## #1: Introduction
January 14, 2019 · *Zilles, Fagen-Ulmschneider*

### 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:
  **Wade Fagen-Ulmschneider** <waf@>, T. Asst. Professor
  **Craig Zilles** <zilles@>, Assoc. 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:
- **100 points**: Weekly lab assignments
  - There are 14 weeks -- points above 100 are extra credit!
- **260 points**: MPs (20 for MP1, 45 for MP2-7)
  - Early submissions of MPs earns up to +7 points /MP after MP1
- **490 points**: Bi-weekly Exams (CBTF)
  - "Quiz 0" (50 minutes, 40 points)
  - 3 "theory" quizzes (50 minutes, 70 pts, theory/math-focused)
  - 3 programming quizzes (110 minutes, 70 pts, coding focused)
- **150 points**: Final Exam (CBTF)
- 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 |
|---|---|---|---|---|---|
| [1070, ∞) | A+ | [930, 1070) | 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 | | |

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. **Course Piazza Site**: Online Q&A discussion forum to ask and answers from your peers and course staff. Join it!
   *URL: http://piazza.com/illinois/spring2019/cs225*

2. **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**: Basement of Siebel Center
   **Times**: Check CS 225's website "Calendar" for times

3. **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)*.

4. **Debug Your Brain (DYB)**: Wade and Craig will hold open office hours. Come by at least once and say hello, let us know how the course is going, or about any problems you're having. Not in a lab, not well suited for help on coding assignments *(we'll try, but best to use lab office hours)*.

## Variables and Classes in C++

Every variable is defined by four properties:

1.

2.

3.

4.

And every variable is one of two types:

|  |  |
|---|---|
| `int myFavoriteInt;`<br>`char grade = 'A';`<br>`double gamma = 0.653;` | `Sphere myFavoriteSphere;`<br>`Cube rubix;`<br>`Grade courseGrade;` |

## 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** |
|---|
| |

## Encapsulation principles:

| Cube.h | Cube.cpp |
|---|---|
| 1<br>2<br>3<br>4<br>5 | 1<br>2<br>3<br>4<br>5 |

## Our first class:

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

## Key Concepts in C++ Classes:

Every class will be made up of common key pieces:

1. _____
   `Cube.h:1`

2. _____
   `Cube.h:3..14`

3. _____
   `Cube.cpp:1`

4. _____
   `Cube.cpp:3..6`

| **CS 225 – Things To Be Doing:** |
|---|
| **1.** Join the CS 225 Piazza<br>**2.** Visit our course website!<br>**3.** Attend lecture (every Monday, Wednesday, and Friday)<br>**4.** Attend your lab sections (lab sections start **this week!**)<br>**5.** MP1 is released Friday, due Monday after next (Jan. 28th) |