

# CS 204 – Advanced Programming – Spring 2024

3 credits

**Prerequisite** CS201. Although formally the grade D is prerequisite, those who got C+ or less are recommended to repeat CS201 and then take CS204, because the level of C+ or less in CS201 does not give enough background to succeed in CS204.

## Description and objectives

This course aims to provide programming experience and to give advanced programming techniques. In this way, students would be more prepared to data structures and several other junior and senior level CS courses. CS204 is a prerequisite course for several CS courses including data structures. Thus, it is a must course for CS students and students who will take advanced CS courses.

CS204 heavily depends on CS201. Thus a very good CS201 background is needed. We will **NOT** make a review of CS201 topics.

The programming language that will be used in this course is C++; we will use C-Lion over Windows operating system as the development environment. You have to open a student account <https://www.jetbrains.com/clion/> using your sabanciuniv emails in order to activate free student license of C-Lion.

C-Lion uses GNU C++ (G++) compiler and GNU Debugger (GDB) in Windows. C-Lion also has MacOS version; however, the underlying compiler is different in MacOS. Due to this reason and due to variations of operating systems and hardware, you may encounter compatibility issues if you use MacOS. Similarly, Xcode is also problematic and you may face compatibility issues if you insist on using Xcode. You can continue to Visual C++ as the development environment but we cannot provide any portability/compatibility guarantee for the codes. Thus we do not support anything other than C-Lion over Windows. Use any other compiler and operating system at your own risk.

## Topics planned to be covered

- Introduction (overview of basic concepts, Visual C++ environment, preprocessor directives, compiler, compiler options, linker, libraries, debugging)
- Pointers and dynamic memory allocation
- Linked lists
- Stacks and queues
- Templates, templated classes and functions
- Advanced issues on classes and object oriented programming
- Data representation, bitwise operations
- Inheritance, polymorphism and advanced object oriented design
- Exception handling
- Programming with threads
- Visual programming and graphical user interfaces (since we have one less lab week this semester, we will not be able to cover it this semester)

## Instructor

**Albert Levi**, FENS 1091, ext. 9563, [levi@sabanciuniv.edu](mailto:levi@sabanciuniv.edu)

**Office Hours:** whenever I am in my office (generally I am in my office). Whenever you have a question you can drop by or write me.

**Assistants:** Detailed assistant information (office hours, etc.) will be available at SUCourse+. All office hours are planned to be held online. See the details at SUCourse+.

## Textbook(s)

**Main texts** are "Ivor Horton's Beginning Visual C++ 2012", by Ivor Horton, ISBN: 978-1-118-36808-4.  
Actually any version of this book is OK, I said 2012 since it can be found electronically. On the other hand, although this book says "Visual C++", it is general enough.

"A Computer Science Tapestry" (CS201 book)

**Reference books** are "Starting out with C++ Early Objects", 7<sup>th</sup> edition, by T. Gaddis, J. Walters, G. Muganda  
"Objects, Abstraction, Data Structures and Design using C++" by Koffman and Wolfgang.

**We may not stick to the textbooks; you are responsible material covered in class too. Thus it is very important to attend to lectures. Moreover, most students do not need books in this course.**

## Schedule

**Lectures:** Monday 16:40-18:30 FMAN 1099 (auditorium), Wednesday 12:40-13:30 FENS G077 (auditorium).

**Labs:** Sections A1, A2, A3: Thursday 12:40 – 14:30, B1, B2, B3, B4: Friday 10:40 – 12:30, C1, C2: Friday 15:40 – 17:30.

All labs will be held physically and will start this week. Lab TAs are listed at SUCourse+.

## Homework (Take Home Exams)

There will be 6 programming homework assignments that might also be considered as take home exams. There will be no late submissions. You must submit your own work! No group works! No direct help from any online source is allowed. All of these acts will be considered as plagiarism. Collaboration will not be considered as an excuse for plagiarism!

See below sections for homework grading and submission related.

## Grading and Exams (absolutely tentative)

Midterm (35%): around week 9-10. **Exact date is April 27, 2024, Saturday, 16:30 – 18:20.**

Final (45%): will be scheduled by student resources.

Current plan is to have one Midterm and one Final exam. In case of changing plans to have two Midterm Exams, total of exams (80%) will remain intact but the distribution will change.

Homework assignments (20%) – The homework assignments are not of equal weight and individual weights will be determined at the end of the semester. All of them will be considered in grading. Homework grading will mostly be based on correctness of the execution; not based on how big is the mistake or how hard you work for it. Thus please test your code very carefully. No debugging will be done during grading. No code/file changes are allowed after the submission. If you submit wrong file, we cannot grade your work. If you have mistyped even a single character that causes a compilation error, we cannot do anything. Even if you find out your mistake later, we do not allow code changes. See below sections for more about homework grading and submission.

Attendance (-2%): We will take attendance in both lectures and labs (starting after add-drop period). 70% attendance is required. Those who do not meet this threshold will be proportionally penalized up to 2%. No medical reports or other excuses will be considered as extra right for non-attendance; they are to be considered within 30% of right to not attend.

Letter Grades: 84.50 will get A. Grade intervals are exactly 5.00 points. Thus passing grade is 39.50. No extra rounding up (which means 84.499999... gets A-, 39.499999... fails).

## Use of SUCourse+ and Communications

We will make announcements via SUCourse+ that you will also receive as emails. Some announcements may be sent as plain email or the quick ones via WhatsApp group.

We have a WhatsApp group for the class that I also participate (of course you might have another one without me). The invite link for it is <https://chat.whatsapp.com/GTWqJ8cTF9n1Mz99NJb5C9>

All lecture materials, homework and assignments will be posted at SUCourse+. The submissions will also be there unless otherwise stated.

Lecture materials will be posted as PowerPoint file without annotations made in class. Sample codes discussed in class will also be shared. Weekly postings will be done after the lectures (Wednesdays or Thursdays).

## Other Rules and Remarks

- The highest grade you can get from an individual homework assignment is 1.6 times of your weighted exam average. For example, if your weighted exam average (Midterm and Final) is 62.5% or more, then you may get up to 100 from any of the homework assignments. As another example, if your weighted exam average is 40%, then maximum of each homework is 64 even if you get more than that during grading. We will grade the homework assignments first without considering this, but at the end of the semester, after final exam is announced, we will apply the reductions.

- Students are expected to attend all classes, recitations/labs. In CS204 you will continue to learn a programming language and it is much easier to learn a programming language when a person explains it. You have to spend more time to compensate a missed class. So absenteeism does not buy time.
- Students are responsible for the material covered in class even if it is not part of the lecture notes published on the website (Sometimes we explain some stuff by writing). That is why attendance is important.
- Use of online sources (such as YouTube videos, code repositories, programming sites, ChatGPT, etc.) is not recommended since they may lead you some materials/methods that are not taught (thus not allowed) and are not permitted. Moreover, using such resources may end up plagiarism in homework assignments. An exception to this recommendation would be using online help to find the reason of an error message, but be careful about the issues mentioned above.
- Students are responsible to check their emails (Sabanci University accounts) and SUCourse+ daily for any announcements related to this course.

## Homework Submission and Grading Policy of CS 204

- All homework submissions must be done before the specified deadline. If you submit on the exact deadline time, then you are late. That means if the deadline is 21:00, then the latest second that you can submit is 20:59:59.
- Late homework submission is not allowed even with a penalty.
- Medical reports, or any other excuses (even valid ones) do **not** add extra days to the homework deadlines.
- Homework submission must be done only to SUCourse+. Email or other type of submissions are not allowed.
- **No modification is allowed after SUCourse+ closes.** Thus, please make sure that you've submitted the correct homework. If you submit wrong file or if a crucial file is missing, we cannot grade your homework and you get zero (0). Sometimes, the students argue the local computer's system time as a proof of timely completion of a wrongly submitted homework; we cannot accept such local proofs and we cannot accept any file other the ones submitted to SUCourse+. No exceptions to this rule.
- We do not allow code changes after SUCourse+ closes either. We grade whatever you submit to SUCourse+. This rule holds even if one character change increases your grade from 0 to 100.
- **Homework grading is mostly based on correct execution.** We generate some test data for grading. If your homework executes wrongfully against this test data, your grade will be lowered accordingly no matter how big is your programming bug and no matter how hard you work for it. Sometimes the bug is too simple, but it may cause your program to work totally wrong and you may get very low grades. Sometimes, you mistype a character that causes some compilation errors. These are too unfortunate but we have nothing to do. In order to avoid such cases, please test your program thoroughly before the submission and make sure that the submitted version is the most up to date one. And please do not write us to complain about this policy and its outcomes within the semester; you know it at the beginning of the semester and you take this course by knowing this policy.
- **We do not debug your code during grading to understand where the problem is.** As mentioned in the previous bullet, we just test your code and grading is not based on how big your bug is.
- **Use of CodeRunner:** We plan to use CodeRunner embedded to SUCourse+ for most of the homework assignments for *functional grading* purposes (except the ones that require manual check such as multithreading applications). CodeRunner also allows you test the code before the final submission and you get feedback about the correctness against some test cases. There will be both *visible* and *hidden* test cases in CodeRunner, and both will contribute to the functional grade of your homework. You will get feedback for both visible and hidden test cases; but for the hidden test cases, you will not be able to see which parts are wrong. Moreover, we will definitely will not disclose details of the hidden test cases.
- **Other grading criteria** include modularity of the code, coding style, commenting, efficiency, etc. There might be homework-specific rules as well. Thus even you pass all test cases, your grade may be less than 100 if you do not follow stylistic and other rules.
- **Testing is your responsibility.** Depending on the suitability of homework, we will provide sample runs, together with the homework specification, corresponding to the visible CodeRunner test cases. However, we do not guarantee that sample runs / visible CodeRunner test cases cover all of the edge and corner cases. Also keep in mind that the hidden test cases will be different than the visible ones and we keep our right to add extra test cases after the submissions closes. To sum up, it is your responsibility to test your program against all possibilities in order not to lose points due to some bugs.
- **Only course material:** You have to use only the material covered in class. In other words, you are **not** allowed to use anything that has not been taught in CS201 and CS204. Thus, if you use any type of online help, you do not only cause plagiarism, but also take risk of violating this rule.
- **No break and continue:** You are **not** allowed to use `break` and `continue` statements.

- **No global:** You are not allowed to use global variables unless otherwise stated.
- Homework grading may be done via a demo and you may be questioned about your homework during the demo.
- **Development platform related issues:**
  - o Formal development environment of CS204 is **C-Lion over Windows with G++ compiler and C++ 17** standard (For technical help for installation, please refer to the guides at SUCourse+).
  - o If you want to use MS VS, VSCode, Xcode (MacOS), C-Lion on MacOS, or another platform, I have to say "use at your own risk". That means, we may not help in case of problems.
  - o MS Visual Studio has its own compiler and may cause some inconsistencies with G++ of C-Lion.
  - o It is really hard to install any development environment on MacOS that uses G++. We provide some guides in SUCourse+ from previous years in order to help the Mac users to install C-Lion with G++ on MacOS, but we cannot provide any help during office hours if these guides do not work for you.
  - o I know that Mac users prefer to use Xcode, but unfortunately Xcode is extremely problematic when it comes to CS204 topics. Xcode is forgiving for programmer mistakes and even if you think that your code works, there might be some logical errors in your code that Xcode suppresses. That is why, please do not use Xcode.
  - o However, even our formal platform (C-Lion over Windows) may cause some minor compatibility issues with CodeRunner due to differences in operating systems (CodeRunner runs on an Ubuntu 2204 server with G++ compiler). If you want to have zero compatibility issues, you need to use Ubuntu that we cannot assume to have for all students (thus cannot make it the formal environment).
  - o Those, who have problems such as working locally but not working over CodeRunner, can try [onlinegdb.com](http://onlinegdb.com) for testing/debugging purposes.

### Rules to submit a medical report to take a make-up exam in CS 204

- All medical reports must be issued or approved by the health center. Please make sure that external medical reports are given to health center at last at the end of the report coverage. If it is going to be delayed for some reason, please let the instructor know about it.
- If possible, let the instructor know about your medical issue and your unavailability for the exam before the exam. If there is a non-medical reason for missing an exam, this issue must be brought to instructor's attention before the exam.
- Those who will take the makeup exam should apply for it by following the course announcements; We will not follow up on the makeup exam takers via the medical reports. Please do not keep asking the date for the make-up exam and wait for my announcement about it.
- According to university rules, a person with a medical report cannot attend physical lectures and cannot attend exams.
- Last, but not the least, make-up exams will be **HARDER** than the normal exams for the sake of fairness to those who take the exam on time and studied less than the make-up takers.

### Summary Policy on Plagiarism and Homework Trading (see the full version at SUCourse+)

A plagiarized homework may or may not be a verbatim copy of another homework. Verbatim copies are of course plagiarized ones. If you use any online tool or code provided by online sources, this is also plagiarism. If a homework is derived from another one by partially changing some parts, this action is also plagiarism. Cooperation and working together is not an excuse. A common fallacy is that the graders cannot catch a program that is developed by partially changing another program. Believe it or not, such programs are caught very easily. There are software products available to catch such cases, and we use them. When a plagiarism case is detected, sanctions are applied to all parties regardless of the actual source of the homework. These sanctions are as follows.

- For the first time, all plagiarized homework owners receive -100 (minus hundred).
- Second time, the student fails the course automatically.

**Plagiarism, Homework Trading, Illegal Local and Remote Help and Cheating will not be tolerated. See the related policy at SUCourse+**