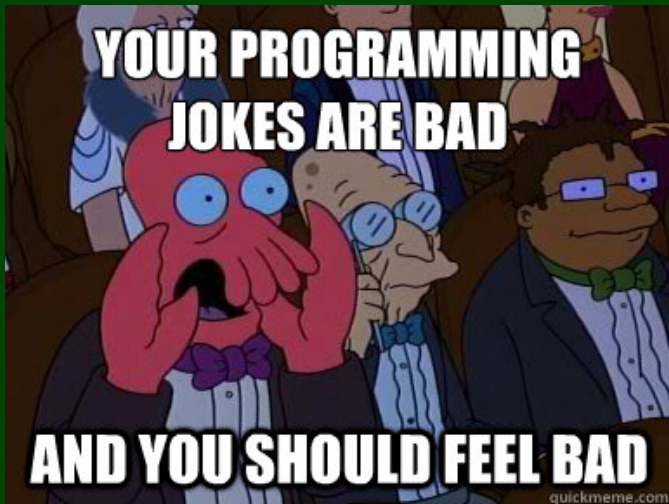# CSE 143

## Computer Programming II

# Goodbye World!

### CSE 142 vs. CSE 143: The Big Picture

In **CSE 142**, you learned how to use logic, control flow, and decomposition to write programs.

In **CSE 143**, you learned to solve **more complex** and **larger** tasks **efficiently**.

### Big Learning Goals

- Abstraction (implementation vs. client)
- Data Structures (organizing complex data)
- Algorithms (standard ways of completing common tasks)

We built some **really cool** programs. And had a lot of fun?

*Programmers waste enormous amounts of time thinking about, or worrying about, the speed of noncritical parts of their programs, and these attempts at efficiency actually have a strong negative impact when debugging and maintenance are considered. We should forget about small efficiencies, say about 97% of the time: premature optimization is the root of all evil. Yet we should not pass up our opportunities in that critical 3%.*
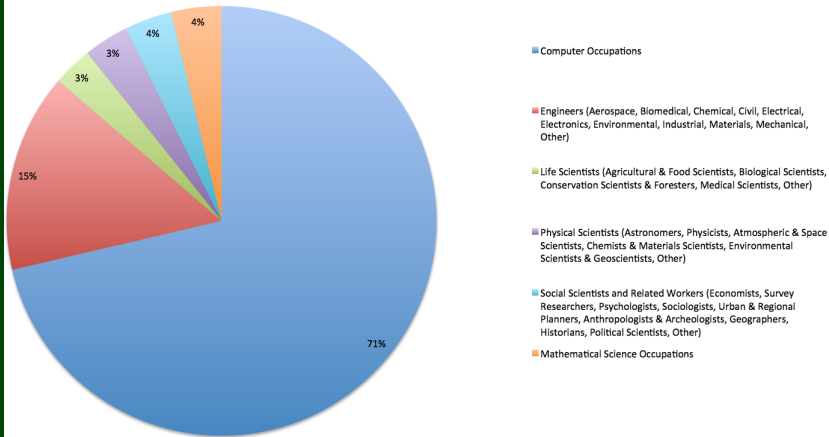
*Computer programming is an art, because it applies accumulated knowledge to the world, because it requires skill and ingenuity, and especially because it produces objects of beauty. A programmer who subconsciously views himself as an artist will enjoy what he does and will do it better.*

### Overview of Topics We Covered

- Lists
- Stacks and Queues
- Recursion
- Sets and Maps
- Grammars
- Searching
- Sorting
- Binary Trees

Confirmed, Incoming Freshmen

**Job Growth, 2012-22 - U.S. Bureau of Labor Statistics**
Computer Occupations = 71% of all STEM

- Computer Occupations
- Engineers (Aerospace, Biomedical, Chemical, Civil, Electrical, Electronics, Environmental, Industrial, Materials, Mechanical, Other)
- Life Scientists (Agricultural & Food Scientists, Biological Scientists, Conservation Scientists & Foresters, Medical Scientists, Other)
- Physical Scientists (Astronomers, Physicists, Atmospheric & Space Scientists, Chemists & Materials Scientists, Environmental Scientists & Geoscientists, Other)
- Social Scientists and Related Workers (Economists, Survey Researchers, Psychologists, Sociologists, Urban & Regional Planners, Anthropologists & Archeologists, Geographers, Historians, Political Scientists, Other)
- Mathematical Science Occupations

**Computer Science + Your Interests
=
A Match Made In Heaven**



- Foreign Policy: outcome prediction

- Law: evidence summary

- Medicine: smart diagnostics

- Music: hit identification

- Sports: superstar discovery

- Wall Street: high frequency trading

There are a variety of "next steps" in computer science and programming. Here's some of them:

- Learn a new programming language. (Some people find learning new languages fun! The best part is that now that you know Java it's surprisingly easy!)

- Learn how to make games/websites/mobile apps/etc. Whatever is interesting to you. . . go for it!

- Choose a project to work on that sounds interesting!

- Take another course!

- Interview for a job!

- Use programming in your area of interest!

- Learn more theoretical computer science (by reading a book, or something)
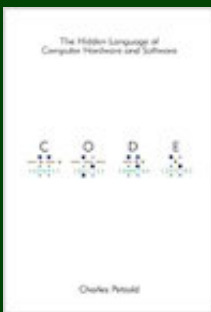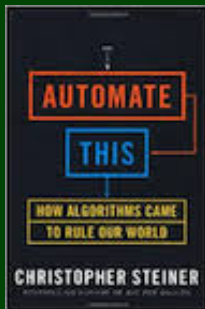
When choosing a personal project, the most important thing is that **you think what you're doing is cool**. Here's some suggestions:

- Automate something that you do a lot!

- Make one of the HWs from this class cooler!

- Write a program that solves your homework for you!

- Make a game!

- Write an app and sell it!

- Contribute to an open source project!

**Java is a perfectly good language, but. . .**

Depending on what you want to do, you might want to (or need to) learn another language.

- **Python** has very consise and clean syntax. It's useful for whipping up quick programs.

- **Javascript** is the language of the internet.

- **Java** is the language for Android.

- **Objective-C** is the language for anything Apple.

- **C** is the langauge for low-level systems programming.

- **Haskell** is a "functional" programming language. Learn this one if you want a challenge!

## CSE Non-Majors

- CSE 154: Web Programming
- CSE 373: Data Structures and Algorithms
- CSE 374: Programming Concepts and Tools (C/C++, Linux, . . . )
- CSE 131: Digital Photography
- CSE 460: Animation Capstone (open to all majors)
- INFO, AMATH, DXARTS, . . .

## 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

- Making computers understand language:
  http://nlp.stanford.edu/software/

- Building Games:
  http://lwjgl.org/

- Building Games with Physics:
  http://jbox2d.org/

- Processing Biological Data:
  http://biojava.org/wiki/Main_Page

- Accessing Facebook Data:
  http://restfb.com/