

**Computer Engineering 70**  
**Formal Specification and Advanced Data Structures**  
**Winter 2012**  
**Mondays, Wednesdays, and Fridays**  
**10:30 am – 11:35 am**

**Instructor**

Instructor: Darren Atkinson  
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Office hours: Tuesdays 1:15–2:15 pm and Wednesdays 9:30–10:30 am  
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**Teaching Assistant**

Teaching assistant: Gavin Hagiwara  
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Lab hours: Mondays and Tuesdays, 2:15–5:00 pm

**Textbooks**

Required: Ullman, *Elements of ML Programming, ML97 Edition*, 1998

**Grading**

**Lecture**

Midterm exams: 50% (2/1 and 2/22)  
Final exam: 50% (3/19)

**Laboratory**

In-lab assignments: 10% each

**Overview**

Abstract data types: lists (including stacks, queues, dequeues, and priority queues), sets, multisets (bags), maps (dictionaries), and graphs

Data structures: lists (linked-lists), binary trees (including binary search trees and AVL trees), 2-3 trees, heaps (including binary heaps, binomial heaps, and fibonacci heaps)

Computer science theory: algebraic specification, axiomatic semantics, structural induction, normal forms

## Learning Outcomes

Students will . . .

1. Use a formal specification language to define ADTs.
2. Use structural induction as the basis for inductive definition of recursively defined functions and data structures.
3. Develop programs that implement ADTs while meeting a specification.
4. Develop programs using pair-wise programming, and evaluate the teamwork of three different lab teams during the quarter, based on a rubric provided by the instructor.
5. Implement simple container data types (e.g., stacks, queues, sets, priority queues) and data structures, and realize the implementation differences between structures as values versus objects.
6. Implement advanced data structures (e.g., B-trees, binomial heaps, chain-based hash table, skew heaps, and other data structures requiring amortized analysis).

## Policies

### Disability Accommodation Policy

To request academic accommodations for a disability, students must be registered with Disabilities Resources located in Benson, room 216. If you would like to register with Disabilities Resources, please visit their office in Benson 216 or call (408) 554-4109. You will need to register and provide professional documentation of a disability prior to receiving academic accommodations.

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