Fundamentals of Computer Programming II
Winter 2021 Syllabus

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General information

CS 211 teaches foundational software design skills at a small-to-medium scale. We aim to provide a bridge from the student-oriented *How to Design Programs* languages to real, industry-standard languages and tools. In the first half of the course, you'll learn the basics of imperative programming and manual memory management using the C programming language. In the second half of the course, we'll transition to C++, which provides abstraction mechanisms such as classes and templates that we use to express our design ideas. Topics include expressions, statements, types, functions, branches and iteration, user-defined

types, data hiding, basic UNIX shell usage, and testing.

Prerequisites

- CS 111, *or*
- comfort with recursion, linked lists, and lambda, *or*
- proficiency with the *HtDP* Design Recipe.

Course structure

Instruction

Lectures will be pre-recorded and made available on Canvas for both streaming and download.

During our scheduled class time, 02:00—3:20 PM Central Standard Time, we will meet via Zoom for Q&A, discussion, and short activities. In lieu of your registered discussion section times, we have scheduled additional office hours.

Assignments

There will be six weekly homework assignments, followed by a final project with four steps: a proposal, specification, delivery, and evaluation.

You must achieve a score of at least 50% on each of the aforementioned 10 assignments in order to pass the course.

Labs

Some class sessions will have a lab associated with them. Labs are opportunities for you to practice what you've learned. Some labs also guide you in how to set up your C and C++ environments, which will be crucial for completing homework assignments, and how to use tools such as GDB (the GNU debugger). Each lab will have an associated quiz on Canvas that asks you questions about what you did in the lab.

Assessment

There will be no exams in CS 211 this quarter.

We may, however, provide short, *optional* quizzes to help you assess your progress.

Resources

References

- C reference
- CS 211 Style Manual—follow this!

- If you can't find your answer in one of the above references, you should try our Campuswire discussion board.

Software

In a few weeks, we will switch to a full-featured IDE (integrated development environment). For now, however, all you need is a terminal emulator and an SSH client to login to your shell account.

Mac Your computer comes with Terminal.app and OpenSSH, so you have everything you need. (Your instructor uses iTerm2 instead of Terminal.app.)

Windows PuTTY is a free program that does both terminal emulation and SSH. The easiest way to install it is the PuTTY MSI installer.

Linux, UNIX, etc. You need an SSH client (*e.g.,* from Ubuntu's openssh-client package) and probably a terminal emulator (*e.g.,* xterm) which is almost certainly pre-installed. (Your instructor uses Terminator instead of the Ubuntu default.)

Optional books

Part I: C

Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language,* Second Edition. Prentice Hall, 1988.

> **The** classic C book from the language's inventors. The language has evolved somewhat in the 30+ years since the second (and most recent) edition was published, but it's still the clearest introduction I know of.

Part II: C++

Bjarne Stroustrup, *Programming: Principles and Practice,* **Second Edition**. Addison-Wesley, 2014.

> Introductory programming book by the primary designer of C++. It's a bit quirky, but a reasonably gentle introduction by the genius behind the madness.

Paul Deitel & Harvey Deitel, *C++ How to Program,* 10th Edition. Pearson, 2017.

> Big, heavy, comprehensive textbook—likely overkill unless you like that sort of thing.

After the course is over

Scott Meyers, *Effective Modern C++,* 2014.

If you want to continue using C++ and use it well, this book will teach you a lot.

Academic Support and Learning Advancement (ASLA)

If you are looking for help with a course or an academic challenge, or if you would simply like to sharpen your study strategies and stay on track, check out Academic Support & Learning Advancement. They offer drop-in tutoring, study groups, academic coaching, and individual consultations for all undergraduates. Visit their website or email asla@northwestern.edu for more information.

Course policies

Collaboration and academic integrity

For the purposes of this policy, we define three **levels of collaboration**:

- **Partner collaboration** means your code and the other student's code are identical because you share it and work on it together.
- **Close collaboration** means you communicate about code however you see fit.
- **Arms-length collaboration** means you discuss problems and solutions at a high level.

When collaborating at arms length, you MAY NOT read, write, look at, record, or in any way transcribe the code in question; you MAY NOT have the code on your screen when doing it. When you engage in arms-length collaboration, you MUST submit a file named `COLLABORATION.txt` that lists your arms-length collaborators.

You are always free to:

- seek help from any member of the course staff on an assignment or lab,
- use the Campuswire discussion board to ask questions regarding assignments, so long as your questions (and answers) don't show the solution,
- closely collaborate with other current CS 211 students on a lab, and
- arms-length collaborate with other current CS 211 students on an assignment, provided you list them in `COLLABORATION.txt`.

For some assignments you will have an opportunity to **register a homework partner** (via instructions we will provide you). When you have a registered partner, you and your partner are jointly responsible for writing one shared copy of the assignment, which you submit together. When you do not have a registered partner, you must write your own code by yourself.

No other collaboration on assignments is permitted. In particular, you may not collaborate closely with, share code with, nor receive code from anyone other than your registered partner (or the course staff) on any assignment.

Please note that providing illicit help to another student is cheating, and is subject to the same penalties as receiving illicit help. It is your responsibility to safeguard your own work.

If you are unclear on any of these policies, or if you are in doubt about a particular situation, please ask a member of the course staff. Students who violate these policies will be reported to the appropriate dean.

Ability

Northwestern University is committed to providing the most accessible learning environment possible for students with disabilities. Should you anticipate or experience disability-related barriers in the academic setting, please contact AccessibleNU to move forward with the university's established accommodation process (accessiblenu@northwestern.edu or 847-467-5530). If you already have established accommodations with AccessibleNU, please let me know as soon as possible, preferably within the first two weeks of the term, so we can work together to implement your disability accommodations. Disability information, including academic accommodations as part of a student's educational record, is confidential under FERPA regulations.

Communication

Receiving

Course announcements will be posted on the Campuswire discussion board, not on Canvas. Thus, it's important that you receive messages from Campuswire. Be sure to sign up, and set your preferences so that you don't miss anything.

Sending

There are many ways you might try to contact the course staff, and some will work better than others.

For health or personal issues, or to request an appointment, please email the instructors directly. Include both instructors on your email for the fastest response.

For other issues—especially technical questions about the material or homework—please post to our Campuswire discussion board. You will get a better answer, faster, by posting there than by email us directly. If your question requires revealing the code of your solution then please post it privately so that only course staff can see it. But if appropriate, please do post it publicly so that other students can benefit as well.

We reserve the right to post your emailed questions on Campuswire, suitably anonymized, and to answer them there.

These methods are not recommended for contacting the instructor:

- Canvas messaging — I won't see it!
- Campuswire DMs — ditto
- Google Chat, WeChat, Facebook, WhatsApp, Signal, Telegram etc. — nope

Recording

This class or portions of this class will be recorded by the instructor for educational purposes and will be available to the class during the quarter. Your instructor will communicate how you can access the recordings. Portions of the course that contain images, questions, or commentary/discussion by students will be edited out of any recordings that are saved beyond the current term.

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy and state law. Students requesting the use of assistive technology as an accommodation should contact AccessibleNU. Unauthorized use of classroom recordings—including distributing or posting them—is also prohibited. Under the University's Copyright Policy, faculty own the copyright to instructional materials—including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot reproduce, display, or distribute these materials. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

Homework

For each homework, we provide a TGZ or ZIP file containing starter files. You must download this TGZ or ZIP file to start your homework, as it has a Makefile (for C) or CMakeLists.txt (for C++) with the correct compiler settings, as well as "starter" source files with the correct names that the grading tests will expect.

Code submission

Submit your code via GSC. Submit only files that you have added or changed. This means any .c, .cxx, .h, or .hxx files you edit or create, necessary resource files, and your Makefile or CMakeLists.txt if you modify that.

Never submit object files (.o), executables (.exe on Windows; no extension on MacOS/Linux), or other build products (such as anything your cmake-build-debug/ directory). If GSC tells you you're out of space

but you haven't uploaded any big media resource files, that might be a sign that you're uploading something you shouldn't.

Self evaluation

Each homework assignment will be followed by a 48-hour self-evaluation period on GSC. The self evalution will account for a potentially significant portion of your grade–possibly upwards of 50% some weeks. In other words, to get full credit for the code that you submit, you must do self evaluation as well.

Late work

Homework assignments may be submitted after the due date. For each day the assignment is late, 1% will be deducted from the assignment's maximum grade. For example, an assignment submitted 5 days late has a maximum grade of 95%. Remember that you must receive a 50% on each homework assignment in order to pass the course.

Lab quizzes and final project submissions may not be submitted late.

Grades

Your grade will be based on these components:

What	Value	When	Count
Homework assignments	65.0%	Tuesdays	6
Lab quizzes	5.0%	Sundays	8
Final project prose	4.5%	Thursdays	3
Final project code	25.5%	Tuesday, March 9	1

In order to achieve a passing grade in the course, you must earn at least 50% on *each* of the 10 homework assignments and final project items counted above. Lab quizzes are not subject to this rule.