CS201 Data Structures and Algorithms

Schedule

Daily preparation guide

Study the material listed in the preparation section *prior* to attending class that day. Try to formulate precise questions concerning the parts you don't understand or the importance of the material. If you come across some really difficult material, try searching the web for alternative explanations.

Wednesday, August 22

Introduction:

- Classes begin
- Review of syllabus
- Review of order notation
- Review of logarithmic identities
- Review of sorting algorithms
- Example prerequisite material questions: `http://beastie.cs.ua.edu/concepts/cs/ds/`

Monday, August 27

Preparation:

- Chapter 3, *Growth of Functions*

Wednesday, August 29

- Chapter 6, *Heapsort*
- Chapter 7, *Quicksort* (optional: 7.4.2)
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/ds/sorting.html`

Monday, September 3

Labor Day, no class

Wednesday, September 5

Preparation:

- Chapter 4, *Divide-and-Conquer* (optional 4.6)
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/recurrences.html`

Monday, September 10

Preparation:

- Chapter 12, *Binary Search Trees* (optional 12.4)
- Chapter 13, *Red-Black Trees* (see *the best red-black tree pseudocode ever*)
- Problem 13-3, *AVL trees* (see *the best AVL tree pseudocode ever*)
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/sbtrees.html`

Prerequisite exam

Wednesday, September 12

Self-balancing trees, continued

Friday, September 14

Programming assignment #0 due

Monday, September 17

Constitution Day!

Monday, September 17

Preparation:

- Web search, "Binomial Heaps"
- Sections 19.1 — 19.3, *Fibonacci Heaps* (postponed - amortized analysis of operations)
- Problem 19-2, *Binomial Heaps* (see *the best binomial heap pseudocode ever*)
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/heaps.html`

Wednesday, September 19

Binomial and Fibonacci Heaps, continued

Monday, September 24

Preparation:

- Chapter 21, *Disjoint Sets*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/disjoint.html`

Wednesday, September 26

Preparation:

- Chapter 22, *Elementary Graph Algorithms*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/graphs.html`

Monday, October 1

First concept exam:

- Solving recurrences
- Self-balancing search trees
- Binomial and Fibonacci heaps
- Disjoint sets
- Graphs and graph exploration

Wednesday, October 3

Preparation:

- Chapter 23, *Minimum Spanning Trees*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/graphs.html`

Monday, October 8

Preparation:

- Section 24.3, *Djikstra's Algorithm*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/graphs.html`

Wednesday, October 10

Preparation:

- Web search: memoization
- Chapter 15, *Dynamic Programming*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/dynamic.html`

Friday, October 12

Programming assignment #1 due

Monday, October 15

Dynamic programming, continued

Wednesday, October 17

Preparation:

- Chapter 9, *Medians and Order Statistics*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/lsort.html` (questions 1 - 10)

Monday, October 22

Medians and order statistics, continued

Wednesday, October 24

Fall break

Monday, October 29

Preparation:

- Section 8.1, *Lower bounds for sorting*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/lsort.html` (question 11 - 16)

Wednesday, October 31

Last day to drop a class

Wednesday, October 31

Second content exam:

- Minimum spanning trees
- Shortest paths
- Dynamic programming (including memoization)
- Linear time selection

Friday, November 2

Programming assignment #2 due

Monday, November 5

Preparation:

- Section 8.2, *Counting Sort*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/lsort.html`

Wednesday, November 7

Preparation:

- Section 8.3, *Radix Sort*
- Section 8.4, *Bucket Sort*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/lsort.html`

Friday, November 9

Programming assignment #3 due

Monday, November 12

Preparation:

- Chapter 17, *Amortized Analysis*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/amortized.html`

Wednesday, November 14

Amortized analysis, continued

Monday, November 19

Preparation:

- Section 34.1 — 34.3, *P and NP*
- `http://beastie.cs.ua.edu/cs201/npc.html`
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/pnp.html`

Wednesday, November 21

Thanksgiving

Monday, November 26

Preparation:

- Section 34.4 — 34.5, *NPC proofs and problems*
- Example questions: `http://beastie.cs.ua.edu/concepts/cs/al/pnp.html`

Wednesday, November 28

P, *NP*, and *NP*-completeness, continued

Monday, December 3

Dead week

Wednesday, December 5

Dead week, last day of class

Friday, December 7

Last day to withdraw from the term

Wednesday, December 12

Final exam (cummulative), 11:30am to 2:00pm