

# CS16: Introduction to Algorithms and Data Structures

<http://cs16.net/>

Spring 2006

**Time & Place:** MWF 11–12 (D hour), CIT 368

**Instructor:** Roberto Tamassia (rt)

**Head TAs:** Greg Howard (ghoward), Amy Simpson (asimpson)

**Undergraduate TAs:** Steven Barlow (sbarlow), Sanghoon Cha (scha), Jeff Cohen (jscohen), Tatyana Dyshlova (tdyshlov), Peter Goldstein (pgoldste), Yoonha Kim (ykim1), Nong Li (nli), Teresa McRann (tmcrann)

## Course Prerequisites

The prerequisite for this course is CS15. If you did not take CS15 in Fall '05, '04, or '03, you *must* contact Roberto to explore the possibility of a special arrangement. The following background is assumed: programming experience in Java; knowledge of basic binary arithmetic and elementary properties of polynomials, logarithms, and exponentials.

## Student Agreement

To be officially enrolled in CS16, you must complete and return a *signed* copy of the CS16 Student Agreement. Please make sure you read and understand the CS16 collaboration policy. Questions regarding the policy should be directed to Roberto or the Head TAs.

## Reading Material

The textbook for the course is

Michael T. Goodrich and Roberto Tamassia, *Data Structures and Algorithms in Java* (4th Edition). John Wiley & Sons, Inc. (2006).

Please note that a new and substantially different textbook is being used for the Spring 2006 semester. Editions used in previous semesters do not reflect changes made to the course with the introduction of Java 5.0. Class notes and copies of the slides presented in class will be made available on the course web site.

## Topics

*Analysis of Algorithms:* time complexity, asymptotic notation, amortization, recurrence relations

*Elementary Data Structures:* stacks, queues, sequences, trees, positions, locators

*Searching:* hash tables, skip lists, binary search trees, 2–4 trees, red-black trees

*Sorting:* insertion sort, selection sort, heap sort, merge sort, quicksort, radix sort

*Text Processing:* tries, data compression

*Geometric Algorithms:* point inclusion, convex hull

*Graph Algorithms:* depth-first search, breadth-first search, shortest path, minimum spanning tree, topological sorting, maximum flow, transitive closure

*Cryptography:* numerical algorithms, encryption, digital signatures, public key infrastructure, information security

## Graded Work

- Five collaborative homeworks (30%)
- Two in-class exams (20%)
- Five programming assignments
  - Queue / Dance Dance Revolution (10%)
  - Heap / Market Maker (10%)
  - Convex Hull / Robot (10%)
  - Graph / SimBroadband (10%)
  - Crypto / Encrypted IM (10%)

## Announcements

The CS16 Web site (<http://cs16.net/>) and the CS16 newsgroup, `brown.cs.cs016` are the main sources of information about the course. You should check both regularly, as announcements, clarifications, questions, and answers are posted often, as well as other course related information.

Students may post questions to TAs on the newsgroup. Posts to the newsgroup from TAs will include administrative announcements, answers to previously posted questions, and other information of general interest. Students may answer each others' posts, provided that the collaboration policy is not violated. You should never post your own code, or anything too specific, as the newsgroup can be read by everyone. If you have doubts about whether or not posting something is legal: don't do it, ask a TA instead. Remember that the purpose of the newsgroup is to allow people quick access to questions and answers. Please do not clutter the newsgroup with jokes, flames, or general discussions about the course.

Subjects of newsgroup posts should use the following format:

[Assignment Name] Subject of Question.

TAs will put “\*\*” around important posts. This makes it easier to find the post that you are looking for.

## Handins

All paper handins should be placed in the wooden CS16 handin bin in room 242 of the CIT. Please follow the handin instructions on the homework handout. All program handins should be submitted through the web site. You will receive a web account once we have received your signed CS16 Student Agreement.

## Exams

There will be two exams in CS 16. A week prior to the exam, problems which resemble those that will be on the exam will be distributed. The exam will consist of a subset of those problems. Please note that each exam is worth only 10% of your grade.

## Late Policy

As with most classes in the CS department, there is an official late policy for CS 16.

**Homeworks:** We do not accept late handins for homeworks. Please plan accordingly. However, your worst homework will be weighted half as much as the others.

**Programs:** Each program has a regular deadline which is specified on the program handout. All programs handed in after the regular deadline are considered to be late. However, each student will be allotted a total of 120 “late credits” towards submitting programs late. Each late credit can be used to extend by one hour the deadline for a program. For every day late you will lose 10%, or fraction thereof, of your grade. At the end of the semester, your late credits will be optimally distributed among your assignments.

**Exceptions:** Exceptions to the above rules can be made only for “good reasons,” which include medical problems, family emergencies, and official Brown-sponsored activities. If you believe you have a good reason, you should discuss the matter with Roberto. If Roberto determines that you have a good reason, you may be excused from doing certain homeworks and/or you may obtain additional late credits for your programs. Note that job interviews, availability of low airfares, and recreational activities are not considered good reasons.