

# Road Map

## CS Concepts

- Client/Implementer
- Efficiency
- Recursion
- Regular Expressions
- Grammars
- Searching / Sorting
- Backtracking
- Hashing
- Huffman Compression

## Data Structures

- Lists
- Stacks
- Queues
- Sets
- Maps
- Priority Queues

## Java Language

- Exceptions
- Interfaces
- References
- Comparable
- Generics
- Inheritance / Polymorphism
- Abstract Classes

## 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](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)