CSCE 240: Advanced Programming Techniques

UNIVERSITY OF SOUTH CAROLINA

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office hours[1] — TTh 9:55–10:55 am, 4:30–5:30 pm, and by appointment, Jan 10th–Apr 25th, 2022

Course Details

Section: 003

Meeting Time: TTh 2:50–4:05 PM, Jan 10th–Apr 25th

Meeting Location: Swearingen 2A14

Credit Hours: 3

Bulletin Description: Pointers; memory management; advanced programming language structures: operator overloading, iterators, multiple inheritance, polymorphism, templates, virtual functions; Unix programming environment.

Prerequisite(s): Grade of D or better in CSCE 215, grade of C or better in CSCE 146.

Learning Objectives

- Independently design and implement C++ programs in a Unix environment
- Demonstrate mastery of pointers, iterators, memory management including object creation and destruction, and parameter passing in C++
- Demonstrate mastery of object-oriented programming concepts including: inheritance, polymorphism, operator overloading, template functions and classes, and the use of STL containers.
- Develop object-oriented models using UML

All learning outcomes of the remote section are equivalent to face-to-face (F2F)section outcomes.

Text

Walter Savitch, *Absolute C++* 6th ed., Pearson, 2016

All reading/materials comply with fair/use policies.

Course Overview

This course is synchronous and in-person. Attendance is mandatory as described in the Course Delivery section below. Students unable to attend a synchronous session will face no prescribed course penalties.

Student-to-Instructor Interaction — There will be two synchronous, in-person course meetings each week. Those meeting times and locations can be found in Course Details section, above.

Student-to-Content Interaction — Students will complete readings from the course text[2], submit programming assignments (based on reading assignments and lecture), and take written in-class exams.

Communication Response Time — While classes are in session (Jan 10th–Apr 25th, 2022) and excluding holidays, students may expect communication to be within the following constraints:

- Program Submission feedback: five business days after submission deadline. Students should address any concerns about feedback within five business days of feedback posting.
- Exam Submission feedback: five business days after submission. Students should address any concerns about feedback within five business days of feedback posting.

Technology and Software

This course will extensively make use of blackboard.cse.sc.edu. You should check regularly and will be held responsible for anything posted on the site.

This course is taught using Unix and open source software. All software required by the course is free for download. Students are expected to be familiar with the Unix operating system (familiarity is a prerequisite for this course via CSCE 215) and help cannot be offered with other Operating Systems or software, i.e. Mac OS, Windows, Visual Studio, etc.

Topics Covered[3]

1. Unix Programming Environment: Unix tools, C preprocessor, Make, Shell, I/O redirection, debugging.
2. Unit Testing.
3. Pointers: Pointer manipulation, functions and function pointers, virtual functions.
4. Basic class management: constructors, destructors, data hiding, container classes.
5. Memory management: object creation and destruction, memory leaks.
6. Advanced C++ features: operator overloading, iteration, special containers, inheritance, code reuse, multiple inheritance, virtual functions, polymorphism, templates, template libraries.

7. Introduction to UML and object oriented modeling: usecase models, object identification, specifying static behavior, activity diagrams, collaboration diagrams and sequence diagrams, specifying relationships: generalization/specialization, aggregation, associations including multiplicity and roles, dynamic behavior using state diagrams.
8. Introduction to Source Control and Distributed Source Control, for example, using git.
9. Software Development Patterns.

Course Activities

Exams: There are three exams in this course covering topics from

1. Chapters 1, 2, 3, 11.1, and 4—**10 Feb 2022**[4]
2. Chapters 5, 6, 7, and 10—**24 Mar 2022**
3. Chapters 11.2, 14, 15, and 16—**28 Apr 2022 4:00 pm**

All exams must be taken in-person, during the time, and in the location for the section in which a student is enrolled. Other arrangements may be made through Disability Services but must be established prior to the exam[5] as usual.

Exam attendance is mandatory. Any student missing an exam without a medical excuse and documentation from the correct medical professional will receive a grade 0. If an excuse is accepted, then the student will have the opportunity to replace the missing Exam with her/his Final Exam grade. Documentation dated after the exam cannot be accepted. Any student missing the Final Exam will receive an F for the course.

Programming Assignments: There are six programming assignments in this course. Students are encouraged to ask the instructor for guidance and to seek help in online information repositories. Program assignments must be completed by the student submitting the assignment without programmatic help from individuals other than the instructor. Students will be given a reasonable amount of time to complete assignments for full credit.

For further information on program expectations, see the Program Expectations below.

Program Expectations: Make note of the following requirements.

– Programs must run correctly on one of the reference Linux machines in the SWGN 1D43 or SWGN 3D22 computer labs. Your program running on your personal computer is not considered valid. It must run on an official computer chosen by the "client" (the instructors). Note, these are the same machines used in the prerequisite course.[6]
– Programs that do not compile will not receive execution credit.
– Programs that crash during execution will not receive execution credit.

- Programs that go into infinite loops during execution will receive no execution credit. Programs will be given 10s execution time for this metric, as I have not solved the halting dilemma.
- Programs that fail to have your name and copyright information in the header documentation of ALL files (header and implementation code) will receive zero credit.
- Programs are expected to process any input file that meets the same format description as the sample data provided. For grading purposes, programs **will** be executed with different data with the same format.
- It is not enough for your programs to compile and pass correctness tests, they must also be styled correctly and documented. We will be following the Google Style guidelines found at:
  https://google.github.io/styleguide/cppguide.html.
  You may download the Google's free cpplint Python3 application to ensure that you are correctly following the style guidelines.
- Submissions will be graded roughly as follows: 80% for correct execution, 20% for correct organization, style, and documentation. It is also true that we tend to be a little more lenient on organization, style, and documentation for the first programming exercise than on later programs so as not to penalize you excessively for an initial misunderstanding of our standards.
- All submissions from all sections will be submitted to the MOSS website at Stanford for plagiarism detection purposes.

Grading

Programming:	50%	A	≥ 90.0	C	≥ 70.0
Exam 1:	15%	B+	≥ 85.0	D+	≥ 65.0
Exam 2:	15%	B	≥ 80.0	D	≥ 60.0
Exam 3:	20%	C+	≥ 75.0	F	< 60.0

Students With Disabilities Resource Center

Students with disabilities should contact the Student Disability Resource Center. The contact information is below:

1705 College Street, Close-Hipp Suite 102,
Columbia, SC 29208
Phone: 803.777.6142
Fax: 803.777.6741
Email: sasds@mailbox.sc.edu
Web: https://sc.edu/about/offices_and_divisions/student_disability_resource_center/index.php

These services provide assistance with accessibility and other issues to help those with disabilities

be more successful. Additionally, students with should review the information on the Disabilities Services website and communicate with the professor during the first week of class. Other academic support resources may help students be more successful in the course as well.

Library Services (http://www.sc.edu/study/libraries_and_collections)
Writing Center (http://www.cas.sc.edu/write)
CarolinaTechZone(http://www.sc.edu/technology/techstudents.html)

Academic Integrity

All students must review the Office of Academic Integrity sanctions.This information may be found at USC Honor Code Sanctions One or more of the following sanctions may be imposed for Academic Integrity violations:

1. Expulsion from the University,

2. Suspension from the University for a period of no less than one semester, and/or

3. Probation.

A combination of the above sanctions may be implemented. It should be noted that submitting someone else's work is cheating and against the Carolina Code. Cheating, or any other Academic Integrity violations, will result in failure of the course for all involved parties.All parties will also be referred to the Office of Academic Integrity for additional retribution. Contact Information: Byrnes 201, 803.777.4333 https://www.sa.sc.edu/academicintegrity

In addendum, any student found to upload solutions to this class' problem set to a public repository or any plagiaristic website like Chegg or Course Hero, at any point, will receive an automatic F for this course in addition to any sanctions imposed by Academic Integrity. Such willful violation cannot be excused.

Course Delivery

This is an in-person synchronous course. Attendance is mandatory. Though amenities will be provided when possible, there can be no guarantee of availability to in-class materials outside of class or a guarantee of in-class submissions accepted outside of class. You will need to attend class. I cannot maintain additional online sections of courses along with the in-person sections. I do not have the resources.

Students suffering from any contagious or unknown illness should not attend class. Students should instead go to campus health and see a health professional. In addition to helping contain the spread of sickness, it will provide you with documentation for your absence or absences. Without correct documentation from a reasonable source, assignments, quizzes, and exams cannot be submitted late, made up, or dropped. With correct documentation, an Instructor of Record (in

many cases) must attempt to provide reasonable accommodations by law and University Policy.

Students experiencing emotional distress should contact Mental Health in University Heath Services. If short-term distress becomes a long-term problem, documentation may provide an avenue for consideration. Documentation of work with counselors and therapists is not listed in the prescribed reasons for excused absence, but provides documentation that may be useful in extreme cases e.g., a hardship withdrawal. Additionally, working with a counselor or therapist may allow a student to reduce or manage distress.

COVID-19 Considerations

The following section outlines the University of South Carolina's response to the COVID-19 global pandemic as it directly affects this course.

Masks While inside university buildings (and therefore inside classrooms), the university has instituted a campus-wide mask mandate.[7] Masks are to be worn correctly over nose and mouth at all times while inside buildings and public transportation to prevent the spread of the COVID-19 virus. If a student is not wearing a mask or is wearing her or his mask incorrectly, the steps prescribed to the Instructor of Record are as follows:

1. Request that the student in question put on her or his mask or adjust its fit to correctly cover both nose and mouth.

2. If a student refuses to put on or wear mask correctly, request that student leave the class.

3. If a student refuses to comply with either request, report student to Student Conduct. This is the final step taken by faculty.

Contact Tracing In classrooms with students seated closer than 6 feet, students' seating organization must be observed.[8] Instead of assigned seating or a seating chart with students noting where they sat each day, a photo will be taken at the beginning of lecture each day. Students are encouraged to sit in the same location each class so that infection tracing can be most effective.

Notes

[1]Office hours may be virtual, as necessary.
[2]See Course Materials section
[3]This list may be extended or abridged at my discretion.
[4]This date and the second midterm date are tentative.
[5]see Students With Disabilities Resource Center section
[6]If you are unable to remotely connect to these machines, you should resolve that as soon as possible.
[7]See Face Coverings section at the Safety Guidelines website.
[8]See "Do I need a seating chart for the classroom?" at the Keep Teaching website.