



#1: Introduction

January 19, 2022 · G Carl Evans, Brad Solomon

Welcome to CS 225: “Data Structures”

Course Website: <https://courses.engr.illinois.edu/cs225/>
...or just Google Search: **cs225 uiuc**

Description: Data abstractions: elementary data structures (lists, stacks, queues, and trees) and their implementation using an object-oriented programming language. Solutions to a variety of computational problems such as search on graphs and trees. Elementary analysis of algorithms.

Instructors:

G Carl Evans <gcevans@>, T. Asst. Professor
Brad Solomon <bradsol@>, T. Asst. Professor

Course Coordinator:

Thierry Ramais <ramais@>, Head of Course Logistics

Lab Sections: As part of registering for CS 225, you have also registered for a lab section. **Labs start this week** and are held by your contact TA – your lab TA is the first person who you should contact if you’re having any troubles with the course!

Coursework and Grading

A total of 1,000 points are available in CS 225, along with many opportunities to earn extra credit (capped at +100 points). The points are broken down in the following way:

- **120 points:** Weekly lab assignments (10 pts each)
 - There are 14 weeks -- extra credit for attendance starting week 3!
- **360 points:** MPs (60 pts each)
 - Early submissions of MPs earns up to +7 points /MP after MP1
- **300 points:** Exams (CBTF online)
 - 3 exams 100 points each
 - Exams in lecture time at about 6, 9, 12 weeks into the semester
- **220 points:** Final Project or Final Exam
- **Extra Credit:** Problems of the Day (POTD)
 - Short, fun programming exercises to keep you coding!
 - +1 extra credit point /POTD, maximum of +40 points

Final Course Grades

Your final course grade is determined by the number of points you earned during the semester:

Points	Grade	Points	Grade	Points	Grade
[970, ∞)*	A+	[930, ∞)*	A	[900, 930)	A-
[870, 900)	B+	[830, 870)	B	[800, 830)	B-
[770, 800)	C+	[730, 770)	C	[700, 730)	C-
[670, 700)	D+	[630, 670)	D	[600, 630)	D-
		(600, 0]	F		

* To get an A+ you need the score of 970 but you also need to have your final project or for some other work in this course to be seen as exceptional.

We never curve individual exam or assignment scores; instead, if necessary, we may lower the points required for each grade cutoff to be lower than the stated cutoff. However, this has not been necessary in recent semesters. In no case will we raise the cutoff.

Contacting Us:

We want to do everything we can to make sure you have a great time learning data structures. There’s a lot of ways to reach out if you get stuck:

1. **Admin Email:** cs225admin@lists.cs.illinois.edu this goes to Thierry, Brad, and Carl and should be the first contact for course admin problems.
2. **Discord:** The course has a discord server that you can join at <https://discord.gg/YuEwhnR>
3. **Open Office Hours:** Course staff will be holding over 50 hours of office hours every week, starting next week. Great way to get help on MPs, labs, and technical content.
Location: Siebel Basement
Times: Check CS 225’s website “Calendar” for times
4. **Lab TA:** Your Lab TA is your primary administrative contact for the course. You will see them each week in lab and can reach them via e-mail. Out of fairness, no coding assistance will be provided via e-mail (*use open office hours*).

Creating New Types

In data structures, we will be learning and creating new types of structures to store data. We will start simply – by the end, we will have types we built being the building blocks for new types!

Big Idea: Encapsulation

Our First Class – Cube:

Cube.h		Cube.cpp	
1	#pragma once	1	#include "Cube.h"
2		2	
3	class Cube {	3	double Cube::getVolume() {
4	public:	4	
5	double getVolume();	5	
6		6	}
7		7	
8		8	
9		9	
10		10	
11	private:	11	
12		12	
13		13	
14		14	
15		15	
16	};	16	

Public vs. Private:

Situation	Protection Level
Cube functionality provided to client code	
Variable containing data about the Cube	
Helper function used in Cube	

Hierarchy in C++:

There **Cube** class we're building might not be the only **Cube** class. Large libraries in C++ are organized into _____.

Cube.h		Cube.cpp	
1	#pragma once	1	#include "Cube.h"
2		2	
3	namespace cs225 {	3	namespace cs225 {
4	class Cube {	4	double
5	public:	5	Cube::getVolume() {
6	double getVolume();	6	return length_ *
7		7	length_ * length_;
...		...	}

Default Constructor:

Every class in C++ has a constructor – even if you didn't define one!

- Automatic/Implicit Default Constructor:
- Custom Default Constructor:

Cube.h		Cube.cpp	
...		...	
4	class Cube {	3	Cube::Cube() {
5	public:	4	
6	Cube();	5	
...	/* ... */	6	}
		...	

Custom, Non-Default Constructors:

We can provide also create constructors that require parameters when initializing the variable:

Cube.h		Cube.cpp	
...		...	
4	class Cube {	3	Cube::Cube(double length) {
5	public:	4	
6	Cube(double length);	5	
...	/* ... */	6	}
		...	

CS 225 – Things To Be Doing:

1. Visit our course website!
2. Setup your computer with the Docker VM
3. Attend lecture (every Monday, Wednesday, and Friday)
4. Attend your lab sections (lab sections start **this week!**)