Road Map

CS Concepts
• Client/Implementer
• Efficiency
• Recursion
• Regular Expressions
• Grammars
• Searching / Sorting
• Backtracking
• Hashing
• Huffman Compression

Java Language
• Exceptions
• Interfaces
• References
• Comparable
• Generics
• Inheritance / Polymorphism
• Abstract Classes

Data Structures
• Lists
• Stacks
• Queues
• Sets
• Maps
• Priority Queues

Java Collections
• Arrays
• ArrayList
• LinkedList
• Stack
• TreeSet / TreeMap
• HashSet / HashMap
• PriorityQueue
Major themes

• Abstraction
  • Leverage existing components without understanding details
  • Create components that can be used as black boxes

• Design tradeoffs
  • Algorithm analysis - scalability and growth
  • Keeping code easy to read for maintainability

• Recursion
  • Reason about problems in terms of self-similarity
  • Write very short code to achieve complex behaviors
What project?

- Add a GUI to the random sentence generator
- Automate chemistry, physics, calculus problems, etc
  - Maybe even automate writing code with good style?
- What are you currently doing that a computer could do?
- List of some project ideas
What language?

- Expanding your Java knowledge with a project is valuable
- Pick a project, see what language is most appropriate
  - iOS: Swift
  - Android: Java, Kotlin
  - Client-side web: Javascript (many frameworks to choose from)
  - Beautiful visuals: Processing
  - Data Processing + Machine Learning: Python
  - Data Management: SQL
  - Embedded systems: C / C++
- Learn a new programming paradigm
  - Functional languages: Racket, Haskell, Scala, (now, Java 8!)
Leveraging existing code

• Processing language
  • http://nlp.stanford.edu/software/

• Building games
  • http://lwjgl.org/
  • http://jbox2d.org/ (with physics!)

• Processing biological data
  • http://biojava.org/wiki/Main_Page

• Accessing Facebook data
  • http://restfb.com/

• Making music
  • http://www.jfugue.org/
Courses?

- **CSE non-majors**
  - CSE 154: Web Programming
  - CSE 163: Intermediate Data Programming (Python)
  - CSE 373: Data Structures and Algorithms
  - CSE 374: Programming Concepts and Tools (C/C++, Linux, ...)
  - CSE/STAT 416: Machine learning (requires STAT 311 or 390)
  - CSE 131: Digital Photography
  - CSE 460: Animation Capstone (open to all majors)
  - And more!

- **CSE majors**
  - CSE 311: (Mathematical) Foundations of Computing
  - CSE 332: Data Abstractions (Data Structures and Algorithms)
  - CSE 331: Software Design and Implementation
  - CSE 341: Programming Languages
  - CSE 344: Intro to Data Management (and databases)
  - CSE 351: Hardware/Software Interface
  - And more!

- **INFO, AMATH, HCDE, DXARTS, ...**
Interesting Fields

- Machine Learning/Artificial Intelligence
- Natural Language Processing
- Data Visualization

- User Experience Design
- Accessibility

- Embedded Systems
- Databases
- Networks

- Computer Security
- Domain Specific Languages
Internships

- Various career fairs around campus.
- Start looking early!
- Cast a broad net and interview lots of places. Don’t be afraid of getting rejected!
- For those just starting out
  - [Microsoft Explorer Program](#)
  - [Google Engineering Practicum](#)
Roles in Industry

• **Software Developer/Software Engineer**
  - Builds and designs software
  - Includes designing and engineering architecture of a software system as well as programming

• **Product Manager (PM)**
  - Designs and makes decisions regarding the overall product
  - Works with people across disciplines at the company
  - Role can be different at different companies

• **Test/QA**
  - Write and design tests of the product

• **User Experience Designers**
  - Ease the interaction between clients of a product and the product itself
Small vs Big Company?

- **Small Company**
  - Lots of autonomy and impact within the company
  - Often move quickly
  - Breadth – get to work on many projects and with many types of people

- **Large company**
  - Large data sets, impact many users
  - Lots of support and infrastructure to do your job well
  - Depth – get to focus on specific areas of a project
AMA
(ask me anything)