CS 280: Data Structures

Contact Information

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Prerequisites CS 225

Course Description The objective of this course is to introduce the classical Abstract Data Types (ADT) in Computer Science. The ADTs provide the hierarchical views of data organization used in programming. Fundamental data structures and algorithms as well as complexity notation are introduced. Note that this course has a strong programming component and builds off of the programming language courses taken in previous semesters. Simply reading about data structures and algorithms and listening to a lecture is insufficient to master and implement these fundamental concepts. Every non-trivial program you write at DigiPen and in the Real World will make heavy use of data structures and algorithms and this course enables you to reason about them and apply them. CS225 is a prerequisite for this course.

Goals and Objectives Upon successful completion of this course, students will understand, implement, and be able to use several data structures and their associated algorithms. Primary data structures that students will work with are arrays, lists, stacks, queues, trees, hash tables, and graphs. In addition, students will be able to apply algorithm complexity and notation in their discussions and evaluations of data structures. Students will have the knowledge to select (and implement) the appropriate data structures that will be used in larger projects, especially the game projects in the third and fourth year.

Course	Day and Time	Room
CS280	W/F 9:00-10:20am	Plato

Textbooks and References
Required

- none

Recommended

- Algorithms in C++, by Robert Sedgewick.

Additional references (Optional)

- Introduction to Algorithms, Second Edition, Cormen et al. (a lot of mathematics)

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

Programming assignments	45%
Exams	50%
Quizzes	0.1%
Labs	4.9%

x%	Grade
$x \geq 93$	A
$90 \leq x < 93$	A-
$87 \leq x < 90$	B+
$83 \leq x < 87$	B
$80 \leq x < 83$	B-
$77 \leq x < 80$	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 CS280, Memory management	
2	Intro to analysis of algorithms (arrays/lists)	
3	Introductory sorting	
4	Recursion and recursive functions	
5	Data Types (ADT), stacks, queues	
6	Midterm 1	
7	Intro to Trees, BST, AVL Trees, expression trees	
8	More trees, 2-3-4, splay	
9	Red-black trees	
10	Hashing	
11	Graphs, Heaps	
12	Midterm 2	
13	Skip lists, B-Trees	
14	TBD	

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. 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 5-6-7 programming assignments during the semester, with the first one being assigned no later then the second week. You will be given between 10 to 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 exerpts from the web, and representing them as original work. The type and severity of any occurence, 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.

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 at least 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).

Grades You can see all your current grades through my submission page.