Programming Practice for Solving Problems

Department: Fudan International Winter Session 2025

<table>
<tr><td>Course Code</td><td colspan="7">GEIS30001</td></tr>
<tr><td>Course Title</td><td colspan="7">Programming Practice for Solving Problems</td></tr>
<tr><td>Credit</td><td>2</td><td>Experiment (including Computer) Credit</td><td>2</td><td>Practice Credit</td><td></td><td>Aesthetic Education Credit</td><td></td></tr>
<tr><td>Credit Hours Per Week</td><td>12 credit hours per week, 36+3 tutorial hours in total (one credit hour is 45 minutes)</td><td>Education on The Hard-Working Spirit Credit Hours</td><td></td><td>Language of Instruction</td><td>English</td><td>Honors Course</td><td>□Yes
☑No</td></tr>
<tr><td rowspan="2">Course Type</td><td colspan="3" rowspan="2">□Core General Education Course
□Specific General Education Course
□Basic Course in General Discipline
☑Others</td><td colspan="4">2+X Major ：
□Professional Core Course
□Professional Advanced Course</td></tr>
<tr><td colspan="4">Non 2+X Major ：
□Professional Compulsory Course
☑Professional Elective Course</td></tr>
<tr><td>Course Objectives</td><td colspan="7">Polishing students’ programming skills solving problems using programming languages, data structure and algorithms.</td></tr>
<tr><td>Course Description</td><td colspan="7">The course combines practice with theory, and polishes students’ programming skills solving problems by programming language, data structure, and algorithms.
1. Fundamental Programming Skills
Simple Computing; Simple Simulation; Recursion; Sorting;
2. Practice for Data Structure
Practice for Linear Lists: Applications of Arrays and Character Strings; Application of Stacks and Queues;
Practice for Tree: Application of binary trees;
Practice for Graph: Application of Graph Traversal; Applications of Shortest Paths;
3. Practice for Algorithms and Mathematics</td></tr>
</table>

	Practice for Ad Hoc; Complex Simulation; Applications for Number Theory and Combinatorics; Application for Greedy Algorithms; Application for Dynamic Programming

Course Requirements:

Students not only overview the system for algorithm analysis and design, but also practice solving problems by programming by using algorithms.

Course Prerequisite: Programming Language, such as C/C++, Java, Python, and so on.

Students need to bring their laptops to class.

Teaching Methods:

1. Lectures (90 minutes): Introducing knowledge background; showing related programming contest problems; then analyzing solutions to problems.

The teaching model for lectures is case teaching.

2. Practice (45 minutes): Setting a mock programming contest, instructing students to solve problems by programming.

Online judge systems are the informatization technology used in the course.

Course Director's Academic Background:

Dr. Yonghui Wu serves as Associate Professor at School of Computer Science in Fudan University, China. He acted the coach of Fudan University Programming Contest teams from 2001 to 2011. Under his guidance Fudan University was qualified for ACM ICPC World Finals every year and won three medals (bronze medal in 2002, silver medal in 2005, and bronze medal in 2010) in ACM ICPC World Finals. Since 2012, he has published a series of books for programming contest and education covering data structures, algorithms and strategies in simplified and traditional Chinese and English. Since 2013, he has been giving lectures in Oman, Taiwan, Hong Kong, Macau, Malaysia, Bangladesh and the United States for programming training. He is currently the chair of the ICPC Asia Programming Contest 1st Training Committee.

Instructor's Academic Background:

Dr. Yonghui Wu serves as Associate Professor at School of Computer Science in Fudan University in Fudan University, China. He acted the coach of Fudan University Programming Contest teams from 2001 to 2011. Under his guidance Fudan University was qualified for ACM ICPC World Finals every year and won three medals (bronze medal in 2002, silver medal in 2005, and bronze medal in 2010) in ACM ICPC World Finals. Since 2012, he has published a series of books for programming contest and education covering data structures, algorithms and strategies in simplified and traditional Chinese and English. Since 2013, he has been giving lectures in Oman, Taiwan, Hong Kong, Macau, Malaysia, Bangladesh and the United States for programming training. He is currently the chair of the ICPC Asia Programming Contest 1st Training Committee.

Members of Teaching Team

Name	Gender	Professional Title	Department	Responsibility

Course Schedule:

3 weeks, 4 lectures/week, 3 hours/lecture

Day 1: Introduction to the course, Simple Computing, Practice for Simple Computing

Day 2: Simple Simulation; Recursion; Practice for Simulation

Day 3: Applications of Arrays, Practice for Arrays

Day 4: Sorting, Training for Copmutational Thinking and Mathematical Thinking

Day 5: Applications of Character Strings; Application of Stacks and Queues; Practice for Stacks

Day 6: Applications for Tree Structure; Application of binary trees; Practice for binary trees

Day 7: Applications for Graph Traversal, Practice for Graph Traversal

Day 8: Applications of Shortest Paths; Pushing Boxes: the search technology; Practice for Graph

Day 9: Ad Hoc problems; Complex Simulation; Practice for Ad Hoc

Day 10：Applications for Number Theory and Combinatorics, Practice for Number Theory and Combinatorics

Day 11：Application for Greedy Algorithms; Application for Dynamic Programming; Practice for Greedy Algorithms and Dynamic Programming

Day 12：Examination

The design of class discussion or exercise, practice, experience and so on:

Students are put into a case of a problem description, apply knowledge that they have learned, think how to solve the problem. And after the algorithm solving the problem is showed, students try to program and debug to pass all test cases within the time and memory limit.

The process combines practice with thinking, stimulates students' desire for knowledge, and deepens their understanding knowledge. Therefore, such a process promotes teaching innovation and course construction based on programming contest problems.

If you need a TA, please indicate the assignment of assistant:

TA will help students in experiments and in homework when students meet any problems.

Grading & Evaluation:

Attendance: 20%

Homework (solving problems): 40%

Examination: 40%

Usage of Textbook： ☑Yes(complete textbook information form below) □No

Textbook Information (No more than two textbooks) **:**

Title	Author	ISBN	Publishing Time	Publisher	Type I	Type II
Algorithm Design Practice : for Collegiate Programming Contest and Education	Wu Yonghui, Wang Jiande	**9781 4987 7663 9**	**2018**	CRC Press	Self-compiled Textbook (Published)	
Data Structure Practice: for Collegiate Programming Contest and Education	Wu Yonghui, Wang Jiande	9781 4822 1539 7	**2016**	CRC Press	Self-compiled Textbook (Published)	

Teaching References: