CS 187: Programming with Data Structures (Spring 2010)

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During this lecture

• Introduction to the class and topics
• Logistics
• Policy

• Preliminary test
  – To get a sense of your preparation for the class
  – Don’t need to stress, it doesn’t count towards your grades
What are Data Structures?

• Ways of representing and storing data
  – Our life is surrounded by data these days: files, photos, videos, experimental results...
  – Need efficient ways of representing and storing data
  – Abstract Data Structures
    • Not concerned with the physical implementation
What are Data Structures?

• Ways of representing and storing data
• There are many different ways of data representation. Some examples:
  – A collection of records -> Array
  – Sparse records -> Hash tables
  – A hierarchical/organizational structure -> Trees
  – 3-dimensional models -> Graphs
What are Data Structures?

• Algorithms that compute around the data
  – Sorting
  – Searching
  – Add/delete/modify

• Think about Java classes
  – Objects: where the data are stored
  – Methods: algorithms
Why are they useful?

• By now, you probably know how to write loops in Java:

```java
int sum = 0;
for (i=1; i<=n; i++) {
    sum = sum + i;
}
```

• Real-world problems are much more complex!
Why are they useful?

• Think about writing a phone directory
  – A large number of records
  – Add/delete/modify records
  – Missing fields in records
  – Efficient search in a giant directory

• All of these need efficient ways of data representation and algorithms
Why is this class useful?

• This is one of the most important courses in your undergraduate curriculum
• It’s a prerequisite for upper level classes
• You will not only learn about data structures but also practise programming skills
In Simpler Terms

• CS 187 is about:
  • Learning the basics of important data structures
    – How to access Java’s provided classes
    – How to implement them (underpinnings)
    – How to evaluate them
    – How to decide when to use them
  • Practise programming skills through assignments
Class Webpage

• Direct link:
  • http://graphics.cs.umass.edu/mywiki/cs187.s10

• Or through:
  – The CS department webpage of course description
  – My personal homepage
    • http://www.cs.umass.edu/~ruiwang
Topics

• Java programming overview
• Algorithm analysis
• Lists, Stacks, Queues
• Sorting
• Recursion
• Hash Tables
• Trees, Graphs
• Heaps
Textbook

- *Data Structure and Algorithms in Java (2nd edition)*, by Robert Lafore
  - Clear, easy to understand
  - Demonstrations called Workshop applets
  - Other good things
Textbook

• Recommended read:
  – *Objects, Abstract, Data Structures and Design*, by Koffman
  – This is the book that has been used by 187 by previous semesters
Grading

• 6 Assignments: 50%
• Midterm: 20%
• Final exam: 25%
• OWL exercises, Quizzes: 5%
• You need to get a C or better on the final to pass the class!
Logistics

• Discussion section:
  – Wednesday 10:10 – 11:00, Hasbrouck 124
  – Check schedule on the class webpage
    • No discussion tomorrow

• Office hours
  – Me: 4:00 – 5:00pm Tuesday, CS 270
  – TAs: TBA
Logistics

• Course Bulletin Board:
  – If accessing off campus, use username/password cs187_S10 / S10rw

• Class email
  – [cmpsci-187-01-spr10@courses.umass.edu](mailto:cmpsci-187-01-spr10@courses.umass.edu)
  – This will go to everyone.
Policy

• Late Policy
• Collaboration
• Submission
Prerequisites

• Basic Java programming
  – CS 121, ECE 122 or equivalent

• Basic math skills
  – Know the difference between polynomials and exponentials...
What you need to succeed in 187

• Come to class
• Go to the discussion section (led by TA)
• Go to office hours
• Read the assigned reading
• Start working on programming assignments early!
• Think before coding
• Be passionate about programming!