CSC 230 Course Syllabus

CSC 230 – CSC230: C and Software Tools

Section 002

Spring 2016

3 Credit Hours

Course Description

Details of C programming as compared with Java; Lexical structure, syntax, semantics, and pragmatics (idioms, common uses) of C; Stages of compilation, linking and execution; Strings, arrays, structures, pointers, and memory management; C libraries; Tools for design, maintenance, and debugging of programs; Separate compilation, modular programming; Integrated development environments.

Learning Outcomes

Upon successful completion of this course, a student will be able to...

1. Write small to medium C programs having several separately-compiled modules.
2. Explain what happens to a program during preprocessing, lexical analysis, parsing, code generation, code optimization, linking, and execution, and identify errors that occur during each phase. In particular, they will be able to describe the differences in this process between C and Java.
3. Correctly identify error messages and warnings from the preprocessor, compiler, and linker, and avoid them.
4. Find and eliminate runtime errors using a combination of logic, language understanding, trace printout, and gdb or a similar command-line debugger.
5. Interpret and explain data types, conversions between data types, and the possibility of overflow and underflow.
6. Explain, inspect, and implement programs using structures such as enumerated types, unions, and constants and arithmetic, logical, relational, assignment, and bitwise operators.
7. Trace and reason about variables and their scope in a single function, across multiple functions, and across multiple modules.
8. Allocate and deallocate memory in C programs while avoiding memory leaks and dangling pointers. In particular, they will be able to implement dynamic arrays and singly-linked lists using allocated memory.
9. Use the C preprocessor to control tracing of programs, compilation for different systems, and write simple macros.
10. Write, debug, and modify programs using library utilities, including, but not limited to assert, the math library, the string library, random number generation, variable number of parameters, standard I/O, and file I/O.
11. Use simple command-line tools to design, document, debug, and maintain their programs.
12. Use an automatic packaging tool, such as make or ant, to distribute and maintain software that has multiple compilation units.
13. Use a version control tools, such as subversion (svn) or Git, to track changes and do parallel development of software.
14. Distinguish key elements of the syntax (what’s legal), semantics (what does it do), and pragmatics (how is it used) of a programming language.

Course Structure

Lecture, In-Class Exercises, and (Out-of-Class) Exercises

In this class, you get to earn some points toward your final grade through a number of **in-class exercises** (using Google forms) and **(out-of-class) exercises** (C code submitted through Wolfware Classic).

The course consists of lectures interspersed with in-class exercises. The in-class exercises, typically labeled “In-class Exercise XX.YY”, provide the opportunity to explore recently covered materials individually or with peers. The in-class exercises are submitted so the instructor can get a feel for the class' comprehension of materials in a timely manner. The in-class exercises will be lightly evaluated by the teaching staff and will typically be due by the end of class or the start of the next class.

At least one member of the pair/team will need to have a laptop computer, or other electronic device, such as a smartphone, that can submit answers on a Google form or via Moodle to complete in-class exercises.

Out-of-class exercises, which will typically be labeled as "Exercise XX", will give you a chance to write or fill in missing parts of short programs. They will generally be due the on Sunday evening after they are assigned. This will include an exercise deadline of April 24, during the last week of class.

Hopefully, the in-class exercises will engage you with the course materials immediately so that you can learn by doing. The out-of-class exercises should give you an opportunity to practice the programming language concepts in a whole program as we learn them, instead of just trying to apply concepts when you're working on a homework.

I understand that students sometimes have to miss class, or forget about an (out-of-class) exercise. You'll get to drop your three lowest in-class exercise grades and your three lowest out-of-class exercise grades. You'll also get to drop 5 percent of the remaining grade from each of these categories. This is our mechanism for handling any missed exercises (both in and out of class); it will let you miss a few and do poorly on a few more without any penalty to your final grade.

Homework Assignments

In addition to the frequent, small programming exercises, you'll complete six homework assignments. These will give you a chance to use what you're learning to solve larger, more interesting problems. As these homeworks are assigned, they will be posted to the course homepage. Electronic submission of homeworks will normally be due at 11:00 on their due date, with the last homework due April 20.

If you have a conflict on the due date, just plan to complete and submit your homework early. Since homework submission is electronic, you can even submit your work while you're away if you have to travel. If a documented emergency (e.g., hospitalization) prevents an assignment from being submitted, that assignment will simply be dropped from the student's homework average.

All homework deliverables (code modules, test cases, Makefiles, etc.), as specified in the assignment, must be submitted electronically by the due date. Penalties and policies regarding late work submissions are stated in the "Late Work" section of the syllabus.

It is the student's responsibility to ensure that all submissions are made to the appropriate submission tool and that the submission contains the materials that the student wants graded. The teaching staff will evaluate the ***last*** submission made for a project part. Verify all submissions.

If the homework deliverables consist of a coded solution, your program must compile and run on the "Common Platform" as outlined on the course website. Penalties for non-compiling or non-executing deliverables are outlined in the grading rubric for each homework assignment.

All deliverables are to be your own work, unless you are allowed to collaborate with an assigned classmate as described in the assignment (and then the deliverables must be your and your partner's own work). Penalties and policies regarding academic misconduct are defined in the "Academic Integrity" section of the syllabus.

Exams

We have three exams in this course, two in-class preliminary exams on February 15 and March 28 and a final exam on Monday, May 2, 1:00p-4:00p, as scheduled by the university. Material in this course builds from basic language elements to larger ideas and constructs. This affects the exams. The second exam is intended focus on material covered since the first exam, but a good understanding of all previous material is necessary to do well on this exam. The final exam is intended to be comprehensive.

All exams are closed book, but students are permitted to bring one 3 × 5 note card to each exam. You may use both sides of your card, but your card must be hand written by you, with your name on it. Note cards will be collected after each exam.

There will be no makeup exam given because of absences during the scheduled exam times. Exception will be made only for emergency cases such as hospitalization. You need to contact the instructor as soon as possible and provide appropriate documentation in order to be excused from an exam or to take a makeup exam. Be sure to check your calendars, and don't plan to be away during the scheduled exam times.

Time

You are expected to spend, on **average**, 6 to 12 hours per week outside of class preparing and working on assignments. In some weeks, especially those around homework deadlines, you may spend more than 12 hours on course work. Please plan and use your time wisely. Do NOT wait until the last minute to complete homeworks!!!

Course Policies

Computers and Electronic Devices

Students are encouraged to use computers and other electronic devices like tablets during class. The teaching staff asks that students respect their neighbors and keep their focus on course materials rather than games, FaceBook, etc. Electronic devices are required for submission of exercises. You may not record the lecture without express written permission from the instructor.

Class Communication

We will use Piazza for out-of-class discussions. A link is provided on the course homepage. Students are welcome and encouraged to post questions and are requested to help answering other students' questions.

There are three requirements for all posts to the message board.

- The post must be courteous to and respectful of students, staff, and the University community.
- Before you post a new question, have a quick look to see if the same question has already been asked (and maybe answered). Reducing duplication in the discussion board will make it more useful to everyone.
- Students must consider the academic integrity expectations and the difference between answering a question and providing a solution. It's OK to help out by explaining a problem you had, posting sample input and output, or pointing out a tricky special case. It's not OK to post your code (even broken code) when you're asking for help, and it's not OK to post a working solution (even in part) when you're trying to help someone else out.

In addition to the course homepage in Moodle and the Piazza message board, there is a mail alias for the course. Email csc230-001-sup@wolfware.ncsu.edu to reach the instructor and all TAs for the course. The teaching staff will also use a class wide email alias to provide time-sensitive and important information, such as a change in the due date for a homework assignment. You will want to make sure that your preferred email address is registered through MyPackPortal.

Grade Appeals

On exams and programming projects, the instructors establish guidelines for grading, and grading responsibility is shared with Teaching Assistants and graders. Instructors supervise the teaching assistants and spot check some of their work. If you believe an error has been made on a homework assignment, write up a short description of your case and send it to the TA responsible for that part of the project (email is fine). The instructor MUST be cced on the email.

The teaching assistant will consider your appeal and adjust your grade if necessary. If you are not satisfied with the decision made by the TA, then take the appeal to the instructor, who will make the final decision.

Students have one week from when project or exam is returned to begin an appeal. The one-week clock starts even if a student is absent the day assignments are returned or posted. These limits obviously can't apply to any assignment or exam graded within a week of the end of the term. For those assignments, appeals must be made before 11:00 am on May 1.

Minimum Grade Requirements

In order to receive a final grade of D- or higher, you must have an average of 50% or higher on all three exams and an average of 50% or higher on all of the homeworks. Students failing to meet these requirements will receive a grade of F for the course.

Instructor

Dr. Sarah Heckman (sesmith5) - *Instructor*
Email: sarah_heckman@ncsu.edu
Web Page: http://www4.ncsu.edu/~sesmith5
Phone: 919-515-2042
Office Location: Engineering Building II 2297
Office Hours:

M from 2:50p-3:50p in EBII 1221
T from 12:20p-1:20p in EBII 1221

Course Materials

Textbooks

C Programming: A Modern Approach - *K. N. King*
Edition: 2nd
ISBN: 0393979504
Web Link: http://knking.com/books/c2/index.html
Cost: 94.70
This textbook is required.

Requisites and Restrictions

Prerequisites

CSC 216 with a C or better
Class is restricted to Computer Science or Computer Science Unmatriculated students only

Grading

Grade Components

Component	Weight
In-Class Exercises	**8**
Out-of-Class Exercises	**8**
Homework Assignments	**40**
Exam 1	**12**
Exam 2	**12**
Final Exam	**20**

Letter Grades

This Course uses Standard NCSU Letter Grading:

97	≤	**A+**	≤	100
93	≤	**A**	<	97
90	≤	**A-**	<	93
87	≤	**B+**	<	90
83	≤	**B**	<	87
80	≤	**B-**	<	83
77	≤	**C+**	<	80
73	≤	**C**	<	77
70	≤	**C-**	<	73
67	≤	**D+**	<	70
63	≤	**D**	<	67
60	≤	**D-**	<	63
0	≤	**F**	<	60

Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to http://policies.ncsu.edu/regulation/reg-02-20-15.

Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found at http://policies.ncsu.edu/regulation/reg-02-20-04.

The grade of "AU" will be awarded to students who earn an average of 60% or higher on the exams and have attempted all exams.

Policies on Incomplete Grades

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at http://policies.ncsu.edu/regulation/reg-02-50-3.

Late Assignments

If you miss the submission deadline for a homework assignment, you can submit it late for a 20 percent penalty. Late homework submissions will normally be accepted for 24 hours after the regular submission deadline.

If you make a homework submission before the due date, then, after the due date, you realize that you’ve made a mistake, you can still make a late submission if it’s within 24 hours of the deadline. Of course, you’ll need to decide whether it’s better to lose points for a mistake on an on-time submission or to lose 20 percent for a perfect but late submission. In general, you’ll earn more points with a correct-but-late submission than you will with a broken-but-on-time submission.

No late submissions will be accepted through email.

No exercises (in-class or out-of-class) will be accepted late.

Attendance Policy

For complete attendance and excused absence policies, please see http://policies.ncsu.edu/regulation/reg-02-20-03

Attendance Policy

Attendance to lecture is mandatory (this is a 200-level course)!

Absences Policy

Excused absences are defined in the NC State Academic Policy on Attendance Regulations (http://policies.ncsu.edu/regulation/reg-02-20-03). **Documentation of the absence is required to excuse an absence.**

- Exam makeups will only be given with a documented excused absence.
- Homework extensions will only be given with a documented excused absence. An alternative assignment may be provided depending on circumstances.
- Exercise waivers will only be given with a documented excused absence.

All anticipated absences must be presented to the instructor no later than one week before the absence. All emergency absences must be turned in no later than one week after the student's return date. All other absences will be unexcused.

A maximum of 4 class periods per semester may be missed due to excused absences. Any number of excused absences beyond four will only be allowed with special permission of the instructor.

Makeup Work Policy

All homeworks and exams must be made up within one to two weeks of the absence and the timeframe will be determined through discussion between the instructor and student. If a homework assignment has already been returned, the instructor may request the student to complete an alternative assignment. No exercises will be made up.

Academic Integrity

Academic Integrity

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at http://policies.ncsu.edu/policy/pol-11-35-01

All work that you turn in for grading must be your own! This means that all work must be an independent and individual creation by you. Any attempt to gain an unfair advantage in grading, whether for yourself or another, is a violation of academic integrity. You may only work on an assignment with another student(s) in the class if explicitly stated in the assignment.

Students who cheat on a homework, exercise, or exam will receive a -100 for the assignment!!!

Cheating is worse than not turning in the assignment. All cases of academic misconduct will be reported to the Office of Student Conduct. A first offense will place the student on Academic Probation for the remainder of their academic career. A student's status on Academic Probation may affect financial aid and be reported to groups that request the information, like Park Scholars, ROTC, graduate schools, etc. Letters of recommendation will not be provided for any student that has been found guilty of or admitted to an academic integrity violation in my class(es).

The Computer Science department uses software that detects cheating violations for programming projects. Do not use other student's code, do not share your code, do not copy or use code from someone who took the class X semesters ago, do not use code from online.

The only people that you MAY receive help from are your instructor and the TA(s) for CSC230. You may use any of the resources provided by the teaching staff on the course website.

You MAY also reference your textbook, the textbook website, the C Standard Library documentation, and the C++ Standard Library documentation.

You MAY NOT receive help from anyone or anything else.

Examples of Cheating (this list is NOT exhaustive):

- to give any student access to any of your work which you have completed for individual class assignments.
- It is cheating AND plagiarism to use another person's work and claim it as your own. You are expected to complete all assignments on your own, unless otherwise specified in the assignment.
- to interfere with another student's use of computing resources or to circumvent system security.
- to email, ftp, post on the Internet, bulletin boards, message boards, etc. your work for others to obtain. Do NOT use sites that allow you to "anonymously" post code. Those sites are searchable, and others may find your code (like the teaching staff).
- to ask or pay another person or persons to complete an assignment for you.
- It is cheating AND plagiarism to decompile any compiled code and use the decompiled source code as your own. You may also break the law by decompiling code.
- It is cheating AND plagiarism to use code that you find online.
- to give another student access to your account (NC State account or others that you use for university work) or to give them your account password.
- for you and another student to work collaboratively on an assignment, unless otherwise specified by the assignment.
- to circumvent the intention of the assignment and/or the automated grading system (e.g., by hardcoding test case solutions).

Examples of NOT Cheating (this list is NOT exhaustive):

- Using the code from the class website (with citations in the comments).
- Using code from other programs YOU wrote.
- Using code from other programs that YOU and a partner wrote as part of assigned exercises.
- Help from TAs or instructor (with citations in the comments).
- Using code from the textbook or textbook website (with citations in the comments).

Example Citations

/* (In file or function level comments)

* I received help from Dr. Heckman on *date* during her office hours. We discussed X.

```
*/
```

```
/*
* The code for this method is based on Exercise Y that I completed with Z on date.
*/
```

Protecting Yourself

- Do not leave papers lying around your workstation.
- Do not dispose of important papers in the lab recycling bins and trash cans until after the assignment is graded.
- Do not give out your password.
- Do not leave your workstation unattended or forget to log yourself out.
- Do not leave your laptop unattended.
- Do not give other students access to any of your workspace or email them any code.
- Do not give other students access to your course materials or your personal computer.
- Do not email, ftp, or post your code on the Internet, message boards, etc.
- Keep all copies of final an intermediate work until after the assignment is graded.
- Keep all graded assignments until after you receive the final grade for the course.
- Do not discuss implementation details of the assignment with your peers.

Forum Use

The forum is available to ask questions about assignments and tests. **Do NOT post any code publically to the forum!** The teaching staff reserves the right to edit any student's forum post for inappropriate content.

Academic Honesty

See http://policies.ncsu.edu/policy/pol-11-35-01 for a detailed explanation of academic honesty.

None.

Honor Pledge

Your name on any test or assignment **or** the electronic submission of an assignment through Moodle or other class courseware system indicates "I have neither given nor received unauthorized aid on this test or assignment."

Electronically-Hosted Course Components

Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics, and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

Electronically-hosted Components:

The following materials are electronically-hosted for use by students through a combination of Moodle, Wolfware Classic, Google Docs (through NC State), a teaching staff managed VCL server for automated grading, and Piazza: lecture notes, message boards, electronic submission of assignments, electronic submission of exercises.

EOL provides the video of the lectures for use by students enrolled in Section 002.

Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office (http://www.ncsu.edu/dso), 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at http://policies.ncsu.edu/regulation/reg-02-20-01.

Support Fellow Students in Distress

As members of the NC State Wolfpack community, we each share a personal responsibility to express concern for one another and to ensure that this classroom and the campus as a whole remains a safe environment for learning. Occasionally, you may come across a fellow classmate whose personal behavior concerns or worries you. When this is the case, I would encourage you to report this behavior to the NC State Students of Concern website:http://studentsofconcern.ncsu.edu/. Although you can report anonymously, it is preferred that you share your contact information so they can follow-up with you personally.

Non-Discrimination Policy

NC State University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at http://policies.ncsu.edu/policy/pol-04-25-05 or http://www.ncsu.edu/equal_op/. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Course Schedule

NOTE: The course schedule is subject to change.

Intro and C Fundamentals — 1/8/2015

Intro and C Fundamentals

IO, Compilation, and Parsing — 1/11/2015

IO, Compilation, and Parsing

Version Control and Build Automation — 1/13/2016

Version Control and Build Automation

Variables, Expressions, and Types — 1/20/2016

Variables, Expressions, and Types

Scanf and Type Conversion — 1/25/2016

Scanf and Type Conversion

Program Structure — 1/27/2016

Program Structure

Arrays — 2/1/2016

Arrays

Pointers Part 1 — 2/3/2016

Pointers Part 1

File IO and Functions — 2/8/2016

Functions

Pointers Part 2 — 2/10/2016

Pointers Part 2

Exam 1 — 2/15/2016

The exam will cover all materials through Pointers Part 2.

Strings — 2/17/2015

String Processing

Pointers Part 3 — 2/22/2016

Pointers Part 3

Dynamic Memory Allocation — 2/24/2016

Dynamic Memory Allocation

Debugging — 2/29/2016

Debugging

Structs — 3/2/2016

Structs

Data Structures — 3/14/2016

Data Structures Part 1

Bitwise Operators — 3/16/2016

Bitwise Operators

The C Standard Library — 3/21/2016

The C Standard Library

The Preprocessor — 3/23/2016

The C Preprocessor

Exam 2 — 3/28/2016

The exam will cover all materials through the Preprocessor

More Data Structures and Object Orientation — 3/30/2016

More Data Structures and Object Orientation

Security — 4/4/2016

Security

The Rest of C — 4/6/2016

The Rest of C

Performance — 4/11/2016

Performance

C++ Part 1 — 4/13/2016

C++

C++ Part 2 — 4/18/2016

More C++

C++ Part 3 — 4/20/2016

Even more C++

C++ Part 4 — 4/25/2016

The last part of C++

Exam 3 — 5/2/2016

The exam will cover all topics covered in the course.

Homework 1 Deadline — 1/13/2016

The project is due at 11:00p. Late submissions are allowed for an additional 24 hours.

Homework 2 Deadline — 2/3/2016

The project is due at 11: 00p. Late submissions are allowed for an additional 24 hours.

Homework 3 Deadline — 2/24/2016

The project is due at 11: 00p. Late submissions are allowed for an additional 24 hours.

Homework 4 Deadline — 3/16/2016

The project is due at 11: 00p. Late submissions are allowed for an additional 24 hours.

Homework 5 Deadline — 4/6/2016

The project is due at 11: 00p. Late submissions are allowed for an additional 24 hours.

Homework 6 Deadline — 4/20/2016

The project is due at 11: 00p. Late submissions are allowed for an additional 24 hours.