abstract Data Types and Creating Data Types

9.1 Overview

9.2 Built-in Abstract Data Types: String, Color, and Picture.

9.3 Implementing Abstract Data Types: Turtle graphics, Complex numbers.

10. Programming Languages

10.1 Popular languages

10.2 Python basics

5. Assessment Scheme

Component/ method	% weight
Homework Assignments	40
Midterm Exam	20
Final Exam	40

6. Grade descriptor

General

Grade	Description
A/A-	EXCELLENT – exceptionally good performance and exceeding expectations in all or most of the course learning outcomes; demonstration of a solid understanding of the subject matter, the ability to analyze problems and apply extensive knowledge, and skillful use of concepts and materials to derive proper solutions.
B+/B/B-	GOOD – good performance in all course learning outcomes and exceeding expectations in some of them; demonstration of a good understanding of the subject matter and the ability to use proper concepts and materials to solve most of the problems encountered.
C+/C/C-	FAIR – adequate performance and meeting essential expectations in course learning outcomes; demonstration of adequate understanding of the subject matter and the ability to solve simple problems.
D+/D	MARGINAL – performance barely meets expectations in the course learning outcomes; demonstration of partial understanding of the subject matter and the ability to solve simple problems.
F	FAILURE – performance does not meet expectations in the essential course learning outcomes; demonstration of serious deficiencies and the need to retake the course.

7. Feedback for evaluation

Informal feedback to the instructor and/or teaching assistant(s) through face-to-face talking, phone calls, emails, group discussions, the course website, etc.

8. Reading

Required Reading:

1.Computer Science: An Interdisciplinary Approach, 978-0134076423, Robert Sedgewick, Kevin Wayne, Addison-Wesley Professional, 1ST, 2016, United States

Recommended Reading:

1.Python Programming: An Introduction to Computer Science, 978-1590282755, John Zelle, Franklin Beedle, Franklin, Beedle & Associates, 3RD, 2016, United States

9. Course components

Activity	Hours/week
Assignments	4
Lecture	3
Tutorial	1

10. Indicative teaching plan

Week	Content/ topic/ activity
00000 00001	Prologue and Introduction
00000 00002	Basic Programming Concepts
00000 00003	Conditionals & Loops
00000 00004	Arrays
00000 00005	Input and Output
00000 00006	Input and Output, Functions and Libraries
00000 00007	Functions and Libraries

00000 00008	Midterm Test
00000 00009	Recursion
00000 00010	Performance
00000 00011	Abstract Data Types and Creating Data Types
00000 00012	Popular Programming Languages
00000 00013	Python Basics
00000 00014	Python Basics

11. Implementation plan

The implementation plan may vary from year to year. Please indicate expected enrolment, and number of sections.

[Example: 150 students for lecture (x 2); 30 students for tutorials (x 10)]

150 students for lecture; 30 students for tutorials (x5)

12. Any other information

13. Approval

Has the course title been included in the programme submission approved by CUHK Senate? Are there any differences?

Have the details (as in this document) been approved at School or other level in CUHK-Shenzhen?

Submit application

14. Version date

Version number	2
As of (date)	2023-07-18