CS106B Syllabus

Below is the tentative syllabus for this quarter's offering of CS106B. The specific content ordering may change based on how quickly we're able to move through the relevant topics. The assigned readings may be done before or after each lecture, though we recommend doing the readings before class.

Date	Topics	Readings	Assignments
Part One: Processing Data in C++			
Monday, January 7	*Why continue onward in programming?* Course Overview The C++ Programming Language	Chapter 1	Assignment 0 Out
Wednesday, January 9	*How do we harness self-similarity?* Functions in C++ Recursive Functions	Chapter 2 Chapter 7	
Friday, January 11	*How can we process text recursively?* Strings and Streams Recursion over Strings	Chapter 3 Chapter 4.1 – 4.3	Assignment 0 Due Assignment 1 Out
Monday, January 14	*How do we store aggregate data?* `Vector` and `Grid` An Optimization Problem	Chapter 5.1	
Wednesday, January 16	*How do we model and explore nested structures?* `Stack` and `Queue`	Chapter 5.2 – 5.3	
Friday, January 18	*How do we work with associative data?* `Map`, `Set`, and `Lexicon`	Chapter 5.4 – 5.5	Assignment 1 Due Assignment 2 Out
Part Two: Recursive Problem-Solving			
Monday, January 21	Dr. Martin Luther King, Jr. Day National Holidy No Class		
Wednesday, January 23	*How do we model self-similar structures?* Graphical Recursion Recursive Enumeration	Chapter 8.1 Chapter 8.4	
Friday, January 25	*How do we find all solutions to a problem?* Enumerating Subsets Enumerating Permutations	Chapter 8.2 – 8.3	
Monday, January 28	*How do we choose the best team for the job?* Enumerating Combinations Recursive Optimization		Assignment 2 Due Assignment 3 Out
Wednesday, January 30	*How can we optimally allocate resources?* Enumeration and Optimization Recursive Backtracking	Chapter 9.1 – 9.2	
Friday, February 1	*How do we find a needle in a haystack?* Applications of Backtracking		
Monday, February 4	*Why are some algorithms faster than others?* Algorithmic Efficiency Big-O Notation	Chapter 10.1 – 10.2	

Wednesday, February 6	*What's the best way to organize our data?* Sorting Algorithms	Chapter 10.3 – 10.5	Assignment 3 Due Assignment 4 Out
Part Three: Representing Information			
Friday, February 8	*How do we define our own collection classes?* Designing Abstractions	Chapter 6	
Monday, February 11	*How are dynamic arrays implemented?* Dynamic Allocation Implementing `Stack`	Chapter 11 Chapter 12.1	
Wednesday, February 13	*How does data representation impact efficiency?* Optimizing `Stack`		
Friday, February 15	*How do we form sequences from individual elements?* Linked Lists	Chapter 12	Assignment 4 Due Assignment 5 Out
Monday, February 18	Presidents' Day National Holiday No Class		
Tuesday, February 19	Midterm Exam 7:00PM – 10:00PM, Location TBA Covers Topics from Assignment 0 – Assignment 4		
Wednesday, February 20	*What tradeoffs exist in data representation?* Implementing `Stack` and `Queue`	Chapter 13	
Friday, February 22	*How can we efficiently store data in sorted order?* Binary Search Trees	Chapter 16.1 – 16.2	
Monday, February 25	*How can we efficiently search data in sorted order?* Tree and Range Searches		
Wednesday, February 27	*How can we efficiently store text?* Tries Implementing `Lexicon`		Assignment 5 Due Assignment 6 Out
Friday, March 1	*How can we rapidly store and look up information?* Hash Tables Implementing `HashMap`	Chapter 15	
Part Four: Graphs and Networks			
Monday, March 4	*How do we explore network structures?* Graphs Graph Searches	Chapter 18.1 – 18.3	
Wednesday, March 6	*In what order should we perform a series of tasks?* Depth-First Search Topological Sorting	Chapter 18.4	
Friday, March 8	*How do we best play matchmaker?* Bipartite Matching		Assignment 6 Due Assignment 7 Out
Monday, March 11	*How do we analyze networks?* Graph Algorithms		

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Part Five: Looking Forward			
Wednesday, March 13	*What do you want to know?* Your Questions		
Friday, March 15	*What comes after CS106?* Where to Go from Here		Assignment 7 Due *No Late Submissions*
Monday, March 18	Final Exam 8:30AM – 11:30AM, Location TBA Cumulative; Covers All Topics		