

# CS 241 Data Organization using C

Fall 2018

## Instructor

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Office: Farris 2120

Office Hours: Tuesday 2-4pm and Thursday 9:30-11am (and by appointment)

## Textbook

**Mandatory:** Kernighan, Brian W. & Ritchie, Dennis M. *The C Programming Language, 2nd ed.*, ISBN: 0-13-110362-8.

This little book has been around since 1988, so it shouldn't be difficult to find a copy.

**Optional:** Kochan, Stephen G. *Programming in C, 4th ed.*, ISBN: 0-32-177641-0.

The other book is the canonical book for the course. If you struggle with C, or are retaking the course, I recommend buying this book as well.

## Description

CS 241 is an introduction to the C Programming language, an introduction to using a command-line interface of the Linux operating system, and an introduction to machine level data organization and memory allocation. Students taking this course should already be familiar with basic concepts of computer programming such as variables, conditional control flow and loops. Developing mastery of these fundamental concepts is one of the goals of CS 241. Students in CS 241 author many C programs. Some lab assignments will be short and relatively simple. Others will be more interesting and touch on a wide range of computer applications including encryption, numerical analysis, databases, artificial intelligence, genetic algorithms and games. Many examples used in this course involve implementation of standard data structures such as linked lists and trees. However, mastery of such data structures is not within the course's domain.

The primary goals of CS 241 are for the student to be able to:

1. Read and apply the C syntax covered in the textbook (The C Programming Language by Kernighan and Ritchie).
2. Without a computer, determine the output of C language source code involving triply nested loops, conditional control flow, function calls, pointers, arrays, arithmetic, logical and bit operators, structures and memory allocation.

3. Use a Linux command-line environment to manipulate files, and directories, and to edit, compile, run and debug C programs. This includes the use of simple makefiles and a low level debugger such as valgrind.
4. Implement, in C, any given algorithm with a complexity level equivalent to that of quicksort or a doubly linked list with accuracy, efficiency and clarity

## Grading

Your grade will be calculated as follows:

- **40%** Homework Assignments
- **20%** Lab Assignments
- **30%** Exams (midterm and final)
- **10%** Lecture, quizzes, and participation

I use standard cutoff points when determining grades (e.g. A is [93-100], A- is [90-93), B+ is [87-90), etc.). I reserve the right to curve grades up, but not down.

## Assessment of Homework

For each homework assignment, you are required to turn in the code you wrote as well as the output of running your code and additional testing cases. Every homework assignment will be graded as follows:

- **60%** Code works on given examples
- **20%** Code follows good CS241 coding style. Code is efficient, readable, and no dead code is included.
- **20%** Student includes additional testing cases that are comprehensive of correct outcome as well as edge cases. Code works on the given test cases.

## Assessment of Labs

There will be two sign-in sheets for each lab: one at the beginning and the other at the end. Each lab is worth 10 points:

- 2 points for being on time to lab and signing in.
- 3 points for staying for the entire time and signing out.
- 2 points for turning in the assignment.
- 3 points for completing the assignment correctly.

Please coordinate with the lab instructors ahead of time if you wish to change sections. At the end of the semester, the lowest two lab scores will be dropped.

# Syllabus<sup>1</sup>

Weeks	Topics	Chapter
1 - 2	Types, Operators, Expressions, Scope, Control Flow, Intro to Functions, and Bit Manipulation.	K&R: Chap 1-3
3 - 4	Functions and Program Structure	K&R: Chap 4
5 - 6	Pointers, Arrays, Structures, Linked Data Structures	K&R: Chap 5-6
7 - 8	I/O and System Interface	K&R: Chap 7-8
9 - 10	Linear Data Structures, Efficient debugging techniques, Lists, Strings, and Dynamic Memory Allocation	Supplemental reading
11 - 12	Hashing and other efficient data structures	Supplemental reading
13 - 14	Sorting, memory management	Supplemental readings
15	Makefiles, Debugging, Profiling and performance tuning, Review	Supplemental readings

## Submitting Assignments

All assignments must be in the 241 dropbox on the CS servers to be graded. If the servers are down, then the entire class will receive an extension. If you are having trouble submitting to the dropbox, see the instructor or one of the TAs before the deadline.

It is your responsibility to make sure the correct file is submitted before the deadline. Always double-check your submissions.

Assignments are due at 11:59PM. You are permitted to submit multiple times and the most recent on time submission will be the one graded, so feel free to submit partial solutions as you complete milestones. Assignments timestamped after the time will be ignored. **This means that if you submit something late and accidentally overwrite a previous submission, your assignment will not be graded.**

Pay attention to deadlines! Assignments are not always due on the same day of the week. You will generally have at least a week for each one, but some larger assignments may give you more time.

## Lab Attendance

Lab class meets once per week in a computer lab. You are expected to attend. If for some reason you cannot attend your regularly scheduled lab class but are able to attend one of the other lab classes during the same week, then that other lab can count as your lab attendance.

**NOTE:** Before attending a different lab section, check with that section's lab instructor to make sure there is an open space for you.

If you feel you need extra help or would simply like to attend lab section in addition to your own, then you are encouraged to do so. First, however, please contact the lab instructor of the extra lab you want to attend to make sure that there is enough space.

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<sup>1</sup>Exact schedule subject to change. Please consult the online schedule.

## Cheating and collaboration

I encourage students to work together on homework assignments and studying. Collaboration is essential part of science. However, directly copying material from another source is not allowed and will result in an F.

Collaborating can look like:

- Sharing a couple lines of your code on the course Piazza page asking for help.
- Talking about the coding assignment with classmates.
- Whiteboarding solutions to the coding assignment with classmates.
- Looking up small difficulties about your program online, but not for outright solutions.
- Incorporating a couple lines of C code from a programming help website into your code with a comment that outlines what the code does and includes a link to the website.
- Reviewing past semester tests that the entire course has access to.
- Going to an instructor or TA's office hours and showing them your code.
- Working with a TA or tutor to help you with the course, provided that you write your own code.

Cheating can look like:

- Looking up solutions for the programming assignment online.
- Asking a classmate to see a copy of their code.
- Failing to cite any code you did not write or copy from course resources, even if it's just a small amount and not integral to the assignment.
- Copying code from another person or having someone else write your code.
- Copying code from the Internet or another source.
- Reading or attempting to read others' submissions on the course dropbox.
- Attempting to disassemble, decompile, or otherwise reverse engineer compiled example programs.
- Allowing another person to copy your code.
- Leaving your code (paper or electronic copies) where others can find it.
- Using outside help (outside of allowed resources) on a quiz or test.
- Violation of copyright or license agreements on external libraries. If you use external library code, it is your responsibility to understand and comply with the appropriate copyright and license issues.
- Violation of the University policy on acceptable computer use.

## Late Work

I expect you to submit your work on time. There are three exceptions to this:

1. You will be given eight lateness coupons that you may spend on homework assignments. Each coupon is good for one 24 hour extension. You may not use more than four on any one assignment. Otherwise, you may stack them as needed.
2. If there are extenuating circumstances such as a serious illness, let me know as soon as possible to work out an accommodation.
3. If there's an unforeseeable incident affecting most students (eg power goes out on campus for hours right before the assignment is due, the servers are down, etc.), then I will provide a reasonable accommodation.

## **Extra Credit**

I do not grant extra credit on a per-student basis.

## **Computer Science Advisement**

Whether or not you have been officially admitted to the CS program yet, please consult a Department of Computer Science Undergraduate Advisor with any questions you may have. This is especially important when navigating the prerequisites for certain courses and resolving scheduling issues. More general university advisors are not always familiar with the details of the computer science program.

## **Ethical scholarship and proper use of UNM resources**

You're responsible for understanding the laws and UNM policies pertaining to everything we do in class. You are expected at all times to comply with all policies and laws, and to behave in an ethical and responsible manner.

## **UNM statement of compliance with ADA**

Qualified students with disabilities needing appropriate academic adjustments should contact the professor as soon as possible to ensure your needs are met in a timely manner. Students must inform the professor of the disability early in the class so appropriate accommodations can be met. Handouts are available in alternative accessible formats upon request.