COMP2012 Object-Oriented Programming and Data Structures

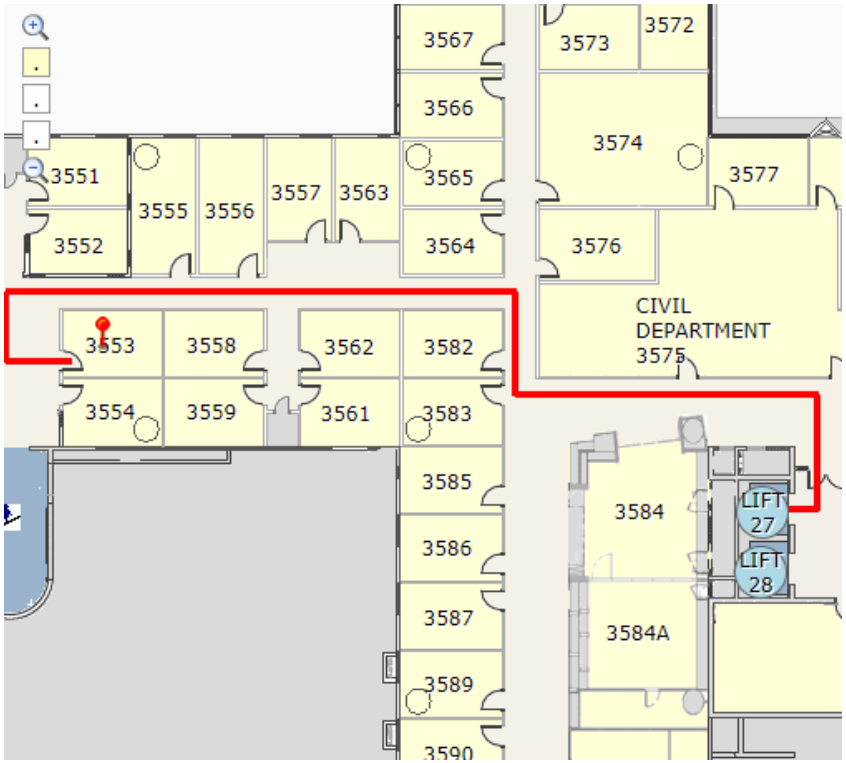
Course Logistics

Dr. Desmond Tsoi

Department of Computer Science & Engineering
The Hong Kong University of Science and Technology
Hong Kong SAR, China

Instructor

Dr. Desmond Yau-chat TSOI (Simply call me "Desmond" ;))



- Personal website: http://www.cse.ust.hk/~desmond
- E-mail: desmond@ust.hk
- Office: Rm 3553 (Lift 27)
- Work phone: 2358-6984
- Office hours: To be confirmed

More about Me

List of institutes that I was teaching at: (in chronological order)

- Hong Kong University of Science and Technology (HKUST)
  - Department of Computer Science and Engineering
  - Department of Accounting
- Nanyang Technological University, Singapore (NTU)
  - Department of Computer Science, School of Computer Engineering
- Hong Kong College of Technology
  - Department of Computer and Information Technology (HKCT)
- Community College of City University (CCCU)

  Now, it has been renamed to UOW College Hong Kong
  - Division of Applied Science and Technology
- Hong Kong Polytechnic University
  - School of Professional Education and Executive Development (SPEED)

Now, I am once again serving CSE, HKUST

Note

You are welcome to talk to me if you have any questions about further study and/or career development!

Instructional Assistant & Teaching Assistants

Full-time IA

- DINH, Anh Dung
  - Office: Rm 3543
  - E-mail: dzung@ust.hk
- USMAN, Muhammad
  - Office: Rm 2532
  - E-mail: usman@ust.hk

Postgraduate TAs

- HE, Sunan
  - E-mail: shebd@connect.ust.hk
- LIU, Zichen
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- PAPPAS, Christodoulos
  - E-mail: cpappas@connect.ust.hk

Postgraduate TAs

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- WANG, Yihui
  - E-mail: ywangrm@connect.ust.hk
- YANG, Shu
  - E-mail: syangcw@connect.ust.hk
- ZHAO, Chenyu
  - E-mail: cyzhao@connect.ust.hk

Undergraduate TAs

- CHUNG, Tsz Wa
- FEI, Yang
- GAO, Yitang
- TSE, Yik Long

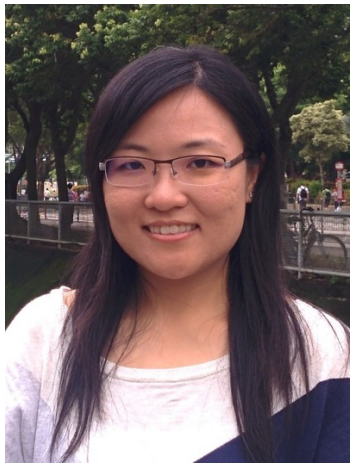
Course Website and Supplementary Website

- Course website (For Lecture Notes, Lab Materials, ...):
  `https://course.cse.ust.hk/comp2012`
- Supplementary website (For Lecture Videos, Progress, ...):
  `https://www.cse.ust.hk/~desmond/comp2012/Password_Only/`
  - Login: comp2012
  - Password: < please mark it down :) >

- Canvas site (For Grades and Discussion via Piazza)
  `https://canvas.ust.hk/courses/54921`

Lectures

- Section L1 (Dr. TSOI, Desmond)
  Wednesday/Friday,
  04:30pm - 05:50pm, Rm 2502
- Section L2 (Dr. TSOI, Desmond)
  Monday/Wednesday,
  12:00pm - 01:20pm, Rm 2306
- Section L3 (Dr. CHAN, Cecia)
  Monday/Wednesday,
  10:30am - 11:50am, Rm 2502
- Section L4 (Dr. PAPADOPOULOS, Dimitris)
  Tuesday/Thursday,
  10:30am - 11:50am, Rm 1104



Labs

- Section LA1: Monday, 06:00pm - 07:50pm, Rm G010 (CYT Building)
- Section LA2: Thursday, 06:00pm - 07:50pm, Rm 4620 (Lift 31-32)
- Section LA3: Friday, 11:30am - 01:20pm, Rm 2502 (Lift 25-26)
- Section LA4: Tuesday, 06:00pm - 07:25pm, Rm G010 (CYT Building)

`http://course.cse.ust.hk/comp2012/`

Also, please bring your own laptop! :)

Format

- First 30 minutes: Tutorial given by an instructional assistant
- Next 60 minutes: Questioning on lab exercise

Check the lab page for the materials in the course website

Important Notes about the Labs

- You must attend the lab meeting for your assigned session. If you need to go to a different lab meeting, seek prior approval from your course instructor at least 1 day before your lab.
- Lab exercises will be given to consolidate your understanding of course materials. Although we do not expect you to finish the lab exercises before you attend the lab, you are strongly suggested to read through the requirements beforehand and try to finish part of the tasks. If you came across any problems, please (a) ask your questions on Piazza; (b) check the Piazza chats regularly; chances are that your questions have been asked already; (c) approach your instructor/TAs before your lab session by emails.
- 3 points for each lab.
  - 1 point for attendance
  - 1 point for finishing the requirement/program and submitting it to ZINC (automatic grading system) by 10-min after the end of the lab, and no late lab assignment will be accepted.
  - 1 point for answering a question related to the lab to show that you really work on the solution yourself. (50% students are sampled to answer questions. If you are not selected, your lab score will be determined using this formula:
    Lab score = 1 (if you attended the lab) + (Scores given by ZINC, which depend on the number of test cases your program can pass) * 2)
- Materials will be released around a week before the lab.
- Public holiday policy.

Course Description

- The course consists of, per week
  - 3 hours of lectures
  - 2 hours of lab exercises

  and it gives 4 credits for successful completion of the course.
- Prerequisites
  - COMP1003 Computer and Programming Fundamentals II (prior to 2011-12) OR
  - COMP1004 Programming Fundamentals and Methodology (prior to 2013-14) OR
  - COMP2011 Introduction to Object-Oriented Programming / Programming with C++
- Exclusion
  - COMP2012H Honors Object-Oriented Programming and Data Structures

Course Objectives / Aims

- To learn the fundamental concepts and techniques behind object-oriented programming. They include:
  - abstract data types;
  - creation, initialization, and destruction of objects;
  - class hierarchies;
  - polymorphism, inheritance and dynamic binding;
  - generic programming using templates.
- To learn the object-oriented view of data structures: linked lists, queues, stacks, trees, and algorithms such as searching and hashing algorithms.

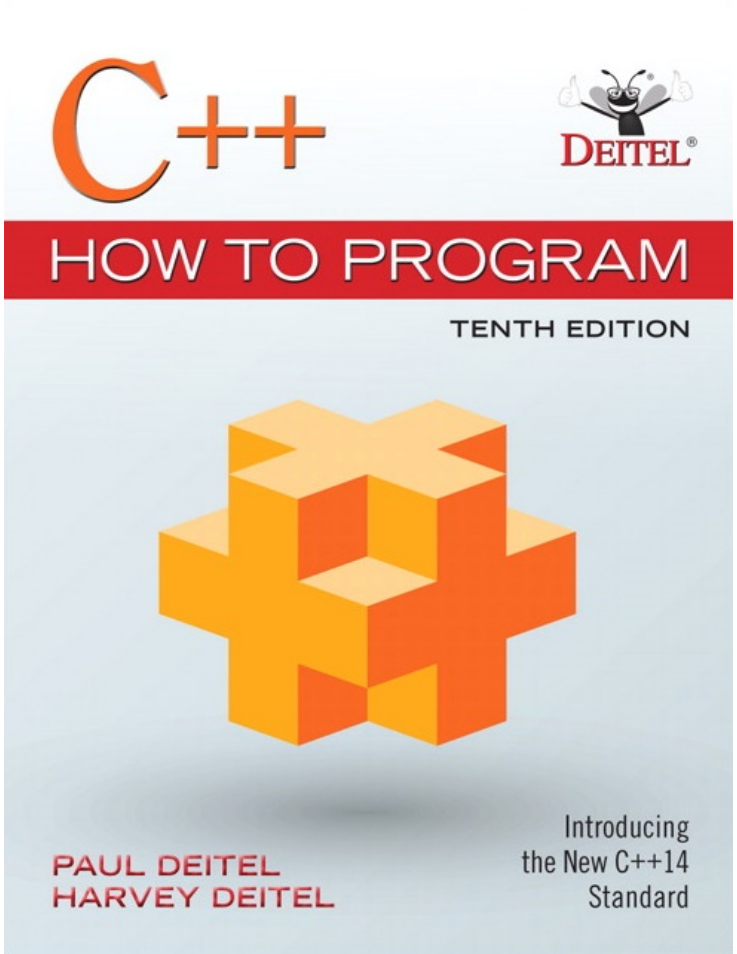
Intended Learning Outcomes

On successful completion of this course, you are expected to be able to:

1. Write and analyze object-oriented programs in C++ with object creation, destruction, member variables and functions, inheritance, polymorphism, and templates
2. Analyze simple programs and provide solutions with OOP
3. Understand the basic operations of data structures such as stacks, queues, lists, binary search trees, and hashes, and their implementations
4. Demonstrate the ability to use the learned data structures to solve problems in C++
5. Develop large programs using separate compilation, good OOP design, and code reuse through the use of inheritance, and generic programming.

Recommended Textbooks

- C++ How to Program, Paul J. Deitel and Harvey M. Deitel & Associates, Pearson, c2017, Tenth Edition.
- ISBN: 9789332585737 (1104 pages)
- Online version is also available at UST library



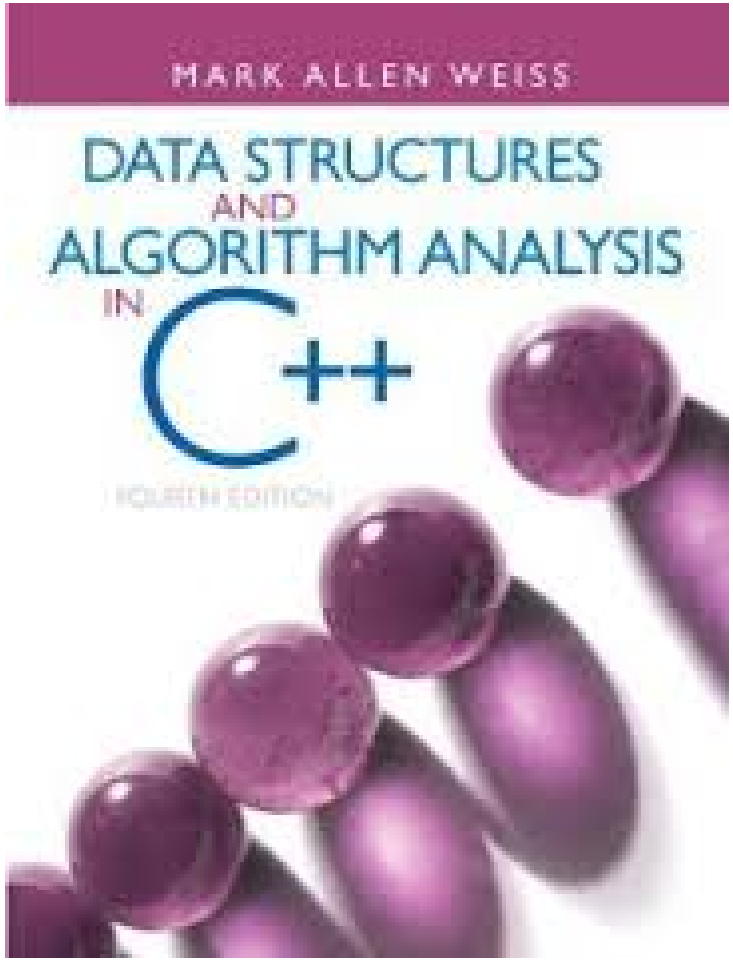
Note

- This textbook uses C++11 codes
- Discusses about new features in C++14

Recommended Textbooks

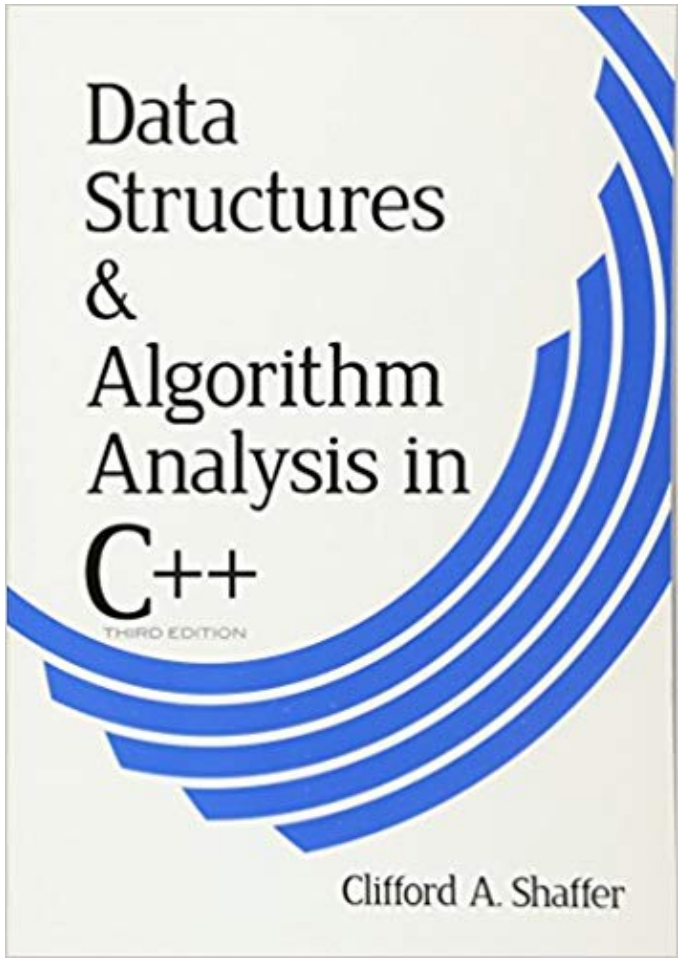
- Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson, c2014, Fourth Edition.
- ISBN: 013284737X (635 pages)
- Available at HKUST Library.
  - QA76.73.C153 W46 2014
  - QA76.73.C153 W46 2014 c.2

The book is out of print. You may be able to find some free PDF copy on the Web.



Recommended Textbooks

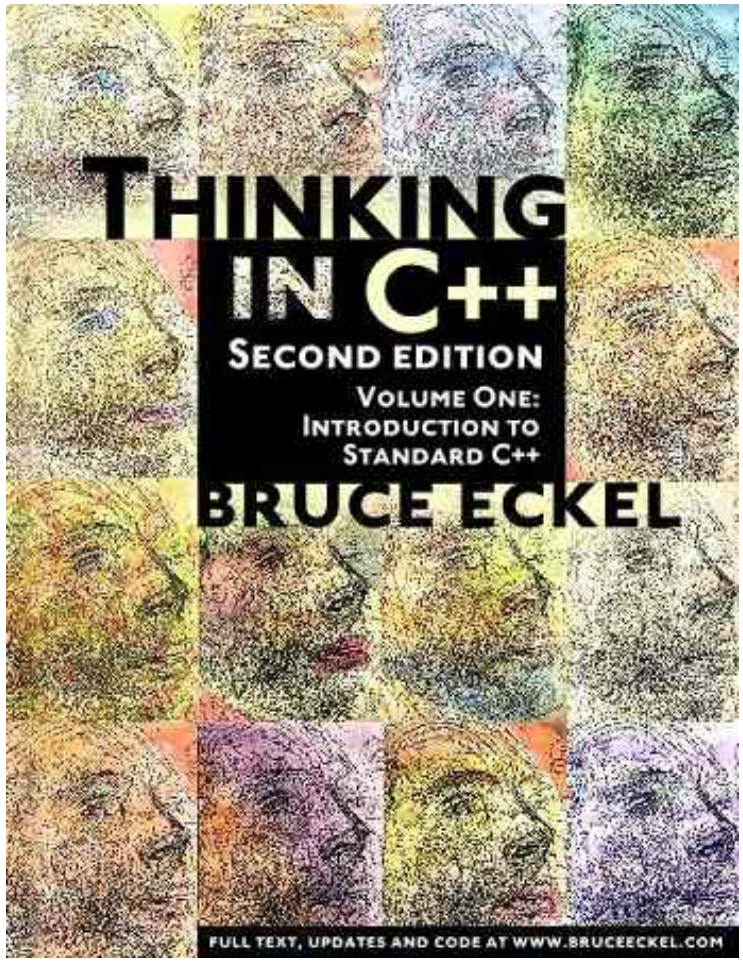
- Data Structures and Algorithm in C++, Clifford A. Shaffer, Dover Publications, c2011, Third Edition.
- ISBN: 9780486485829 (615 pages)
- Available at HKUST Library.
  - QA76.9.D35 S45 2011b



A free copy from the author, Clifford A. Shaffer is available at:
`http://people.cs.vt.edu/~shaffer/Book/C++3elatest.pdf`

Recommended Textbooks

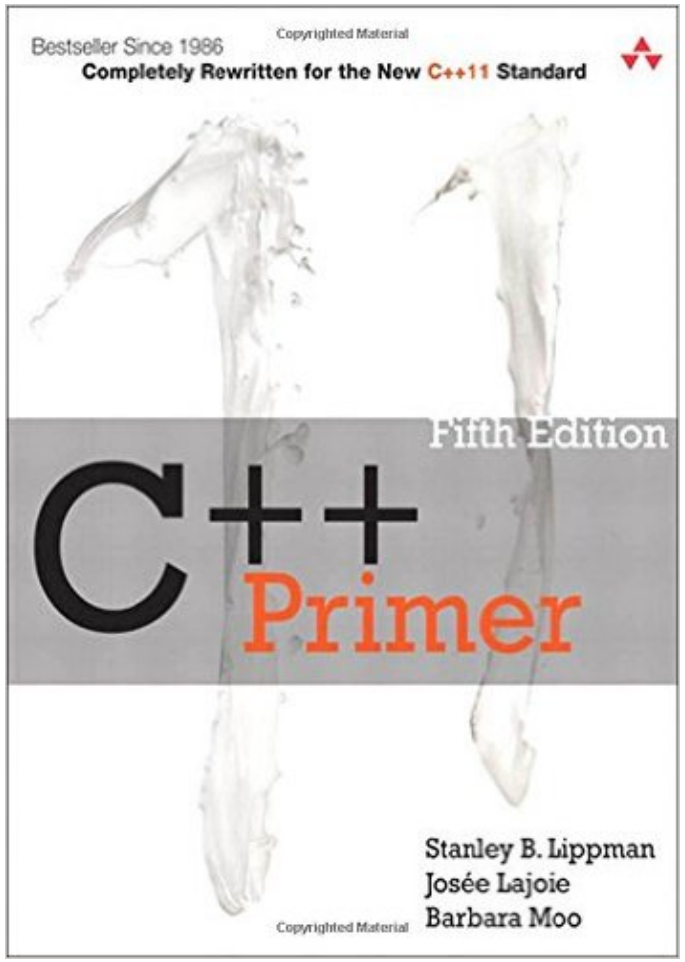
- Thinking in C++, Eckel Bruce, Prentice Hall, c2000 - c2004, Second Edition.
- ISBN: 0139798099
- Available at HKUST Library.
  - QA76.73.C153 E247 2000 v.2
  - QA76.73.C153 E247 2000 v.2 c.2



A free copy from the publisher is available online at:
`http://www.cse.ust.hk/~dekai/library/ECKEL_Bruce/`

Recommended Textbooks

- C++ Primer, Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, Addison-Wesley, c2013, Fifth Edition.
- ISBN: 9780321714114 (938 pages)
- Available at HKUST Library.
  - QA76.73.C153 L57697 2013



Other Materials

- Lecture notes for COMP2011
- Self-tests
- Past exam papers
- Reserved books in HKUST library
  - The C++ Programming Language
    - ★ Author: Bjarne Stroustrup
    - ★ Call#: QA76.73.C153 S77 2013
  - Problem Solving with C++
    - ★ Author: Walter Savitch
    - ★ Call #: QA76.73.C153 S273 2012
  - Programming in C++: Lessons and Applications
    - ★ Author: Timothy B. D' Orazio
    - ★ Call #: QA76.73.C153 D66 2009
  - C++ for Everyone
    - ★ Author: Cay S. Horstmann
    - ★ Call #: QA76.73.C153 H6685 2012

Bjarne Stroustrup
[Pronunciation]
Designer and original implementor of C++

Alan Kay
Pioneer of OOP

Help!

- Talk to me after each lecture and/or attend my office hour
- Piazza on Canvas
- Attend TAs' office hour
- Send us emails
- Make appointments with us

Tentative Teaching Schedule

Topic	#Lectures	Cumulative #Lectures
Course Logistics	0.5	0.5
Pointer, Reference, New C++11 Features, C++ Class Revision & const-ness:	4.0	4.5
Constructors, Destructor, and Initialization	4.0	8.5
Inheritance and Polymorphism	5.0	13.5
Generic Programming	4.0	17.5
Binary Search Trees	2.5	20.0
Hashing	2.0	22.0
rvalue Reference and Move Semantics	3.0	25.0
Shorter Version of STL (Optional)	1.0	26.0

- Teaching schedule is subject to change according to the teaching and learning progress!
- Additional classes will be arranged.
  - L2: February 12 (Monday): The 3rd Day of Lunar New Year
  - L1 & L2: May 1 (Wednesday): Easter Monday

Additional Classes

- No labs on Week 1, 2, 3, 7 and 9 (Midterm Break) but ... with additional lectures $>.<$
  - Week 2:
    - ★ L1: 5 February 2024 (Monday), 6:00pm to 7:50pm, G010
    - ★ L2: 8 February (Thursday), 6:00pm to 7:50pm, Rm 4620
  - Week 3:
    - ★ L2: 15 February 2024 (Thursday), 6:00pm to 7:50pm, Rm 4620
  - Week 7:
    - ★ L1: 11 March 2024 (Monday), 6:00pm to 7:50pm, G010
    - ★ L2: 14 March 2024 (Thursday), 6:00pm to 7:50pm, Rm 4620
  - Week 9:
    - ★ L1: 25 March 2024 (Monday), 6:00pm to 7:50pm, G010

The additional lectures will be conducted in mixed-mode. :)

Discussion with L1 Students

- We have a lecture on February 9th (Friday) from 4:30 pm to 5:50 pm.
- That day happens to be the Lunar New Year eve, which is a special day for Chinese families to come together and celebrate. So, I think many students would like to leave early to spend time with their families on this occasion.

Question

Would you like to change the lecture date to February 7th (Wednesday) from 8:00 pm - 9:20 pm?

C++ Version and Software

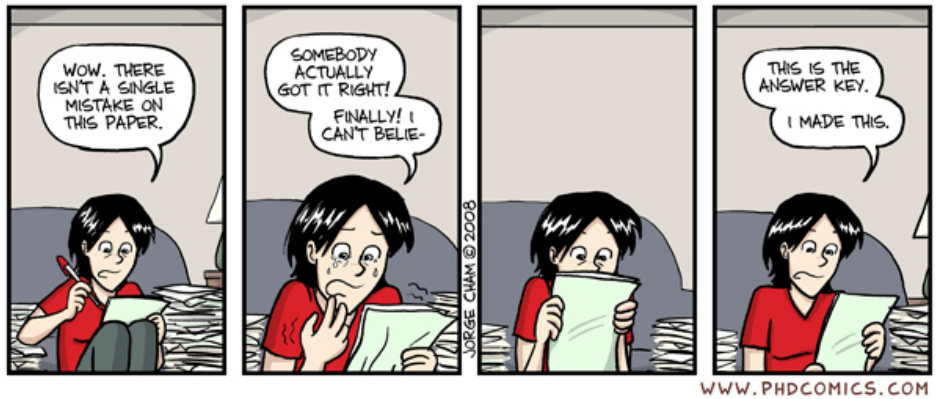
- We use C++ version 2011 (i.e., -std=c++11) as the programming standard for this course
- Integrated Development Environment (IDE)
  - VSCode with MinGW/GCC (Windows)
  - VSCode with g++ (follow Apple's instructions)
- C++ Compiler
  - g++

- Starting from 2011, C++ rolls out a new standard every 3 years!
- Compilers need time to catch up
- You are suggested to check your compilers if they support the new codes

Grading Scheme

Assessment breakdown:

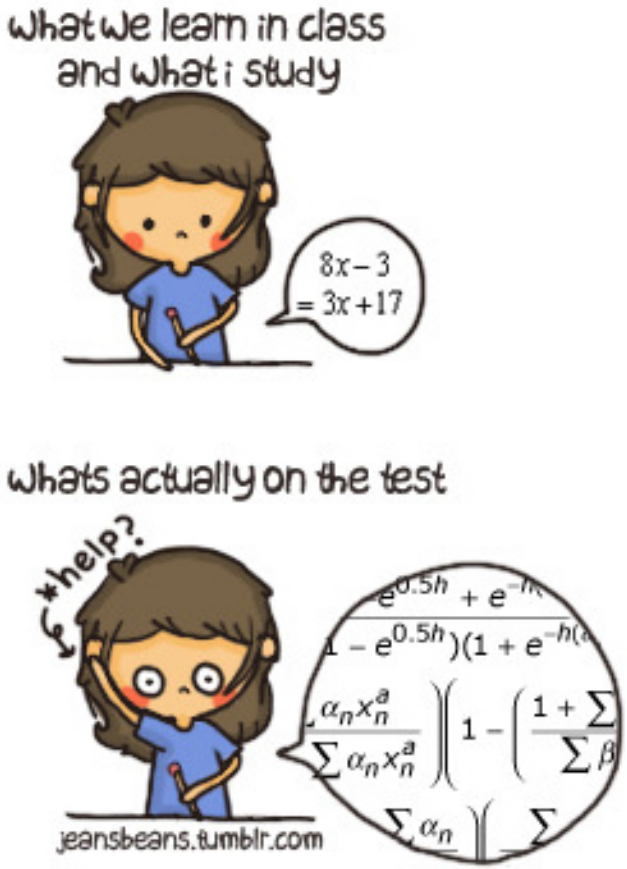
- Coursework (34%)
  - 8 Lab Exercises (10%)
  - 3 Programming Assignments (24% = 8% + 8% + 8%)
- Examination (66%)
  - Midterm Exam (26%)
  - Final Exam (40%)



Coursework (34%) + Examination (66%) = Total (100%)

Midterm Exam

- The midterm exam is scheduled on March 14, 2024 (Thursday), 8pm - 10pm
- Venue: To be determined
- Scope: To be determined



Academic Dishonesty

- Honesty and integrity are central to academic work. You must observe and uphold the highest standards of academic integrity and honesty in all the work (lab exercises, programming assignments, exams, etc.) you do in this course.
- We deal with cheating cases seriously and the maximum penalty is a FAIL in the course plus additional disciplinary actions from the CSE Department as well as from the University.
- Both the copier(s) and the copiee will be punished, and the penalty will be more than just a zero mark in your assignments/exams.
- Links:
  - University's Honor code: `http://ugadmin.ust.hk/integrity/student-1.html`
  - University's Penalties for Cheating: `http://ugadmin.ust.hk/integrity/student-5.html`

Academic Dishonesty (Cont'd)

- We will use a software to check your codes with others' program, and even with previous assignments. The tool is hard to beat. The suspected cases will be further studied by the instructors and the TAs.

If you are not sure what is considered plagiarism

- DO NOT use generative artificial intelligence tools like ChatGPT or similar software for your labs and programming assignments.
- DO NOT copy program codes from another student/person.
- DO NOT look at the actual program codes of another student.
- DO NOT share actual program codes with other students/people (by paper, emails, blogs, FB, Google Doc, etc.).
- DO NOT give your program codes to other students who ask for it, and do not ask for a copy of their code either.
- DO NOT post your program codes anywhere online.
- DO NOT leave your finished/unfinished program codes unattended.
- While we encourage discussion among students, you have to write codes on your own.
- During discussion, you SHOULD NOT go to the details such that everyone will end up in the same code.

The list is by no means exhaustive, and you will need to use your own discretion.

That's all!

Any question?

Welcome Back!