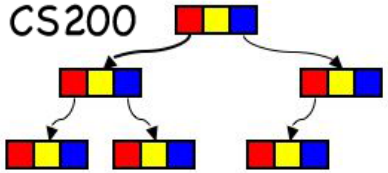
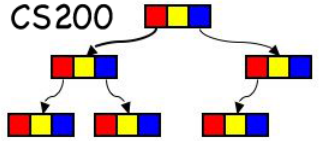



# CS200 Spring 2017
# Data Structures and Algorithms

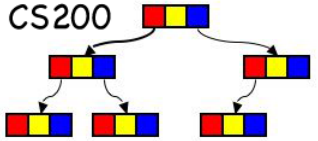



We live in the information age – fueled by computers.
An unprecedented amount of information is freely available.
How many of you have smart phones?
What apps/information do you store, manage and use on a daily basis on that phone?

**This course is about the fundamentals of how that information is stored, managed and used**
**-- the theory and practice of representing and manipulating information**

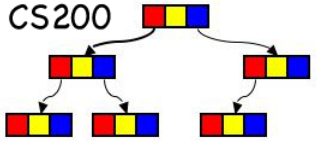
*"scientia est potentia"*
*(knowledge is power)*
**Sir Francis Bacon or Thomas Hobbes**

# Class meetings



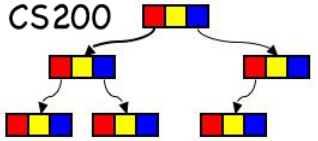

- Lectures
  - Concepts, programming assignment introduction, quizzes, tests.
- Recitations
  - Help with programming and written assignments, practice skills, reinforce/supplement material from lecture, a few programming quizzes.
  - Credit for attending and participating in recitations

# Difference from CS160/161



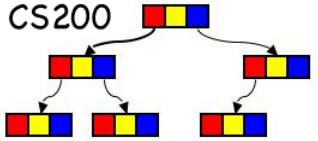

- Data structures and algorithms oriented
  - Complexity and efficiency (Orders of Magnitude) come into play
- Larger program developed incrementally over a number of assignments
  - More freedom in how to structure your program

# Grading



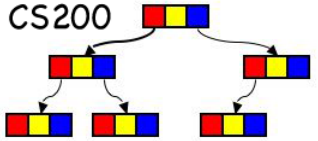

| | |
|---|---|
| Programming assignments | 20% |
| Written assignments | 10% |
| Quizzes | 10% |
| Recitations | 10% |
| Midterm | 25% |
| Final | 25% |

# More Grading Specifics




- Exams:
  - Make-ups or reschedules for extreme circumstances only **inform us in advance!**
  - Written component in lecture on specified date
    - Closed book
  - Preparation for exam:
    - lectures notes
    - recitations
    - quizzes
    - written home works

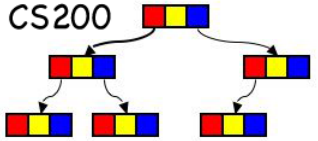
# Policies




Be professional.  Read the web site on this.

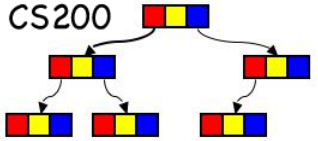
Let's talk about cheating

# Cheating



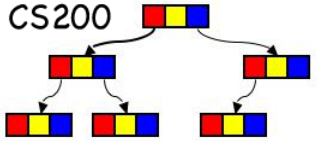

- What is cheating? What is not?
  - **Where would you find a definition?**
- What is gained / lost when cheating?
- What are the consequences?
- When / how does it happen?
  - **How can cheating be avoided?**

# Late Policy



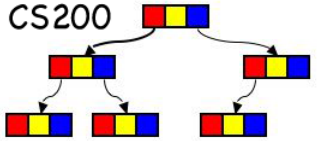

- Programming and Written Assignments
  - By due date/time: full credit
  - Within 48 hours after the deadline: 10% penalty
  - After 48 hours: 0

# Distractions in the classroom




- Cell phones
  - Turn off (first choice) or on vibrate
  - If expecting an important call, sit close to the door and step out.
- Laptops & Smart Phones
  - Sit where you will not distract others (back rows)
  - Do try to limit non-class related activities. Psychological evidence shows that we do not multi-task as well as we think we do.

# Communication



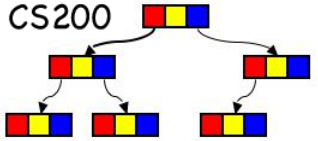

- Check course website often:

  http://www.cs.colostate.edu/~cs200

- Let's go check it out

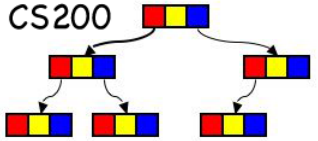
- Canvas will be used minimally
  - to post grades

# Course Goals




- CS160: mostly procedural programming, using objects, logic
- CS161: objects, linear data structures, inheritance, induction, counting
- CS200
  - Logical view
    - Program = Algorithms + Data Structures
    - Understand their relationship and use them correctly, efficiently
  - Implementation
    - Program = Objects + Methods
    - Practice design and implementation of object-oriented programs in **Java**
  - Connect theory to programming concepts
    - Correctness: does it do what I want it to do?
    - Complexity: how much time / spce does it take?

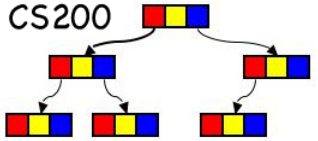
# Course Goals




- An understanding of a variety of common data structures
- A practical understanding of where they are applicable
- A recap of correctness: loop invariants, induction
- Understanding the complexity of programs
  - Time complexity: what is the **Order of Magnitude** time this algorithm takes given an input of size n
  - Space complexity: what is the **Order of Magnitude** space this algorithm takes given an input of size n

What does order of magnitude mean?

# This is the last one…




- We are phasing 160/161/200 out…

  ... and phasing CS1, CS2, Discrete Math in

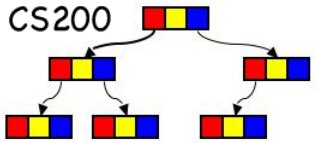
  so students get MORE Programming and less

  discrete math in the first year.

  More the way almost everybody does it.

  Math when students are more ready for it.
- This is the last time we teach CS200, so:
- Do all you can to get through!!

# Programming Assignments




- **Warm up: stacks**

  1: Implementing recursion using an explicit Run-time Stack

- **Expressions** and **Assignments**

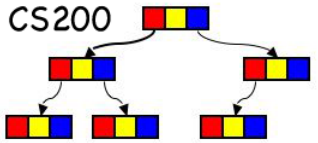
  2: Postfix expressions and evaluation

  3: Infix expressions, parsing, representation, evaluation

  4: Assignments, symbol tables

  5: Analysis: dependences

# Design for Change Principle




- Anticipate how systems will evolve and design to accommodate change.
  - Lack of attention to this principle can result in changes that make system unstructured and difficult to understand and maintain.
- How do we do this?
  - Decompose the solution into logically coherent parts, and make these their own **classes**. You will see more classes. In each class, have separate **methods** for logically coherent operations on objects.