Road Map for Today

- Welcome to Introduction to Data Structures
- Course Description
  - What material will we cover?
  - What am I getting myself into?
- Administrative Issues
  - Course Web Page, Text Book, Exams, Office Hours, Homework, Grading, Cheating Policy, etc.
- Syllabus

Course Prerequisites

- Prerequisite: V22.0101 or departmental permission.
- Who should be taking this course:
  - computer science majors and minors
  - If you know Java very well and have experience with data structures and algorithms, you may consider taking this class with honors. See me if you are interested.
- You must get a c or better in this class to take further computer science classes.

Course Description

- Official Description: The use and design of data structures, which organize information in computer memory. Stacks, queues, linked lists, binary trees: how to implement them in a high level language, how to analyze their effect on algorithm efficiency, and how to modify them. Programming assignments.

What the class is really about

There are three main goals of this course:

I. Foundations of Abstract Data Types (ADT)
   a) What is a data structure?
   b) Examples of data structures and their real world uses.
II. Foundations of Asymptotic Analysis
   a) How do we rate the efficiency of an algorithm?
   b) How does choosing the right ADT effect an algorithm's efficiency?

Foundations of Abstract Data Types

- An abstract data type (ADT) is a set of objects together with a set of operations. For example:
  - Stacks
  - Queues
  - Dictionary
  - Trees
  - Priority queue
Introduction to Algorithm analysis

- Basically, we want to solve any given problem using the fewest possible computer instructions.
  - Two algorithms may solve the same problem. One may take a few seconds while the other takes a few years. We will analyze our data structures to see why one works better than the other for a given set of data.
- For example, we will learn several sort algorithms and analyze the efficiency of each.
  - Insertion sort
  - Merge sort
  - Quick Sort
  - Heap sort
  - See: http://math.hws.edu/TMCM/java/xSortLab/

Administrative Matters

Course Web Site

- Course web site is available at: http://www.cs.nyu.edu/courses/fall08/V22.0102-002/index.html
  Web site contains the following information:
  - Administrative information
  - Course Syllabus
  - Homework assignments
  - Class notes
  - Class programs
  - Sample exams
  - Link to the class mailing list

Class mailing list

- First assignment is to join it. Do it today!
- Go to: http://www.cs.nyu.edu/mailman/listinfo/v22_0102_002_f08
  and follow the instructions
- All assignments and news will be sent to the class list
- Homework questions should be sent to the list and answered by students when possible.

Course Text Book

- Data Structures and Algorithm Analysis in Java (Second edition)
  - by Mark Allen Weiss
- ISBN: 0321370139
- Should be available at the NYU Bookstore
- Lecture notes will loosely follow the book.
- Please keep up with the reading!

Software

- For the course you can use an IDE of your choice. In class I will may use any of the following IDE’s:
  - JCreator
  - Eclipse
  - Netbeans
- All three products can be downloaded from the web for free.
Grading

- There will be a series of homework assignments.
- There will be two midterms and a final.
- Your grade will be determined as follows:
  - Homework (possible quizzes) (20%)
  - Two Midterms (40% each)
  - Final Exam (40%)
- Class participation will help your grade!

homework

If you do not do the homework programs, you cannot pass the course.
If homework is late, 25 points are deducted.
After one week of lateness, homework will not be accepted.
Style counts from the beginning of this class.
Submit the program via email to the e-tutor (more on this later)
Back-up your files: For your own good you must save all programs in several places (make back-up copies!). Computer crashes or lost programs are not valid excuses for not handing in an assignment.

A Word About Cheating

- For the purposes of this class, cheating is defined as by the CS Department’s academic integrity policy.
  - Discussing homework concepts is fine, but you must submit your own work.
- If you are caught cheating, you will receive an immediate FAILURE for the course.

Student Civility

- In an effort to make this class enjoyable for everybody…
  - Please be on time to class!
  - Please do not talk to your friends and neighbors in class! It disturbs everyone, and makes it hard to concentrate. If you have a question, just ask me!
  - Please turn your cell-phones off!

Getting Help

- Help is always available!
  - Option 1: Come to my Office Hours
    - Monday 4:00-5:00, Tuesday and Thursday 3:30 - 4:30 (I may change the time of my office hours – the course site will always be up to date)
    - Location: Room 319 Warren Weaver Hall
    - I get bored when nobody visits!
  - Option 2: Write to the class mailing list. Please do not send homework code to the list.
  - Option 3: Our TA.
  - Option 4: e-tutor

syllabus

- Here is a tentative list of the topics we will cover (note: most chapters will NOT be covered in their entirety):
  - (Ch. 1.3) Recursion
  - (Ch. 2) Asymptotic Analysis of Algorithms
    - We will just scratch the surface as we look at the efficiency of some of our structures and algorithms
  - (Ch. 3) Lists, Stacks and Queues
  - (Ch. 4) Trees
  - (Ch. 6) Heaps
  - (Ch. 7) Sorting
  - (Ch. 5) Hashing
  - (Ch. 10.1.2) Huffman Codes
recitation

- This class has a mandatory recitation. If you are not registered for the recitation, you must do so.
- Recitation will be led by our TA. We have not been assigned a TA yet. Until a TA is assigned, I will lead the sessions.
- **Recitation for this week is cancelled.**