

CS 525: Object-Oriented Design and Programming

Contact Information

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Course Description This course focuses on object-oriented design and programming using the C++ programming language. It is targeted at the graduate student that is already fluent in one or more programming languages. Among the language-specific topics included are pointers, pointer arithmetic, dynamic memory management, namespaces, scope, operator overloading, generic programming (templates), the Standard Template Library, and standard compliance. Object-oriented topics will cover analysis and design considerations. Students considering this course need to have programming fluency in another imperative language, preferably with some basic knowledge of C++. After successfully completing this course, students should have a much deeper understanding of the subtleties and complexities of using object-oriented facilities of the C++ programming language, the standard programming language used in the game industry today.

Goals and Objectives Upon successful completing this course, students should

- have a deep understanding of C++ programming language design
- be able to create and compile a project from the command line using GNU, Borland, or Microsoft compiler
- be able to use various GNU tools to speed up debugging and error analysis
- know C/C++ bit manipulation techniques and be able to apply them to minimize memory usage and/or program runtime
- know C/C++ expression evaluation algorithm and be able to write his/her own complex declarations
- understand C/C++ conversion rules
- be able to use aggregation and inheritance to create new classes
- have a good understanding of function and class templates
- be able to use STL containers and generic algorithm to solve complex problems

Course	Day and Time	Room
CS525	T/Th 4-5:20pm	Zoom

Textbooks and References

Required

- none

Recommended

- C++ Primer Plus on Safari

Additional references (Optional)

- *Pointers on C*, by Kenneth A. Reek. Copyright ©1998 by Addison Wesley Longman, Inc. (ISBN: 0-673-99986-6).
- *The C Programming Language*, Second Edition, by Kernighan and Ritchie. Published by Prentice Hall. Copyright ©1989 by Bell Telephone Laboratories, Incorporated. (ISBN: 0-13-110362-8).
- *The C++ Programming Language*, by Bjarne Stroustrup.
- *The C++ Standard Library: A Tutorial and Reference*, by Nicolai M. Josuttis.
- *Effective C++: 55 Specific Ways to Improve Your Programs and Designs*, by Scott Meyers

- *Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++14*, by Scott Meyers
- *The World Wide Web*. Quite possibly the greatest asset to learning since the teacher and the textbook.

Grading

Grades will be derived from homework assignments and exams. The detailed weightings and letter grades are as such:

		x%	Grade
		$x \geq 93$	A
Programming assignments (4)	24%	$90 \leq x < 93$	A-
Labs (14)	14%	$87 \leq x < 90$	B+
Quizzes (3-4)	6%	$83 \leq x < 87$	B
Midterm exam (1)	24%	$80 \leq x < 83$	B-
Final exam (1)	32%	$77 \leq x < 80$	C+
		$73 \leq x < 77$	C
		$70 \leq x < 73$	C-
		$60 \leq x < 70$	D
		$x < 60$	F

Attendance is mandatory. There are no makeup exams or quizzes. Also, for every lecture that is missed, you will lose one point from your final grade (e.g. a 90 becomes an 89). The only exceptions are if you notify me prior to your absence with a valid reason. (Sleeping, studying for another class, working on your game, etc., are not valid reasons for an absence.) Class participation will boost your grade if you are on the border. (e. g. It is possible to get an A- with an overall average of 88.5%)

Classroom policies.

- No food.
- Drinks are allowed, unless prohibited by School policies.
- No loud noises.
- Laptops are allowed if used to display lecture material.
- No strong smells.

Tentative Schedule (subject to change)

Week	Topic	
1	Intro to CS525, compilers, tools, File I/O, Text files vs. binary files	
2	Command line args, bit manipulation mixing C and C++ code, calling conventions	
3	Complex declarations, function pointers	
4	Inheritance, interfaces, and polymorphism	
5	Overloaded operators, conversions, and efficiency	
6	Class templates, Function templates Midterm	
7	Using STL containers, iterators	
8-9	Generic algorithms, function objects	
10-11	Implementing STL functionality	
12	new and delete operators, operator new, operator delete	
13	Elements of meta-programming	
14	C++-11 features	
15	Final Exam	

Submitting Homework Programming assignments will (obviously) use the C and C++ language. More specifically, all programs must adhere to Standard C and C++, which is what this course is about. Assignments will be graded using GNU's gcc/g++ compilers. All of these compilers are installed on DigiPen computers and available for free to all DigiPen students.

The source files must be submitted electronically through the course submission page - use your digipen login and student number to login.

<http://pontus.digipen.edu/cgi-bin/submission.cgi>

Your source code should be archived in zip format (single file submissions do not require archiving) It is imperative that you begin thinking about your professional career as a game developer as soon as you learn to program. To motivate you towards this goal, at least 10% of the grade on a homework assignment is based on programming quality, clarity, and documentation. This means that even if you turn in a program that runs perfectly, you can expect a grade no higher than a C if you fail to adhere to good programming standards. (Documentation samples are posted on the course web page.) Partial credit will be awarded for incomplete assignments. The code documentation requirements will be discussed in class.

There will be 5-6 programming assignments during the semester, with the first one being assigned during the second week. You will be given between 7 and 14 days to complete each assignment. This gives you adequate time to manage your workload. The amount of time actually required to complete an assignment is much less than the time allotted and is generally between 6 and 8 hours. Depending on your grasp of the subject matter during the lectures, some of you will require more or less time to complete the assignments. In any event, you should plan on devoting 5 hours per week to this course (outside of the lectures).

Academic integrity Academic dishonesty, or cheating, occurs when a student represents someone else's work as their own, or assists another student in doing so. This can happen on exams, quizzes, homework, or projects. Academic dishonesty also may occur when a student uses any prohibited reference or equipment in the completion of a task. For example, the use of a calculator, notes, books or the internet when it is prohibited. Plagiarism is a common form of academic dishonesty. This can take the form of copying and pasting excerpts from the web, and representing them as original work. The type and severity of any occurrence, as well as the legitimacy of any claim of academic dishonesty, will be judged by the instructor and the disciplinary committee. All students are asked to help in promoting a culture of academic integrity by discouraging cheating in all forms.

Disability Support Services If students have disabilities and will need formal accommodations in order to fully participate or effectively demonstrate learning in this class, they should contact the Disability Support Services Office at 425-629-5015 or dss@digipen.edu. The DSS Office welcomes the opportunity to meet with students to discuss how the accommodations will be implemented. Also, if you may need assistance in the event of an evacuation, please let the instructor know.

Religious Accommodation DigiPen Institute of Technology provides reasonable accommodations to students who may be absent from activities or incur significant hardship due to religious holidays or observances. These holidays or observances must be part of a religious denomination, church, or religious organization, and the course instructor must be notified in writing during the first two weeks of the course. The institute's policy for grievances is published in the course catalog.

Submissions The following must be submitted electronically:

- source code for programming assignments
- multiple-choice answers to quizzes, midterm(s), and final exam. Note that hard-copy of quizzes, midterm(s), and final exam should be returned in class (use a separate sheet of paper to copy multiple-choice answers and test ID).

Programming Assignment Late Submissions No late submissions are allowed.

Lab Late Submissions Late lab submissions are not accepted.

Multiple-choice Answers Late Submissions You'll be given 6 hours to submit your answers online, after that submission will be closed and I will submit your answers using the hardcopy (which will cost you 20% of the multiple-choice part of the grade).

Accommodations Students with physical, psychological or learning disabilities that affect their abilities to perform major life activities associated with this class may be eligible for reasonable accommodations under the Americans with Disabilities Act. If you have a documented disability please contact the Disabilities Support Services office to arrange for accommodations for this class.

Grading policy and Grades

You can see all your current grades through my submission page. Here is a link to some guidelines: <https://faculty.digipen.edu/~dvolper/grade-estimation.html>