San José State University
Computer Science Department
CS144-01, Advanced C++ Programming, Fall 2016

Course and Contact Information

Instructor:	Leonard Wesley
Office Location:	MH 212
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Office Hours:	Tuesdays and Thursdays 3:00PM – 4:00PM
Class Days/Time:	Tuesdays and Thursdays 4:30PM – 5:45PM
Classroom:	MacQuarrie Hall (MQH) 222
Prerequisites:	CS 46B and CS 49C (with a grade of C- or better in each), or equivalent knowledge of object-oriented programming and C, or instructor consent. *Students who do not provide documentation of having satisfied the class prerequisite requirements by 3:00PM on the Septembe 1st class meeting, then they will be dropped from the class. Fals prerequisite requirements will result in a F grade for the entire course – no exception.*

Catalog Course Description

Advanced features of C++, including operator overloading, memory management, templates, exceptions, multiple inheritance, RTTI, namespaces, tools.

Expanded Course Description

Students will extend current knowledge of basic C and C++ language constructs such as strings, numbers and objects, control flow, functions & argument passing, classes, vectors & arrays (1D, 2D, and 3D), pointers, inheritance, streams, and data structures (including list, stacks, queues, de-queues, recursion, trees (including AVL, Binary Search Trees, B-trees, and Red-Black Trees), sorting

(including quick sort, simple sort, merge sort, selection sort), search (including linear and binary search), hashing, order of complexity of algorithms (i.e., Big O notation), and linked vs. non-linked implementation of data objects.

Students will be expected to know and be capable of applying the above C++ programming constructs and concepts while studying and applying advanced topics and constructs such as the STL (Standard Template Library), operator overloading, memory management, templates, exception handling, multiple inheritance, RTTI (Run Time Type Identification), namespaces, and various C++ related tools/libraries/modules. Several intermediate sized and one culminating C++ programming team-based project will be included in the course. Each team will also be required to give a short presentation on their project.

Course Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Understand and apply advanced C++ constructs and concepts such as the STL (Standard Template Library), operator overloading, memory management, templates, exception handling, multiple inheritance, RTTI (Run Time Type Identification), namespaces, and various C++ related tools/libraries/modules.
2. Apply the advanced C++ constructs covered in this course to the design and implementation of moderately sophisticated C++ applications.

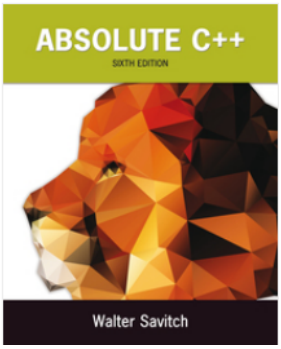
Course Web Page and Messaging

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on the course shell available from the eLearning platform Canvas at: https://sjsu.instructure.com. You are responsible for regularly (i.e. every couple of days) checking with the messaging system through Canvas. It is also recommended that you setup your course Canvas shell account to forward any email sent via Canvas to any non-SJSU email address that you tend to check frequently.

Required Texts/Readings

Absolute C++ 6th Edition 2016 by Walter Savitch, Contributor Kenrick Mock, Published by PEARSON,

- Print ISBN: 9780133970784, 0133970787
- eText ISBN: 9780133970944



Other Readings

- **Big C++** by Cay S. Horstmann (Author), Timothy A. Budd (Author), 2nd, ISBN-10: 0470383283 **(online http://www.coursesmart.com/IR/3596860/9780470383285?__hdv=6.8)**
- **The C++ Programming Language** by Bjarne Stroustrup, 3rd, Addison Wesley, ISBN 0-201-88954-4.
- **Problem Solving with C++** by Walter Savitch, 8th edition, Addison Wesley, 2011, ISBN 9780132162739.
- **Thinking in C++** by Bruce Eckel, 2nd edition, Volume 1 & Volume 2, free electronic versions: http://www.ibiblio.org/pub/docs/books/eckel/

Other Material (available from the class Canvas shell):

- Online resources
- Handouts

Software requirements

You may use any C++ environment for your programming assignments. However, the instructor will use the cygwin C/C++ environment for demonstrating and testing code. It is highly suggested that you use the latest cygwin

environment. You must also bring your personal laptop to each lecture. NOTE: Course C++ code that is provided by and tested by the instructor and/or TA will be generated and tested using cygwin GNU C/C++ environment (version 2.5.x). Generally, you code should be compatible with cygwin ver. 2.5.x if your version of cygwin is very close to this version.

- WINDOWS: See http://cygwin.com/ for information about how to download and install cygwin for your PC-Windows laptop/computer.
- MAC: See http://cygwin.winsite.com/mac/ for information about how to download and install cygwin for a Mac laptop/computer. NOTE: the instructor will be using the Windows version of Cygwin. There might be differences between the Mac and Windows versions of cygwin that preclude ANSI code successfully compiling and running on both systems. Therefore, if you develop code using the Mac cygwin environment, then you should make sure your code runs successfully on a Windows cygwin version as well.

Other equipment / material requirements

Students should make sure that they have access to sufficient computational resources, e.g., relatively recent laptops or workstation and OSs that will allow the completion of in-class and out-of-class homework and exercises. In addition, quizzes and exams are likely to be given via the Canvas shell. Unless the classroom has workstations, students will be required to use personal laptops to log into the Canvas Shell in order to take and complete quizzes and exams. If a laptop “hangs” or “crashes” and preludes the student from continuing with the quiz/exam, the Canvas clock that is timing the quiz/exam for that student will stop. If and when you resolve the problem with your laptop (e.g., reboot) and then log back into the Canvas exam, then you will have an amount of time to complete the quiz/exam that is equal to the time you had left when your laptop computer ceased to communicate with Canvas. It full period exams, you will need to terminate the exam shortly before the next class begins in the classroom. Completing the exam outside of the classroom will not be permitted.

Course Requirements and Assignments

Students will be assigned textbook chapters, homework, web sites, video and or related multi-media or electronic copies of C++ programming topics almost on a weekly basis. Students will be expected to complete assignments by the published due date. A 10% reduction in the max score will be applied within every 24hrs the assignment is late starting with the published due date and time.

All assignments that require a submission will need to be uploaded to the indicated Canvas Assignment unless directed otherwise. In-class instruction will consist of a short quiz, from time to time, at the start of selected classes to test comprehension of assigned material. The schedule for short quizzes is posted in the weekly schedule below. Some classes will be primarily lectures. Other classes will consist of in-class group exercises where teams of 3-4 students will work on in-class programming exercises over one or two 75 minute class periods. Exceptions might be if a guest lecture or other relevant course-related activity is scheduled. Team participation for in-class exercises is critical to achieving the learning objectives of the course. Therefore, attendance and participation on in-class exercises teams will count toward a student's course grade as specified in the "Grades" section below. An attendance sheet might be distributed and must be signed by each student during class in order to determine and confirm attendance.

Students should expect to spend approximately nine (9) hours per week (on average) completing the assigned course work outside of the classroom. This includes viewing videos, homework, in-class lecture and in-class exercise time. The amount of time that a student actually spends will depend on individual skill and the time allocated to the course. The nine (9) hours per week estimate is based on the previous experiences of the instructor and students. So please plan and schedule accordingly.

Previously, students have asked for special exception to policies and procedures for this course. An example includes asking the instructor for extra assignments

or work to help improve a student's grade. Even if such a request is reasonable in the view of the instructor, no exception will be given to a student unless it can be made available to the entire class, AND if the request does not constitute significant extra work on the part of students, instructor, graders and so forth. Students should have no concern that other students will receive special exceptions that will not be available to them to pursue.

Quizzes and Exams:

There will be approximately four quizzes and two exams and a project-related final exam during the semester. The lowest of the four scheduled quizzes will be dropped. No exam scores will be dropped.

Makeup quizzes and exams will only be given for documented, verifiable and a compelling reason (e.g., medical reason) for missing the quiz or exam. Documentation must be provided within one week of the quiz or exam date, or at the earliest documented and verifiable date when the student is able to contact the instructor.. Makeup quizzes and exams might be more challenging in proportion to the length of time between the date of the original exam and the makeup exam. There will be just one makeup quiz/exam day on Saturday December 10th starting at 8:00AM in room MH 225. If you are allowed to take multiple make up exams or quizzes, then all of them must be taken on December 10th.

Scores on quizzes and exams will count toward the final grad (percentage wise) as specified in the "Grades" section below. In general, exams will be cumulative, and quizzes will cover topics from the previous quiz or exam. By "topics" we mean material presented in class or assigned in any and all previous weeks of the course unless specified otherwise. Once a quiz or exam starts, if a student leaves the classroom, they will not be allowed back into the classroom until the quiz or exam is over. Students should make sure they go to the restroom before the quiz or exam begins.

Quizzes and exams will typically start 5 minutes after the scheduled class start time. To minimize disruption to students that are taking the exam, the door to the classroom will be closed ~5 minutes after the start of a quiz or exam, or ~10 minutes from the scheduled class start time. The door will be opened after the quiz and exam is over.

Projects:

Several C++ programming project topics will be presented near the start of the course. Teams of 3-4 students will be formed to work on selected projects. Teams will be required to submit a project proposal before starting on a project, and give a project presentation at the end of the course. Individual student scores on a programming project will be determined by the content and quality of the contribution of each individual student toward the project. Further details will be provided in a project info and report document.

Scores on final programming projects, and project presentation will count toward the final grad (percentage wise) as specified in the “Grades” section below.

NOTE: University policy F15-12 at http://www.sjsu.edu/senate/docs/F15-12.pdf states that “Students are expected to attend all meetings for the courses in which they are enrolled as they are responsible for material discussed therein and active participation is frequently essential to ensure maximum benefit to all class members. In some cases, attendance is fundamental to course objectives; for example, students may be required to interact with others in the class. Attendance is the responsibility of the student. Participation may be used as a criterion for grading when the parameters and their evaluation are clearly defined in the course syllabus and the percentage of the overall grade is stated.”

Classroom Protocol

MH222 is a dual purpose room. It can be a regular lecture room or used as a computer laboratory, for example during in-class exercises. Please note that “or”

in the last sentence is exclusive. In other words, MH222 is never a lecture room AND a computer lab at the same time.

Lecture Mode: This is when MH222 is used as a regular lecture room. Students are expected to listen and follow the lecture. MH222 can be a noisy room because of students typing on laptops. Be considerate to your classmates and follow the lecture. Do not use the computer (workstation/laptop) during lectures if your typing is disturbing to others, and do not talk to your classmates during lectures. Do not use your laptops/workstations to check email, web-chat, tweet, web-surf on the internet, and so forth. If you cannot follow these simple rules, please do not enroll in this class.

Lab Mode: This is when MH222 is used as a computer lab for in-class exercise, Canvas exams, and related assignments that involve the use of computers. Use the computers and share your ideas and solutions with your classmates except during exams or when otherwise instructed. For in-class exercises, the results of your work for that class session will need to be uploaded to an appropriate Canvas assignment for review and grading. We shall alternate between the two modes. A typical in-class exercise class will begin with a short lecture to describe the in-class exercise that will reinforce the assigned lecture video or lecture. This will be followed by a hands-on (Lab Mode). There will be a number of in-class exercises or hands-on-exercises. The purpose of the in-class exercises and hands-on exercises is to develop your understanding of the course, lecture, and video materials.

Grading Policy

Quizzes (1st Lowest of 4 scores dropped)	(20 pts each)	x 3 quizzes	=	60 pts
Exams	(100 pts each)	x 2 exams	=	200 pts
Programming Assignments	(100 pts each)	x 5	=	500 pts

In-Class Exercise Participation	(8 pt each)	x ~5	= 40 pts
Final Exam (i.e., Proj.Rpt. 150pts & Presentation 50pts)			= 200 pts
Total Course Points*			= 1000 pts

*Total Course Points

** The instructor reserves the right to adjust the above point distribution by ±5% if there are exam or quiz questions, as well as homework or in-class exercises that are deemed, by the instructor or department, as overly difficult or overly easy. Notice of any adjustment to the point distribution will be announced in class or via email at least 1 week from when the instructor or department recognizes an adjustment is warranted. The total points might change if and when the number or type of assignments change. Notice that the total points for the course might change if the number of in-class exercises changes.*

Note that "All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades." See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

Questions About Quiz and Exam Grades:

Students must present questions about quiz, exam, and project scores to the instructor within fourteen (14) days from the date that the quiz, exam, and project scores are posted or returned to the class. No questions or concerns will be accepted after fourteen (14) days from returning or posting quiz, exam, and project scores.

Grading Percentage Breakdown

Percentage of Total Course Points	Letter Grade

93.33% an above	A
90% - 93.32%	A-
86.66% - 89.99%	B+
83.33% - 86.65%	B
80% - 83.32%	B-
76.66% - 79.99%	C+
73.33% - 76.65%	C
70% - 73.32%	C-
66.66% - 69.99%	D+
63.33% - 66.65%	D
60% - 63.32%	D-
Below 60%	**F**

Homework assignments: Individual, regularly assigned homework assignments will include small programming assignments from the textbook, and perhaps from online resources. Possible solutions will be posted shortly after the due date of the assignment. The homework is a tool for you to learn the material and prepare you for the tests. However, homework assignments will not be graded.

Reading and/or Video Assignments: Reading and or video viewing assignments will assigned regularly and typically intended to be completed before the next class or as indicated.

Quizzes: quizzes (total 4 & drop the lowest score) will be given during class, each taking between 5 to 15 minutes total. These will generally be problems that probe knowledge and comprehension from the reading/video assignments,

homework, lectures, and in-class exercises. Quizzes will contain multiple choice questions, short answer questions and questions that require writing code.

Exams: Exams (total2) will be cumulative and given during class, each taking up to 75 minutes total. These will generally be problems that probe knowledge and comprehension from the reading/video assignments, homework, lectures, and in-class exercises. Exams will contain multiple choice questions, short answer questions and questions that require writing code.

Class Participation: Participation with in-class exercises is required and will be evaluated and count toward the total course grade as previously described.

Programming assignments: There will be programming assignments that will cover each major topic covered in the course. Programming assignments are to be done individually, unless otherwise specified. They can be discussed with others, in terms of what is required, but should be implemented individually. More information will be given at the time of the first programming assignment. ***Never use any code you find on the web, unless it is given by the instructor. If plagiarized code is used, a zero score will be given for the assignment and an academic integrity report submitted to the university. If code is plagiarized for two or more times, a grade of F will be given for the course. Additionally, you may be disqualified from getting an A/B/C/D grade unless you get at least 5/4/3-2/1 program(s) to work totally correctly and as specified, respectively.***

Final Exam: The final exam will consist of a team-based course programming project. Information will be provided about possible project topics, requirements, and how individual grades for team members will be determined.

Classroom Protocol

Attendance is highly recommended. Please avoid disturbing the class: turn-off cell phones and pagers (or put them on vibrate mode), texting is strictly prohibited during class and quizzes and exams, chatting in the class or during a quiz or exams is prohibited, and avoid coming late.

Students are responsible for lecture, book sections, lab assignments, programming exercises, in-class assignments, quizzes, and exams.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity,

accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/"

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, and grade forgiveness, and so forth. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/**.** Students should be aware of the current deadlines and penalties for dropping classes. Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

Consent for Recording of Class and Public Sharing of Instructor Material

University Policy S12-7, http://www.sjsu.edu/senate/docs/S12-7.pdf, requires students to obtain instructor's permission to record the course.

- You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.
- Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.

Academic Integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

Instances of academic dishonesty will not be tolerated. Cheating on quizzes, exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit

for another class, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

Course Schedule

The tentative course calendar below includes reading assignments, exam dates, and date of final exam (i.e., when project reports and code is due); all exams are final, the rest (e.g., quizzes) are subject to change with fair notice.

Week	T	Th	Topics	Readings, Homework, Programming Assignments
0		8/25	Introduction Census Course Logistics Practice Canvas Quiz/Exam Cygwin g++ Compiling, Loading, Linking	See Week 0 Assignment In Canvas Review first 14 chapters of required Text (Except Chap Section 8.2)
1	8/30	9/1	8/30 Review C++ Class & Class Inheritance (Quick Review)	See Week 1 Assignment In Canvas

Week	T	Th	Topics	Readings, Homework, Programming Assignments
			9/1 C++ Operator Overloading	Continue Review first 14 chapters of required Text (Except Chap Section 8.2)
2	9/6	9/8	9/6 Templates (Quick Review) C++ Memory Management 9/8 C++ Memory Management	See Week 2 Assignment In Canvas (Chap 10 & Chap 16)
3	9/13	9/15	9/13 **In-Class Exercise-1** 9/15 **Quiz 1** (Covers Week 0 to Week 2) 9/15 Start Standard Template Library (STL)	See Week 3 Assignment In Canvas (Chap 19)
4	9/20	9/22	9/20 Possible Projects 9/20 STL 9/22 STL	No Week 4 Assignment
5	9/27	9/29	9/27 **In-Class Exercise-2** 9/29 **Exam 1 (Covers Week 0 to Week 4)**	See Week 5 Assignment In Canvas (Chap 18)
6	10/4	10/6	10/4 Exception Handling 10/6 Exception Handling	See Week 6 Assignment In Canvas (Chap 8 RTTI by BEckel Handout. See Canvas -> Course Handout -> RTTI Reading Material)
7	10/11	10/13	10/11 **In-Class Exercise-3** 10/13 **Quiz 2** (Covers Week 3 to Week 6)	No Week 7 Assignment

Week	T	Th	Topics	Readings, Homework, Programming Assignments
			10/13 Run Time Type Identification (RTTI)	
8	10/18	10/20	10/18 Run Time Type Identification (RTTI) 10/20 **In-Class Exercise-4**	See Week 8 Assignment In Canvas (Chap 20)
9	10/25	10/27	10/25 Design Patterns 10/27 Design Patterns	See Week 9 Assignment
10	11/1	11/3	11/1 **Exam 2 (Covers Week 0 to Week 9)** 11/3 Name Spaces	See Week 10 Assignment (Chap 7.2)
11	11/8	11/10	11/8 C++ Tools 11/10 **In-Class Exercise-5**	TBA
12	11/15	11/17	11/15 **Quiz 3** (Covers Week 7 to Week 11) 11/17 TBA	TBA
13	11/22	No Class	11/22 **Work On Project**	TBA
14	11/29	12/1	11/29 **Quiz 4** (Covers Week 7 to Week 13) 11/29 **Work On Project** 12/1 Project Presentations	None
15	12/6	12/8	12/6 Project Presentations 12/8 Project Presentations	None
	Monday 12/19		FINAL EXAM (Project report and code due Upload to Canvas Monday 12/19, 2016 by 5PM	