Programming Practice for Solving Problems

Department: Fudan International Summer Session 2025

Course Code							
Course Title	Programming Practice for Solving Problems						
Credit	2	Experiment (Including Computer) Credit	2	Practice Credit		Aesthetic Education Credit	
Credit Hours Per Week	9 credit hours per week, 36+3 tutorial hours in total (one credit hour is 45 minutes)	Education on The Hard-Working Spirit Credit Hours		**Language of Instruction**	English	Honors Course	□Yes ■No
Course Type	□Core General Education Course ☐Specific General Education Course □Basic Course in General Discipline ■Others			2+X Major ： □Professional Core Course □Professional Advanced Course			
				Non 2+X Major ： □Professional Compulsory Course ■Professional Elective Course			
Course Objectives	（Including value, knowledge and ability objectives） Polishing students' programming skills solving problems using data structure and algorithms.						
Course Description	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 Minimum Spanning Trees; Applications of Shortest Paths; 3.Practice for Algorithms and Mathematics 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 (Please supply the details about each lesson):
4 weeks, 3 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: Sorting, Overview for Programming Practice for Sorting
Day 4: Applications of Arrays, Practice for Arrays
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, Pushing Boxes; Practice for Graph Traversal
Day 8: Applications of Minimum Spanning Trees; Applications of Shortest Paths; 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 (Provide a final grade that reflects the formative evaluation process)**:**
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	9781498776639	2018	CRC Press	■ Self-compiled Textbook (Published) □Non-mainland Textbook □Other Textbook (Published)	□National Planning Textbook □Provincial and Ministerial Planning Textbook □School Level Planning Textbook □Others
Data Structure Practice: for Collegiate Programming Contest and Education	Wu Yonghui, Wang Jiande	9781482215397	2016	CRC Press	■ Self-compiled Textbook (Published) □Non-mainland Textbook □Other Textbook (Published)	□National Planning Textbook □Provincial and Ministerial Planning Textbook □School Level Planning Textbook □Others
Teaching References (Including author, title, publisher, publishing time, ISBN)**:**						

Table column size can be adjusted according to the content.