CS2312 Problem Solving and Programming

2025-2026 Semester B

Department of Computer Science, City University of Hong Kong

Instructor: Dr. Helena WONG

Your Attention, Please!

- Not a pure programming course.
- Your first programming course and your coming software design course **has a large gap** in terms of the level of abstraction required.
- This course is to help you to raise the level of abstraction from pure programming to **a logical organization of software code** based on the requirements of the targeted applications to be developed.

[Borrowed from Prof. Ricky CHAN's notes in Spring 2013]

Related Courses:
CS2310 Computer Programming
CS2312 Problem Solving and Programming
CS3342 Software Design
CS3343 Software Engineering Practice

Java Programming and OO

- **[Teaching Focus #1] Java Programming**
  - **Crash introduction of basics**
    you have learnt C++ already, we can move fast onto java
  - **Intensive study of key and advanced techniques**
    target: pave the way for Part 2
- **[Teaching Focus #2] Doing the OO**
  - **Object Oriented - concepts/design/principles/practices**

Intended Learning Outcomes - Briefly:

1. **[OO] Understand OO concepts**
2. **[OOD] Design OO solutions**
3. **[OOP] Implement the OO solutions in Java**
4. **[Practices] Apply the best practices in Java programming**
5. **[Review] Evaluate and review OO design and code**

Python and Functional Programming

- [Teaching Focus #3]

  Python and Functional Programming

  - Given in week 12-13

Textbook and Materials

- **[Focus #1] Java Programming**

  Textbook: C.S. Horstmann, and G. Cornell, **Core Java™ Volume I**, Prentice Hall.

  Other books on my desk:

  - Walter Savitch, **Absolute Java**, Addison-Wesley.
  - Y. D. Liang, **Intro. to Java™ Programming Comprehensive Version**, Pearson.

  Official site of Java, tutorial: http://docs.oracle.com/javase/tutorial/index.html

- **[Focus #2] OO concepts/design/principles/practices**

  - Materials from Dr. Sam NG for his teaching of a previous course: CS2332 OOP in C++
    Sam is also the author of the current syllabus of CS2312.
  - Materials from Prof. Ricky CHAN [CS2312 / Spring 2013, CS3342], Prof. Jacky KEUNG [CS3342]
  - More.. [Check out at our courseweb]

- **Acknowledgments:**

  "Some of the material for this course was influenced by and, in some cases, directly borrowed from, materials available on the web for similar courses at other universities. I thank the instructors who posted their materials on the web." [Borrowed from http://www.cse.ohio-state.edu/~neelam/courses/45923/]

Assessment Pattern

- **Coursework: 30%**
  - **[0 or 5 %] Short Quiz (Week 5 lecture, 12:00, 50 minutes)**
  - **[20 or 15 %] Midterm (Week 12 lecture, 12:00, 90 minutes)**
  - **[10 %] Programming assignment**
  - **[+5 %] Bonus for Course Progress**
    - Submissions for weekly lab questions
    - Pop-up quizzes during lectures
    - Continuous attendance and observed effort (Labs and lectures)
    - Quiz-redo etc..

    Purpose: save marginal cases; raise the grades in the middle-range.
    Will not be considered for students who get A- or above before this bonus is applied.

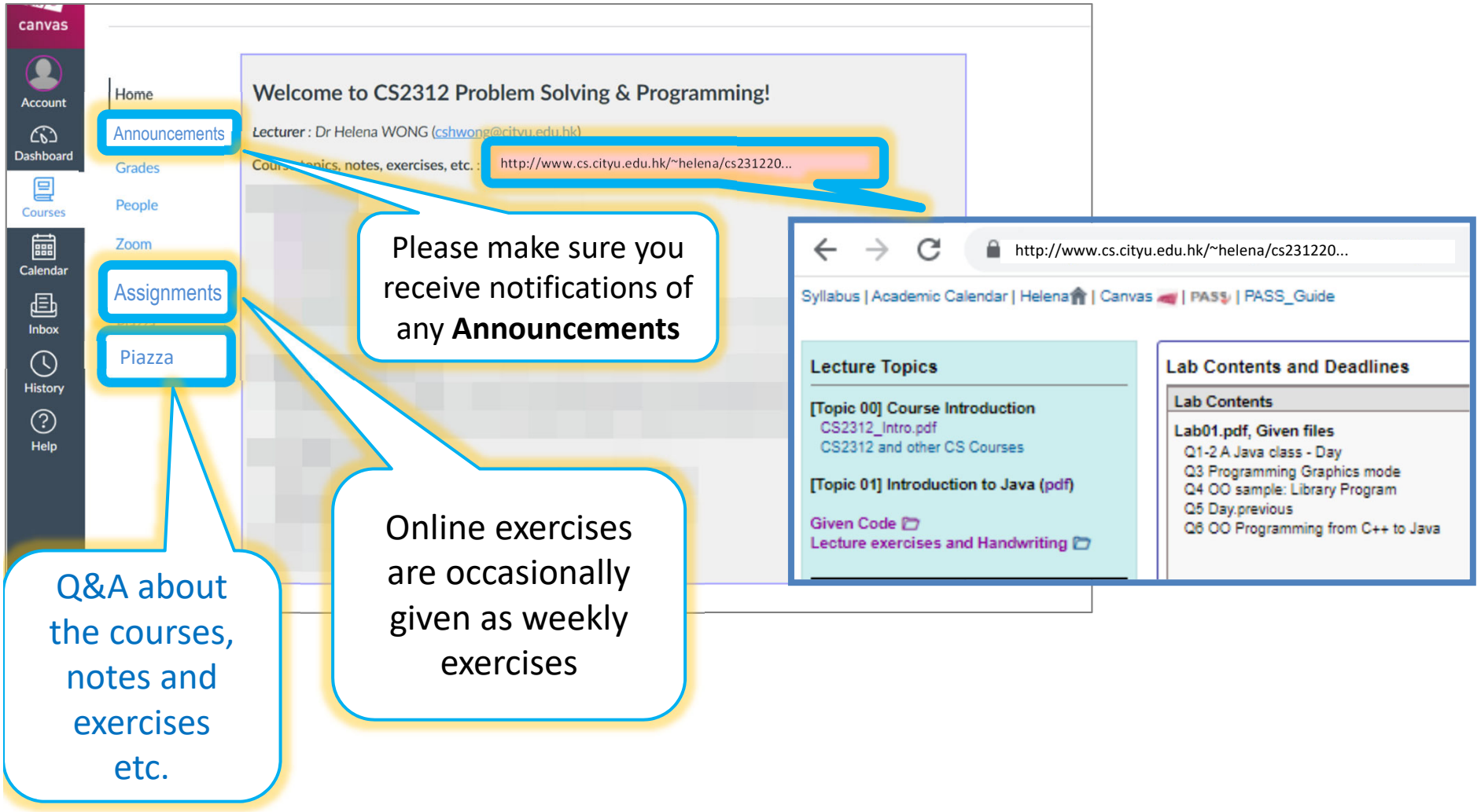
- **Exam: 70%**

Passing Criteria:

At least 30% of the maximum mark for the examination must be obtained; and
At least 35% of the maximum mark for the overall final mark must be obtained

* The Short Quiz, Midterm, Exam are **on paper** and **closed-book**

Course Web


canvas
Account
Dashboard
Courses
Calendar
Inbox
History
Help
Home
Announcements
Grades
People
Zoom
Assignments
Piazza
Welcome to CS2312 Problem Solving & Programming!
Lecturer : Dr Helena WONG (cshwong@cityu.edu.hk)
http://www.cs.cityu.edu.hk/~helena/cs231220...
Please make sure you receive notifications of any **Announcements**
Syllabus | Academic Calendar | Helena | Canvas | PASS | PASS_Guide
Lecture Topics
[Topic 00] Course Introduction
CS2312_Intro.pdf
CS2312 and other CS Courses
[Topic 01] Introduction to Java (pdf)
Given Code
Lecture exercises and Handwriting
Lab Contents and Deadlines
Lab Contents
Lab01.pdf, Given files
Q1-2 A Java class - Day
Q3 Programming Graphics mode
Q4 OO sample: Library Program
Q5 Day.previous
Q6 OO Programming from C++ to Java
Online exercises are occasionally given as weekly exercises
Q&A about the courses, notes and exercises etc.

Information about Week 1 tutorial (12-Jan, COMPULSORY) and More

Dear students,

(1) Please note that our classes start on 12-Jan, the coming Monday.

Your attendance of the tutorial on 12-Jan is **compulsory**.
If you cannot come, please inform me before the class **by email** (given at the bottom).

(2) During the above tutorial on 12-Jan, we will cover:

- Using **VSCode for Java Programming** in the computers inside the teaching venue (B7520)
- Your first OO program (~ 100 lines) and understand its everything.
- Finishing OO questions and submit on the PASS system (the platform of submitting and checking programs in this course)

(3) Q&A for additional information:

Q: "I am an exchange student. I have learnt Python before. Is CS2312 suitable for me?" !!
A: We assume that students have already taken the previous C++ course already. Otherwise this course may be hard for you.

Q: What's the main contents of this course? !!
A: Building OO solutions using Java.
The coursework and final exam are about solving problems with OO, using Java.
More information will be given during the coming lecture on 15-Jan.

Thanks for your attention.
-- Dr. Helena WONG <cshwong@cityu.edu.hk>

Sample OO Program

Consider a *Library System* which allows:

- Register a new member. A member may be a child, adult or senior.
- Cancel, search for an existing member.
- Add a new book.
- Remove the record of a book.
- Search for the details of a book.
- A member borrows / returns a book.
- A member pays fine. Fine rate is $3/day for children, $10/day for adult and $5/day for senior.
- Undo the last action performed by the user.

Procedural approach and **OO approach** are very different!!
Which would be our approach for even *larger* problems?

Sample rundown:

```
> register 001 sam senior
Member created!
> register 002 phoebe
Member created!
> searchMember
ID       Name     Outstanding Fine
001      sam      0.0
002      phoebe   0.0

> searchMember 002
ID       Name     Outstanding Fine
002      phoebe   0.0

> unregister 002
Member removed!
> searchMember 002
Fail!!! Member not exist!
> arrive B1 Book1 Author1
Book arrived!
> arrive B2 Book2 Author2
Book arrived!
> searchBook
CallNo   Title    Authors
B1       Book1    Author1
B2       Book2    Author2
```

CS2310 [**Procedural approach**]: Specify **what** tasks to do in each step
CS2312 [**Object-oriented approach**]: Specify **who** performs **what tasks** in each step.

"Object-oriented design has been widely adopted by businesses around the world. When done properly, the approach leads to simpler, concrete, robust, flexible and modular software. " -- Robert C. Martin *(Uncle Bob)*