COMP 410 – Data Structures

Bulletin Description

410 Data Structures (3 credits). Prerequisite, COMP 401. The analysis of data structures and their associated algorithms. Abstract data types, lists, stacks, queues, trees, and graphs. Sorting, searching, hashing.

General Course Information

Term: Fall 2013  
Department: COMP  
Course Number: 410  
Section Number: 001

Time: MW, 11:00 – 12:15  
Location: SN 014  
Website: http://www.cs.unc.edu/~baruah/Teaching/2013-2Fa/

Instructor Information

Name: Sanjoy Baruah  
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Email: baruah@cs.unc.edu  
Phone: 919-590-6103  
Web: http://www.cs.unc.edu/~baruah  
Office Hours: To be determined in consultation with the class

Teaching Assistants

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Textbooks and Resources

There is one recommended textbook for this course: Mark Allen Weiss, Data Structures and Algorithm Analysis in Java, Third Edition.

We will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and the instructor. Instructions for using Piazza are available on the course web-site.

Course Description
We will study several widely-used data structures from two perspectives: how to use them, and how to implement them in an efficient manner. We will learn terminology for expressing the efficiency of implementations, and techniques for evaluating algorithms to determine their efficiency. We will implement these data structures using the Java programming language. We will learn how we choose data structures to achieve desired programming goals, and how to design and implement new data structures if necessary.

Target Audience

A sound knowledge of data structures is a basic competency in computer science and a prerequisite to a deeper understanding of most topics in computer science. This course is therefore a prerequisite for many higher-level courses in computer science, and is hence targeted at students that intend to take such courses.

This course assumes that the students have some programming experience, and adequate background in mathematical concepts and formal reasoning.

Prerequisites

- COMP 401 (Foundations of Programming)
- An ability to program in Java-- if you do not already have this ability, it is your responsibility to obtain it ASAP.
- Basic math: exponentiation and logarithms; series sums; familiarity with proof techniques (including proof by induction)

Goals and Key Learning Objectives

Upon completing this course satisfactorily, you will be able to use a wide range of common data structures in an appropriate manner. You will be able to identify the data structure that best matches your needs for a particular programming context, and to design and implement your own if necessary. You will be familiar with the concepts and terminology that are used to describe and compare the efficiency of algorithms that implement data structures.

Course Requirements

- Several (3-5) homework assignments, each of which includes a programming component in which you implement some data structure and evaluate your implementation, and an analytical component in which you answer some questions regarding your implementation. These programming assignments are to be done individually by each student – no collaboration is permitted.
- Several closed-book exams that are administered in class, testing your knowledge of the material being covered in the lectures.
- A comprehensive final exam. This, too, will be closed-book.
Grading Criteria

The breakup of grades is tentatively set as follows
- Several homework assignments: 25%
- Several in-class exams: 50%
- Final exam: 25%

Class Participation: This class will be far more enjoyable for everyone if all students come to class ready and willing to discuss the material to be covered. I plan to reward those who participate in class by increasing their final grade by up to half a letter grade. I also reserve the right to add a similar negative "reward" to those who do not observe appropriate etiquette in class.

Course Policies

Assignments: No collaboration is permitted upon assignments. Please do not accept anyone's assistance (other than the instructor's or the TA's) - all submitted work must be your own, and you must include a signed honor statement with each submission explicitly stating that all submitted work is the result of your own effort only. Each assignment will contain submission instructions; assignments are due in class on the date specified. Late assignments are not accepted.

Grading policy: Assignments are graded by the TA under the instructor's supervision. Graded assignments are returned in class. If you wish to dispute the score assigned to you, it is your responsibility to initiate negotiation via email on this, within one week of the date that the assignments are returned in class. No complaints will be considered after this one-week deadline.

Class Etiquette: You are expected to maintain proper etiquette in class. This includes:
- Not making a habit of arriving late, or leaving in the midst of class
- Not talking, sleeping, reading newspapers, eating, etc. in class
- Keeping cell-phones, pagers, etc. off
- Not using your laptop to browse the web

The course final is given in compliance with UNC final exam regulations and according to the UNC Final Exam calendar.

Honor Code

No collaboration is permitted in assignments or exams. All exams are closed-book; all code submitted in assignments must be the student's own. No code obtained from other sources may be used without the explicit (email or written) permission of the instructor or TA.
Collaboration in assignments or exams, or the use of code not the student's own, constitutes an honor code violation.
Disclaimer

The professor reserves to right to make changes to the syllabus, including project due dates and test dates. These changes will be announced as early as possible.