

IM 1003 – Programming Design, Spring 2015

Instructor: Ling-Chieh Kung
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National Taiwan University

In this course, we will introduce how to write computer programs for general purposes. The programming language we will study is C++, one of the most popular and powerful high-level programming language nowadays. We will start from the procedural programming part of C++, which is quite similar to the programming language C, and then discuss those object-oriented features of C++. While we will spend a lot of time on how to write “correct” programs, we will also try to write “good” programs, i.e., those running faster, using less memory, having better formats, generating friendly user interfaces, being more extendable, etc. The language C++ is just something that facilitates the delivery of the principles of computer programming. What really matter are the conceptual principles, not the C++ syntax or rules. Our objective is not to teach you how to write C++ programs; we want to make you be able to teach yourself any other programming languages. C++ is chosen to be taught in this course mainly because, in my opinion, it is a “broad” language. This will be discussed in lectures.

This is a required course for first-year undergraduate students in the Department of Information Management in National Taiwan University. We do not assume any background in computer programming, and there is no prerequisite for this course. However, some experiences in courses like Introduction to Computer Science and Discrete Mathematics helps. In most cases, all students who want to enroll in or audit this course are welcome.

Note. *Though this course counts for three units officially, students are suggested to treat it as at least five units and put efforts accordingly. In my opinion, this course should be (and indeed is) heavier than most introductory programming courses in NTU. If you do not have any programming experience, you do need to spend enough time on programming to really learn something. Studying programming is definitely not easy. Please do not hesitate to let me know if you need any help.*

Basic information

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| Instructor | <ul style="list-style-type: none">• Ling-Chieh Kung (孔令傑).• E-mail: lckung(AT)ntu.edu.tw.• Office: Room 413, Management Building II. Tel: 02-3366-1176.• Office hour: 9:00am-10:00am, Tuesday or by appointment.• http://www.im.ntu.edu.tw/~lckung/ |
| Teaching Assistants | <ul style="list-style-type: none">• Willy Liao (廖偉宏). E-mail: r03725035(AT)ntu.edu.tw..• Tammy Chang (張翔). E-mail: r03725017(AT)ntu.edu.tw.• Shelley Sun (孫至緣). E-mail: r03725004(AT)ntu.edu.tw. |
| Meetings | <ul style="list-style-type: none">• Lectures (<i>in English</i>):<ul style="list-style-type: none">○ 2:20-5:20pm, Monday.○ Room 305, Management Building II.• Labs (<i>in Chinese</i>):<ul style="list-style-type: none">○ 6:30-8:15pm, Wednesday.○ The large computer classroom, Management Building I. |
| Textbook | <ul style="list-style-type: none">• C++ <i>How to Program: Late Objects Version</i> by Paul Deitel and Harvey Deitel, seventh edition, Pearson Education. 臺灣代理: 歐亞圖書, (02) 8912-1188. |
| References | <ul style="list-style-type: none">• <i>A First Book of C++</i> by G. Bronson.• <i>C++ Primer</i> by S. B. Lippman, J. Lajoie, and B. E. Moo.• <i>The C++ Programming Language</i> by B. Stroustrup. |
| On-line Resources | <ul style="list-style-type: none">• To check grades: CEIBA.• To download materials: http://www.im.ntu.edu.tw/~lckung/courses/PD15/• To submit homework: http://lckung.im.ntu.edu.tw/judge/.• To discuss: the bulletin board "NTUIM-lckung" on PTT. |

Grading

- Breakdown**
- Homework: 30%.
 - Project: 15%.
 - Three lab exams: 35% (15% for the best one and 10% for the other two).
 - One written exam: 15%.
 - Class participation: 5%.
 - (Bonus!) PDAO contest or a bonus problem: 5%.

- Conversion rule**
- The final letter grades will be given according to the following conversion rule:

| Letter | Range | Letter | Range | Letter | Range | Letter | Range | Letter | Range |
|--------|----------|--------|----------|--------|----------|--------|----------|--------|-----------|
| F | [0, 60) | C- | [60, 63) | C | [63, 67) | C+ | [67, 70) | B- | [70, 73) |
| B | [73, 77) | B+ | [77, 80) | A- | [80, 85) | A | [85, 90) | A+ | [90, 100] |

Tentative schedule

| Week | Date | Lecture | Textbook | Note |
|------|------|--|---------------|--|
| 1 | 2/23 | <u><i>No class: Chinese New Year</i></u> | | <u><i>No lab</i></u> on 2/25 |
| 2 | 3/2 | Introduction | Chs. 1 and 2 | |
| 3 | 3/9 | Control statements | Chs. 3 and 4 | |
| 4 | 3/16 | Arrays | Ch. 6 | |
| 5 | 3/23 | Functions | Ch. 5 | |
| 6 | 3/30 | Recursion, searching and sorting | Chs. 5 and 19 | <u><i>No lab</i></u> on 4/1: spring recess |
| 7 | 4/6 | <u><i>No class: spring recess</i></u> | | <u><i>Lab exam 1</i></u> on 4/8 |
| 8 | 4/13 | Pointers | Ch. 7 | |
| 9 | 4/20 | Self-defined data types | Ch. 22 | |
| 10 | 4/27 | Classes (1) | Ch. 9 | <u><i>No lab</i></u> on 4/29: IM Night |
| 11 | 5/4 | Classes (2) | Ch. 10 | |
| 12 | 5/11 | <u><i>Midterm exam</i></u> | | <u><i>Lab exam 2</i></u> on 5/13, <u><i>PDAO</i></u> on 5/16 |
| 13 | 5/18 | Operator overloading | Ch. 11 | |
| 14 | 5/25 | File I/O and C++ Strings | Chs. 8 and 18 | |
| 15 | 6/1 | Inheritance | Ch. 12 | |
| 16 | 6/8 | Polymorphism | Ch. 13 | |
| 17 | 6/15 | Data structures | Ch. 20 | |
| 18 | 6/22 | <u><i>Final project demonstrations</i></u> | | <u><i>Lab exam 3</i></u> on 6/24 |

Policies

- Office Hour**
- You are welcome to the instructor's office hour to ask him any question. You may ask him to clarify some concepts, give hints for homework problems, or discuss the final project. In fact, discussions not related to course materials are also welcome. However, because one must have enough painful experiences in debugging and revising programs, the instructor (and TAs) may refuse to debug for any student. If you do not want to come in the designated time, feel free to send the instructor an e-mail to schedule a meeting.
- Labs**
- Students are strongly encouraged to attend labs. In lectures, the instructor will convey the concepts and ideas of C++ programming; in labs, the TAs may review materials covered in lectures, discuss past homework, and give students on-site practices. These practices do not count for any grade. However, attending labs is as important as attending lectures.
 - The TAs will hold labs *in Chinese* (and this is why labs are optional). All the lab materials will be prepared in English for any one to practice by herself/himself. If you do not understand Chinese, you may contact the instructor or TAs to have private discussions in English.
- Class Participation**
- We do not count attendance. If you have something more important to do, feel free to drop a class or a lab. Nevertheless, we encourage class participation and include it in evaluating each student. During lecture time or office hour, you are more than welcome to ask or answer questions and provide comments. You are also encouraged to use the course bulletin board on PTT.
- Homework**
- For most weeks, one homework will be assigned every Monday or Tuesday and due in one week. Please upload your C++ source codes (and other files, if required) to the course website on the due date. No submission in class or in lab. No hard copy. No late submission. While discussions are highly encouraged, each student must turn in her/his own homework. Cheating will result in severe penalty for everyone involved. The lowest two homework grades will be dropped (i.e., you may skip two homework if you want).
 - For homework of this course, we rely heavily on the Programming Design Online Grading System (PDOGS, or P-Dogs). After a student uploads her/his C++ source file, the system will automatically compile and run the program with respect to some testing data, calculate grades, and display the grades to the student. One may repeatedly modify his program and upload again and again until she/he is satisfied. Only the last grades will be recorded.
 - The TAs will grade and regrade your homework upon request. If you have a regrading request, please contact the TAs directly (e.g., in labs).
- Project**
- Students should form a team with at most three students to solve a task specified by the instructor. Each team needs to submit its C++ course codes and the document for their program. Some teams will also get chances to demonstrate of their program to the class for bonus points.
- Lab exams**
- For three Wednesdays we will have lab exams during the lab time. Students will be asked to write several C++ programs in two hours. Students will be assigned seats randomly. One may decide to use the computer in the classroom or her/his own laptop. The Internet will remain active throughout the exams, and one is allowed to search whatever she/he wants online. However, no communication with any living person is allowed. Cheating will result in a severe penalty for everyone involved.
- Written exam**
- We will have an in-class and open-book written exam during the lecture time. Electronic devices and discussions are disallowed. Cheating will result in a severe penalty for everyone involved.
- PDAO Contest**
- The PDAO (Programming Design and Optimization) contest is an ACM-style contest held by IM students. If students form teams to participate in this contest, they will get bonus points according to their performance. For those who plan to join but cannot make it, they may work on a special bonus problem for comparable credits.