

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	<b>课程名称 Course Title</b>	Java 程序设计基础 Introduction to Java Programming
2.	<b>授课院系 Originating Department</b>	计算机科学与工程系 Department of Computer Science and Engineering
3.	<b>课程编号 Course Code</b>	CS110
4.	<b>课程学分 Credit Value</b>	3
5.	<b>课程类别 Course Type</b>	通识必修课程 General Education (GE) Required Courses
6.	<b>授课学期 Semester</b>	秋季 Fall 春季 Spring
7.	<b>授课语言 Teaching Language</b>	英文 English 中英双语 English & Chinese
8.	<b>授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation &amp; Contact (For team teaching, please list all instructors)</b>	张宇, 计算机科学与工程系, zhangy7@sustech.edu.cn Yu Zhang, Department of Computer Science and Engineering, zhangy7@sustech.edu.cn
9.	<b>实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</b>	廖琪梅, 计算机科学与工程系, liaoqm@mail.sustech.edu.cn Qimei Liao, Department of Computer Science and Engineering, liaoqm@mail.sustech.edu.cn
10.	<b>选课人数限额(可不填) Maximum Enrolment (Optional)</b>	

11. 授课方式 Delivery Method	讲授 Lectures	习题/辅导/讨论 Tutorials	实验/实习 Lab/Practical	其它(请具体注明) Other (Please specify)	总学时 Total
	32		32		64
学时数 Credit Hours					
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	None				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite					
14. 其它要求修读本课程的学系 Cross-listing Dept.					

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

本课程面向没有编程基础的大学本科生，培养程序设计的基础知识和基本编程技术。通过 Java 程序设计语言，学习程序设计基本要素和结构，利用 Java 解决简单的编程问题。

The course is designed for freshmen who nearly have no programming experience, and aims to cultivate them on basic concepts and techniques of programming. Students will learn Java programming language, understand basic elements of programming and fundamental program structures, and use Java to solve simple programming problems.

#### 16. 预达学习成果 Learning Outcomes

在课程结束时，学生应该获得以下技能：

- 1) 了解软件系统的基本模块，因特网和互联网的运行机制；
- 2) 掌握 Java 程序设计语言的基本语法；
- 3) 了解面向对象程序设计的基本特性(抽象，封装，继承，多态)，可阅读理解 Java 面向对象程序。
- 4) 熟悉集成开发环境，能设计程序解决简单的实际问题。

On completion of this course, the students should be able to:

- 1) Understand the basic components in a software system and the working mechanism of the Internet and the Web.
- 2) Know the basic syntax of the Java programming language.
- 3) Understand the basic features of object-oriented programming (abstraction, encapsulation, inheritance, polymorphism) and can read Java OO programs.
- 4) Develop programs to solve simple real problems using integrated development environments.

17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

第课程内容覆盖以下主题：

第 1 周：计算机和程序的基础知识

硬件和软件，计算机组织

编程之道，Java 开发环境

第一个 Java 程序：编辑，编译，运行；调试

Lab1: 练习 java 开发环境 JDK 以及 java IDE eclipse 的安装、配置及使用,实验完成第一个 java 程序从源代码到运行的全过程

第 2 周：基本编程概念

变量，值，操作，表达式，语句，

命令行参数，基本输出 (System.print & println)

Lab2: 练习不同类型的数据定义及使用，练习带格式输出及基本输出处理，包括转义字符和格式化说明符的使用，练习基本输入处理，重点联系如何使用主方法的参数作为输入

第 3 周：基本 IO，控制结构(1)：条件和循环

if 语句，while 和 for 语句，基本 IO: Scanner, printf

Lab3: 练习运算符和表达式，三种基本结构语句，通过不同的控制结构实现不同功能

第 4 周：数组与函数(静态方法)

一维数组，数组的常见用法；

函数(静态方法)概念，模块化编程和函数库(应用程序接口 API)

Lab4: 练习一维数组的定义及使用，数组与数组元素以及元素下标之间的关系。结合循环实现数组元素的遍历，练习基本的函数使用

第 5 周：方法重载和控制结构 (II)

更多关于函数，重载，do-while 循环，for-each 循环，switch 语句

Lab5: 通过嵌套循环及 break 与 continue 的配合使用，强化对循环的练习，练习多分支语句以及 break 在其中的作用。

第 6 周：多维数组

二维及高维数组；

java.util.Arrays, java.util.System.arraycopy()

Lab6: 练习多维数组的定义及使用，数组与字符串之间的转换，重点练习二维数组与一维数组的关系以及多维数组中下标的灵活使用

第 7 周：更多 I/O，问题求解决和算法设计

Postfix & Prefix ++ / -，重定向与管道，StdDraw 绘图包

求解编程问题的步骤

Lab7: 重点练习方法的定义及调用, 方法重载, 形参与实参, 不同类型的形参之间的差别

第 8 周: 抽象数据类型, 使用类和对象

抽象数据类型(ADT), 封装, 类: 用户定义的数据类型;

构造函数和方法, 颜色和图像, 字符串(String)

Lab8: 抽象数据类型和普通数据类型之间的关系与差异, 属性与方法

第 9 周: 创建数据类型: 设计类

面向对象程序设计; 创建类; 方法重载;

构造函数, 属性, 启动者, 访问者与改变者; 访问修饰符; final 修饰符

Lab9: 练习类的基本组成, 类的构造方法, 类和对象的关系

第 10 周: 集合体, 列表与对象思维

Collection, ArrayList, LinkedList; 包装类;

BigInteger, BigDecimal, StringBuilder, StringBuffer

Lab10: 重点练习 arrayList 以及 StringBuiler 的基本属性及方法, 练习该类对象的使用

第 11 周: 枚举(enum), 文件 IO, 异常处理

枚举(enum)类型, 文件 IO, 异常和 Try 语句, 其他 IO: 音频与图形

Lab11: 练习枚举类型, 文件处理, 异常和 try 的处理

第 12 周: 深入研究类和对象

示例, 组合与对象引用, 包, 静态导入, 垃圾收集

Object 类; protected 与 final 修饰符

Lab12: 练习如果定义类的继承, 类的继承与类及对象的关系

第 13 周: 继承和多态性

扩展类, 继承, 多态和动态绑定, 覆盖方法;

Lab13: 练习方法的重写以及 方法的重载

第 14 周: 接口, 抽象类, 泛型, 集合与映射

接口, 抽象类, 泛型, Sets 与 Map

Lab 14: 接口的定义及使用

第 15 周: 扩展主题简介, 复习

Lambda 表达式, 流处理简介, 复习

Lab15: 项目验收

第 16 周：优秀项目演示

课程优秀项目演示

Lab16: 复习及答疑

The content includes all the following topics below.

Week 1: Basics of Computers and Programs

Hardware and software, Computer Organization

Way of Program, Java Development Environment

First Java Program: Edit, Compile, Run; Debugging

[Lab1]: practice on how to install set and use JDK and eclipse, edit, compile a java source file then make it run.

Week 2: Basic Programming Concepts

Variables, Values, Operations, Expressions, Statements,

Command-Line Arguments, Basic output (System.print & println)

[Lab2]: practice on definition and usage of different type of data, practice on using format description and escape character while print out, practice on using arguments of main method to get the data while programming begin to run.

Week 3: Basic IO, Control Structures(I): Conditionals and Loops

If statement, while and for statements, Basic IO: Scanner, printf

[Lab3]: practice on operator and expression in java, the difference between the definition and usage of three kind of structured statement

Week 4: Arrays and Functions (Static Methods)

One-Dimensional array, General usage of arrays;

Concepts of Functions, Modular Programming and Libraries (APIs)

[Lab4]: practice on One-dimensional array, including the length, index, how to use loop to go through all the elements in an array.

Week 5: Method Overloading & Control Structures(II)

More on functions, overloading, do while loop, for each loop, switch statement

[Lab5]: practice on nested-loop, the usage of break and continue in a loop. Practice on multi-branch statement switch, the definition and the behavior of it and the usage of break in switch

Week 6: Multi-dimensional Arrays

Two and more dimensional arrays;

java.util.Arrays, java.util.System.arraycopy();

[Lab6]: practice on multi-dimensional array, including its definition and usage, practice on the transformation between array and string, the relationship between one-dimensional array and two dimensional array

Week 7: More on I/O, Problem Solving & Algorithm Design

Postfix & Prefix ++/--, Redirection & Piping, StdDraw

## Steps in Problem Solving for Programming

[Lab7]: practice on the definition of method, the formal parameter and the actual argument, the method reload

### Week 8: ADTs, Using Classes and Objects

Abstract Data Types, Encapsulation, Classes: user-defined data types;

Constructors and Methods; Colors and Images, Strings

[Lab8]: practice on the usage of abstract data, its attribute and method the difference between the abstract data and normal data

### Week 9: Creating Data Types and Design Classes

OOP vs Procedural Design; Creating Classes; Method Overloading;

Constructors, Attributes, Driver, Accessors and Mutators; Access Modifiers; final Modifier

[Lab9]: practice on the definition of class, its constructor attribute and method, to create an object based on a class

### Week 10: Collections, ArrayLists and Thinking in Objects

Collections and ArrayLists; Wrapper Classes;

BigInteger, BigDecimal, StringBuilder, StringBuffer

[Lab10]: practice on the arrayList and StringBuiler

### Week 11: Enum, IO with Files, Exceptions

Enumerate Types, More IO: Audio, Graphics & IO with Files, Exceptions and Try statement

[Lab11]: practice on the definition and usage of enum, the stream with file and the exception handle

### Week12: Deeper Look on Classes and Objects

Examples, Composition & Object Reference, Packages, static import, Garbage Collections

Object class: equals(); protected and final modifiers

[Lab12]: practice on the inherit between class, the difference between inherit and instance

### Week 13: Inheritance and Polymorphism

Extends class, Inheritance, Polymorphism & Dynamic Binding, Overriding Methods;

Object class: equals(); protected and final modifiers

[Lab13]: practice on the method override and method reload

### Week 14: Interface, Abstraction Classes, Generics, Collection Interface, Sets and Maps

Interface, Abstraction Classes, Generics, Collection Interface, Sets and Maps

[Lab 14]: practice the definition and usage of interface

### Week 15: Extended Topics Intro., Reviews

Lambda Expressions, Stream Processing Introduction, Reviews

[Lab15]: the evaluate on project

### Week 16: Excellent Projects Presentation

Excellent Lab Projects Presentation

[Lab16]: Reviews, Q&A

**18. 教材及其它参考资料 Textbook and Supplementary Readings**

Textbook A:

1) Robert Sedgewick & Kevin Wayne: Computer Science: An Interdisciplinary Approach, 2016 Addison-Wesley, Pearson. Booksite: <http://introcs.cs.princeton.edu/java/>

Textbook B:

2) David J. Eck. Introduction to Programming Using Java V8.0, Dec. 2018. <http://math.hws.edu/javanotes8/>

Reference Textbooks:

3) Y. Daniel Liang. Introduction to Java Programming, Brief Version, 11ed, Pearson, Prentice Hall, 2018.

4) Cay Horstmann. Java Concepts, Late Objects, 3e, Wiley 2018

5) Allen B. Downey and Chris Mayfield. Think Java, How to Think Like a Computer Scientist, O'Reilly, 2016.

Think Java is available under the Creative Commons Attribution-NonCommercial 3.0 Unported License. The author maintains an online version at: <http://greenteapress.com/wp/think-java/>

**课程评估 ASSESSMENT**

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance		10%		
课堂表现 Class				

Performance				
小测验 Quiz				
课程项目 Projects	20%			
平时作业 Assignments	30%			
期中考试 Mid-Term Test				
期末考试 Final Exam	30%			
期末报告 Final Presentation				
其它（可根据需要 改写以上评估方 式） Others (The above may be modified as necessary)	10%			实验练习 Lab Exercises

20. 记分方式 GRADING SYSTEM

- A. 十三级等级制 Letter Grading  
 B. 二级记分制（通过/不通过） Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21. 本课程设置已经过以下责任人/委员会审议通过  
This Course has been approved by the following person or committee of authority

