

# Advanced C++ Programming Section 01 CS 144

Fall 2023 3 Unit(s) 08/21/2023 to 12/06/2023 Modified 08/21/2023

## Contact Information

Instructor	Dominic Abucejo
Office Location	Classroom/Online Zoom meeting location (please see Zoom office hours information below)
Telephone	N/A
Email	dominic.abucejo@sjsu.edu
Office Hours	<p>Zoom Office Hours</p> <ul style="list-style-type: none"> <li>• Mornings - Tuesday &amp; Thursday from 8:15 AM to 9:15 AM PST</li> <li>• Evenings - Monday &amp; Wednesday from 8:30 PM to 9:30 PM PST</li> </ul> <p>· Appointment signup is made available via Calendly ( <a href="https://calendly.com/dominic-abucejo/office-hours">https://calendly.com/dominic-abucejo/office-hours</a> )</p> <p>· Office Zoom details are in Calendly</p>
Class Days/Time	<p>Tuesday/Thursday 6:00 pm – 7:15pm PST (Pacific Standard Time)</p> <ul style="list-style-type: none"> <li>· Instruction mode: In-Person</li> <li>· MacQuarrie Hall, Room 222</li> <li>· First day of this class starts on: August 22, 2023</li> </ul>
Prerequisites/ Grading	<p><a href="#">CS 46B</a> and <a href="#">CS 49C</a> (with a grade of C- or better in each), or equivalent knowledge of object-oriented programming and C, or instructor consent.</p> <p>Grading: Letter Graded</p>

## Course Description and Requisites

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

Prerequisite: 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.

Letter Graded

## Classroom Protocols

- This course or portions of this course (i.e., lectures, discussions, student presentations) will be provided in-person.
- Students are not allowed to record without instructor permission Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (syllabi, lectures and lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12-7) is in place to protect the privacy of students in the course, as well as to maintain academic integrity through reducing the instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office.

Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor.

- Any student that needs specific accommodations or assistive technology due to a disability should work with the Accessible Education Center (AEC), and with the instructor.
- Please note that for the Zoom online course summary meeting scheduled, it is based on the Pacific Standard Time zone (PST).
- Due to the COVID/Omicron cases, if you test positive for covid, stay at home. Arrangements for class participation will be provided.

## COVID-19 and Monkeypox Safety Training

Students registered for a College of Science (CoS) class with an in-person component should view the [CoS COVID-19 and Monkeypox Training](#) slides for updated CoS, SJSU, county, state and federal information and guidelines, and more information can be found on the [SJSU Health Advisories](#) website. By working together to follow these safety practices, we can keep our college safer. Failure to follow safety practice(s) outlined in the training, the SJSU Health Advisories website, or instructions from instructors, TAs or CoS Safety Staff may result in dismissal from CoS buildings, facilities or field sites. Updates will be implemented as changes occur (and posted to the same links).

## Program Information

Diversity Statement - At SJSU, it is important to create a safe learning environment where we can explore, learn, and grow together. We strive to build a diverse, equitable, inclusive culture that values, encourages, and supports students from all backgrounds and experiences.

## Course Goals

In this course, you learn the fundamentals of C++ programming and the core foundations associated with it. Each week is progressive where new information is introduced during each week and where the reliance of the prior information of the previous becomes more useful. As a student in this course, you will have opportunities to try and program different scenarios and to create a running C++ program. In addition to the fundamentals, each student will have the opportunity to understand and work with multiple inheritance of classes, overloading, class construction, exception handling, and multi-threaded programming, and more.

## Course Learning Outcomes (CLOs)

At the end of this course, students will have achieved the following course learning outcomes:

CLO 1: Apply object-oriented features of C++, including polymorphism and recursion.

CLO 2: Apply advanced features of C++, including operator overloading, memory management, templates, the Standard Template Library (STL), exceptions, multiple inheritance, runtime type identification (RTTI), namespaces, etc.

CLO 3: Apply modern features of C++, including lambda expressions, smart pointers, move semantics, etc.

CLO 4: Develop interactive GUI-based applications in C++ that use inversion of control and callback functions as event handlers.

CLO 5: Understand the concepts of multithreaded programming.

CLO 6: Use high-level software development tools, including an integrated development environment (IDE), compilers, linkers, and source-level debuggers to implement and debug C++ applications.

CLO 7: Write efficient programs in C++ that adhere to good design principles while avoiding pitfalls of the language.

CLO 8: Document program design with Unified Modeling Language (UML) diagrams.

## Course Materials

### Required/Mandatory Textbooks

The following online textbook (**Zybooks: Programming in C++ with zyLabs**) with online lab is mandatory for each student who is enrolled in this class. All classwork/labs and reading assignments will be done using this platform.

To register and subscribe to the Zybooks C++ Programming online resource, follow the instructions that are provided in an upcoming assignment. Please do not subscribe to this if you are not yet enrolled in the class.

A subscription is **\$89**. Subscriptions will last until Jan 03, 2024.

Please have the following the information ready when you begin your Zybooks account registration:

- Your SJSU student ID
- The above account registration information (noted above)
- Payment information for the online book subscription
- Details of accessing the online zyBooks will be provided in the Canvas course module

## Optional Texts/Readings

# Programming: Principles and Practice Using C++ (2nd Edition)

- **Publisher** : Addison-Wesley Professional; 2nd edition (May 15, 2014)
- **Language** : English
- **Paperback** : 1312 pages
- **ISBN-10** : 0321992784
- **ISBN-13** : 978-0321992789

@ Pearson ([www.pearson.com](http://www.pearson.com)) or Amazon (available for rent or purchase)

## Other Readings

Additional course readings, code examples, exercises, etc. will be assigned and will be provided by the instructor during the course.

## Other technology requirements / equipment / material

*Software requirements i.e. instructions for the installation of applications/services/tools will be described during class instruction.*

## Course Requirements and Assignments

*It is essential that you have already taken the pre-requisite courses as noted in the course description of this syllabus. CS46B and CS49C are requisite courses needed to be enrolled in this course. If you have questions regarding this, please send an email to your professor.*

Course requirements, reading materials, hands-on coding activities, and assignments contribute to and are aligned with course learning outcomes.

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

The final grade is calculated based on the percentage of the total points for all the Course Requirement and Assignments listed below:

## Final Examination or Evaluation

All Class final exams will occur during the week of December 8-14, 2023

For regular class starting times on Tuesday 5:30 through 6:25 PM, *this class's final examination will be held on:*

Tuesday, December 12 --> 5:15-7:30PM PST	
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*The exam will be comprehensive with more emphasis on topics discussed after the last midterm.*

## Grading Information

The final grade is calculated based on the percentage of the total points for all the Course Requirement and Assignments listed below:

In-Class Work	10%
Project	5%
Assignments	20%
Quizzes	15%
Midterms (x2)	30%
Final Exam	20%

### Projects

The project will be based on a theme and will be objective. The project will be 5% of the final course grade. This project will constitute the use of C++ programming based on data analysis with specific objectives such as calculating averages, means, sorting, and other topics. Information on the project, including topics and deadlines, will be given later in the course.

### Quizzes

At least one quiz per week will be issued via Canvas. Quizzes will be 10 to 15 minutes in total duration with one to three questions for each quiz. Each student must complete each quiz on time and (be done independently on Canvas).

### Assignments

- **Homework Assignments** are individual work assignments, regularly assigned, and may include written problem responses. Solutions will not be posted. Assignments will constitute 20% of the final course grade. All assignments are to be submitted via Canvas for grading. Students must submit only their own work by the posted due date. **(No late assignment submissions)**. There will be 8 to 10 assignments during the course semester. These assignments will be based on the topics of the previous and current week.
- **Reading assignments:** Reading assignments will regularly be assigned for the next week's class.

### In-Class Work

There will be in-class work activities which will make up 10% of the final course grade; these will be held daily. Class work is to be completed during class, with a due date/time on the same day. These activities will be based on the week's topics that have been lectured about.

### Midterms/Final Exam

There will be two written midterm exams during the semester. Makeup exams will only be given in cases of illness **(with signed documentation from a medical facility – original copy)**. Exams are closed book, closed notes and closed communications (unless stated otherwise during the semester). Each exam will be 15% of the final course grade. Midterms will consist of every topic taught from the first day of class and up to the week of the midterm; the second midterm is accumulative from the first day of the class.

The final has a fixed date. A makeup exam will only be given in cases of illness (with signed documentation from a medical facility – original copy). Exams are closed book, closed notes and closed communications (unless stated otherwise). The final exam is cumulative. The final exam will be comprehensive and will be 20% of the final grade. Grade percentages are typically computed and will be shown in Canvas. The grading table, below, shows the letter grade and percentage mapping.

NOTE: There will be no rounding of percentages for the final grade calculation, or for any grade category. Do not request for things such as bumping your grade from B+ to A-; you are to earn the grade.

Grade	Percentage
A+	97.50 to 100%

A	92.50 to 97.49%
A -	90.00 to 92.49%
B +	87.50 to 89.99 %
B	82.50 to 87.49%
B -	80.00 to 82.49%
C +	77.50 to 79.99%
C	72.50 to 77.49%
C -	70.00 to 72.49%
D +	67.50 to 69.99%
D	62.50 to 67.49%
D -	60.00 to 62.49%
F	Below 60.00%

## University Policies

Per [University Policy S16-9 \(PDF\)](http://www.sjsu.edu/senate/docs/S16-9.pdf) (<http://www.sjsu.edu/senate/docs/S16-9.pdf>), relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on the [Syllabus Information](https://www.sjsu.edu/curriculum/courses/syllabus-info.php) (<https://www.sjsu.edu/curriculum/courses/syllabus-info.php>) web page. Make sure to visit this page to review and be aware of these university policies and resources.

## Course Schedule

### Fall 2023 Course Schedule

Week	Date	Topics, Readings, Assignments, Deadlines
1	8/22, 8/24	<i>Course Information, Introduction to C++: C++ basics, Comments, Errors, History, Lab practice questions</i>
2	8/29, 8/31	<i>Practice with the zylabs training activities (C++ examples), lab activities, variables/assignments, data types, lab activities</i>
3	9/5, 9/7	<i>Branches, switch statements, string. Character types, lab activities</i>

Week	Date	Topics, Readings, Assignments, Deadlines
4	9/12, 9/14	<p><i>Loops, for, while, nested loops, lab activities</i></p> <p><b>Reminder:</b></p> <ul style="list-style-type: none"> <li>· 9/15: Last Day to Drop Courses without an Entry on Student's Permanent Record (D)</li> <li>· 9/15: Last Day to Add Courses &amp; Register Late (A)</li> </ul>
5	9/21, 9/23	<i>Arrays and Vectors and their methods, 2D arrays. char arrays, lab activities</i>
6	9/28, 9/30	<i>User-Defined Functions, functions with loops, unit testing, pass by reference, default parameter values, function overloading, preprocessor and include, separate files, lab activities</i>
7	10/3, 10/5	<i>Objects and Classes, inline functions, mutators and accessors, initialization and constructors, classes and vectors, separate files for classes, construction overloading, 'this' pointer, operator overloading, namespaces, lab activities</i>
8	10/10, 10/12	<i>Pointers, pointer basics, string functions with pointers, linkedlist, memory regions, destructors, copy constructors, rule of three, lab activities.</i>
9	10/17, 10/19	<i>Streams, input and output, output formatting, file input, lab activities.</i>
10	10/24, 10/26	<i>Inheritance, deriving classes, overriding member functions, polymorphism, virtual functions, abstract classes</i>
11	10/31, 11/2	<i>Is-a vs has-a relationships, UML, lab activities, Recursion, creating a recursive method, stack overflow,</i>
12	11/7, 11/9	<p><i>Exceptions, exception with functions, multiple handlers, lab activities</i></p> <p>11/10: Veterans Day</p>
13	11/14, 11/16	<i>Function and Class Templates, containers, list, pair, map, set, queues</i>
14	11/21	<p><i>Searching and sorting algorithms, binary search, o notation, algorithm analysis, sorting</i></p> <p>11/23 - 11/24: Thanksgiving break</p>
15	11/28, 11/30	<i>Engineering examples, grouping data, command-line arguments, the #define directive, makefiles</i>
16	12/5	<p><i>Introduction to multi-threaded programming, Critical regions, mutexes, and semaphores, Review</i></p> <p><b>Reminder:</b></p> <ul style="list-style-type: none"> <li>· 12/5: The Last day of CS144 class lecture</li> </ul>

Week	Date	Topics, Readings, Assignments, Deadlines
Final Exam	December 12, 2023	Tuesday, 5:15pm to 7:30pm (Late Afternoon class finals category)