	AP Computer Science A Grade 11, AP&AL program in GZFLS
Name of the subject	AP Computer Science A, Grade 11
Year of teaching	2021-2022
Name of the teacher	杜博识 Dubos
Key **P**erformance **I**ndicator	□ The average score of students taking this course should be at least as high as the average of China AP Students. □ The percentage of students who get a 4 or 5 should be 1.1 times as much as the percentage of China AP Students who get a 4 or 5.
Course Description	This year-long course introduces students to computer science with fundamental topics that include problem solving, design strategies and methodologies, organization of data (data structures), approaches to processing data (algorithms), analysis of potential solutions written in the **Java** programming language, and the ethical and social implications of computing.
Course Objective	To successfully complete this course, students should be able to: □ Design, implement, and analyze solutions to problems □ Use and implement commonly used algorithms □ Use standard data structures □ Develop and select appropriate algorithms and data structures to solve new problems □ Write solutions fluently in an object-oriented paradigm □ Write, run, test, and debug solutions in the Java programming language, utilizing standard Java library classes and interfaces from the AP Java subset □ Read and understand programs consisting of several classes and interacting objects □ Read and understand a description of the design and development process leading to such a program □ Understand the ethical and social implications of computer use
Prerequisite	Basic algebra: algebraic expressions, number theory (divisibility, greatest common divisor, lowest common multiple), ratio and proportion, functions (linear, quadratic, exponential, logarithmic and trigonometric). NO prior programming experience required.
Assessment Criteria	□ The general weights assigned to the final grade will include class participation (20%), homework and quizzes (30%), midterm examination (20%), and final exam/project (30%). □ There are 14 problem sets containing multiple-choice questions, free-response questions and also online-judge programming questions. The questions require students to demonstrate their ability to solve problems, including their ability to design, write and analyze programs and subprograms. □ The midterm and final exam are given over a 90 or 120-minute period, with AP-style multiple-choice and free-response questions. The exams test proficiency in a wide variety of topics and require the student to demonstrate the ability to solve problems involving extended reasoning. □ The final project after the AP exam requires students to study in groups on selected

<table>
<tr><td></td><td>topics, submit and present a final report to the instructor and students.</td></tr>
<tr><td>Resources</td><td>□ Lecture notes and problem sets based on past AP exams
□ Anderson, J. and H. J. Franceschi (2018) Java Illuminated (5th ed.). Jones & Bartlett Learning
□ Downey, A. B., & Mayfield, C. (2019). Think Java (2nd ed.). OReilly Media.
□ Roselyn Teukolsky 著.(2019).Barron's AP 计算机科学.世界图书出版公司.
□ Liang, Y. D. (2015). Introduction to Java programming (10th ed.). Boston: Pearson.
□ Sedgewick, R., & Wayne, K. (2017). Computer science: An interdisciplinary approach. Boston: Addison-Wesley.</td></tr>
<tr><td>AP Exam Information</td><td>
<table>
<tr><th>Section</th><th>Question Type</th><th>Number of Questions</th><th>Exam Weighting</th><th>Timing</th></tr>
<tr><td>I</td><td>Multiple-choice questions</td><td>40</td><td>50%</td><td>90 minutes</td></tr>
<tr><td>II</td><td>Free-response questions</td><td>4</td><td></td><td>90 minutes</td></tr>
<tr><td></td><td>Question 1: Methods and Control Structures (9 points)</td><td></td><td>12.5%</td><td></td></tr>
<tr><td></td><td>Question 2: Class (9 points)</td><td></td><td>12.5%</td><td></td></tr>
<tr><td></td><td>Question 3: Array/ArrayList (9 points)</td><td></td><td>12.5%</td><td></td></tr>
<tr><td></td><td>Question 4: 2D Array (9 points)</td><td></td><td>12.5%</td><td></td></tr>
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The AP Exam also assesses each of the 10 units of the course with the following weighting on the multiple-choice section:
<table>
<tr><th>Units</th><th>Exam Weighting</th></tr>
<tr><td>Unit 1: Primitive Types</td><td>2.5–5%</td></tr>
<tr><td>Unit 2: Using Objects</td><td>5–7.5%</td></tr>
<tr><td>Unit 3: Boolean Expressions and if Statements</td><td>15–17.5%</td></tr>
<tr><td>Unit 4: Iteration</td><td>17.5–22.5%</td></tr>
<tr><td>Unit 5: Writing Classes</td><td>5–7.5%</td></tr>
<tr><td>Unit 6: Array</td><td>10–15%</td></tr>
<tr><td>Unit 7: ArrayList</td><td>2.5–7.5%</td></tr>
<tr><td>Unit 8: 2D Array</td><td>7.5–10%</td></tr>
<tr><td>Unit 9: Inheritance</td><td>5–10%</td></tr>
<tr><td>Unit 10: Recursion</td><td>5–7.5%</td></tr>
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<tr><th>Accuracy</th><th>AP CS A Score</th><th>2019 World</th><th>2021 World</th></tr>
<tr><td>Around 80%</td><td>5</td><td>27%</td><td>25%</td></tr>
<tr><td>Around 60%</td><td>4</td><td>22%</td><td>22%</td></tr>
<tr><td>Around40%</td><td>3</td><td>21%</td><td>20%</td></tr>
<tr><td>Around 30%</td><td>2</td><td>12%</td><td>12%</td></tr>
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Topic Outline and Schedule		Refer to the detailed table below
Month	Week	Content of study and homework(Topics and subtopics)
1st semester		
Sept. 2021	Week 1 Date: 1-4	**Unit 3 & Unit 1** Variables and Data types Expressions and Assignment statements Compound Assignment Operators Casting and Range of Variables Boolean Expressions String Objects: concatenation, Literals and more (Unit 2)
Sept. 2021	Week 2 Date: 5-11	**Unit 3 & 1** If statements and Control flow If-else statements Else if statements Compound Boolean Expressions
Sept. 2021	Week 3 Date: 12-18	**Unit 3 & 1** Equivalent Boolean Expressions
Sept. 2021	Week 4 Date: 19-25	**Unit 4 Iterations** While loops For loops Nested iteration
Sept. 2021	Week 5 Date: 26-2	**Unit 4 Iteration & 6 Array** Array creation and Access Traversing arrays Enhanced for loop
Oct. 2021	Week 6 Date: 3-9	National Day
Oct. 2021	Week 7 Date: 10-16	**Unit 4 Iteration & 6 Array** Developing algorithms using Arrays
Oct. 2021	Week 8 Date: 17-23	**Unit 6 Array** String Developing algorithms using Strings
Oct. 2021	Week 9 Date: 24-30	**Unit 6 Array** Developing algorithms using Strings
Nov. 2021	Week 10 Date: 31-6	Midterm Review
Nov. 2021	Week 11 Date: 7-13	Mid term exam
Nov. 2021	Week 12 Date: 14-20	**Unit 8 2D Array** 2D Arrays Traversing 2D Arrays
Nov. 2021	Week 13 Date: 21-27	**Unit 8 2D Array** Review of Unit 6 & 8
Nov. 2021	Week 14	**Unit 7 ArrayList**

	Date: 28-4	ArrayList ArrayList methods Traversing ArrayLists Developing algorithms using ArrayLists
Dec. 2021	Week 15 Date: 5-11	**Unit 7 ArrayList** Searching and sorting
Dec. 2021	Week 16 Date: 12-18	**Unit 2 Objects** Objects: Instances of Classes Creating and Storing Objects Instantiation Calling a Void method Calling a Void method with parameters
Dec. 2021	Week 17 Date: 19-25	**Unit 2 Objects** Calling a non-void method String methods Wrapper class: Integer and Double Using the Math class
Dec. 2021	Week 18 Date: 26-1	**Unit 5 Classes** Constructors Accessor methods Mutator methods Writing methods
Jan. 2022	Week 19 Date: 2-8	**Unit 5 Classes** Static variables and methods Scope and Access This keyword Ethical and Social Implications of Computer Systems
Jan. 2022	Week 20 Date: 9-15	Final Review
Jan. 2022	Week 21 Date: 16-21	Final exam
		Winter Holiday
2nd semester		
Feb. 2022	Week 1 Date: 13-19	**Unit 9 Inheritance** Creating superclasses and subclasses Writing constructors for subclasses Overriding methods Super Keyword
Feb. 2022	Week 2 Date: 20-26	**Unit 9 Inheritance** Creating References using inheritance hierarchies Polymorphism Object superclass Comparing Objects (Unit 3)
Mar. 2022	Week 3 Date: 27-5	**Unit 10 Recursion** Recursion

Mar. 2022	Week 4 Date: 6-12	**Unit 10 Recursion** Recursive searching and sorting
Mar. 2022	Week 5 Date: 13-19	Mock exams
Mar. 2022	Week 6 Date: 20-26	Mock exams
Mar. 2022	Week 7 Date: 27-2	Mock exams
Apr. 2022	Week 8 Date: 3-9	Mock exams
Apr. 2022	Week 9 Date: 10-16	Mock exams
Apr. 2022	Week 10 Date: 17-23	Midterm review
Apr. 2022	Week 11 Date: 24-30	Midterm exam
May 2022	Week 12 Date: 1-7	Labor Day
May 2022	Week 13 Date: 8-14	AP exams
May 2022	Week 14 Date: 15-21	AP exams
May 2022	Week 15 Date: 22-28	Details to be determined
May 2022	Week 16 Date: 29-4	Details to be determined
June 2022	Week 17 Date: 5-11	Details to be determined
June 2022	Week 18 Date: 12-18	Details to be determined
June 2022	Week 18 Date: 19-25	Details to be determined
June 2022	Week 19 Date: 26-2	Details to be determined
July 2022	Week 20 Date: 3-9	Final exam
		Summer Holiday

AP&AL Department in Guangzhou Foreign Language School