COMPSCI 101, Spring 2014
Introduction to Computer Science
Robert Duvall

Welcome!

http://www.cs.duke.edu/courses/spring14/compsci101

What is Oceanography?

- **How to understand the ocean?**
  - ➢ how to conduct a study or map?
  - ➢ know more about Mars than our own oceans!
  - ➢ how can sharks tweet?

- **What is Google Earth without the ocean?**

- **Census of Marine Life**
  - ➢ researchers in more than 80 nations
  - ➢ represented by Duke Profressor Patrick N. Halpin

Human or Computer?

- **How to distinguish a human user from a computer?**

- **How to help humanity too?**
  - ➢ **used by over 100,000 web sites**
  - ➢ **transcribes over 40 million words per day**
  - ➢ **all done for free!**

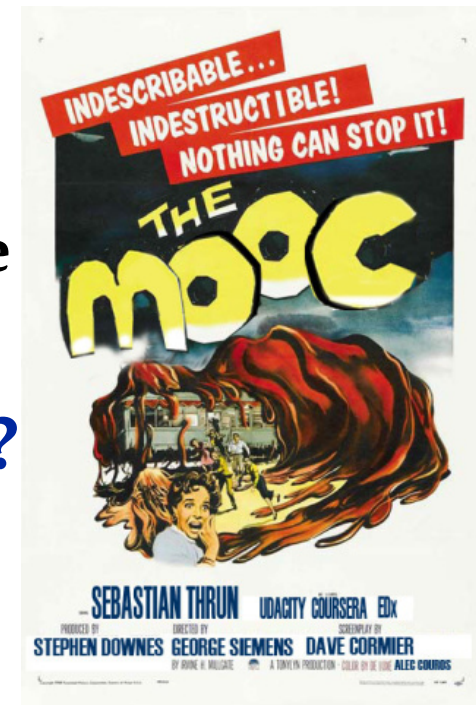- **Luis von Ahn calls it Massive Scale Human Collaboration**

Personalize and Expand Education?

● **Improve individual education?**

➢ **money is not the answer**

➢ **just computers are not the answer**

● **How to improve access?**

➢ **tuition is too high**

➢ **requirements are too restrictive**

● **Online courses + tablets = ???**

Computing is Disruptive

The story of the internet continues to be the story of our time … if you truly want to follow -- or, better still, bend -- that story's arc, you should know how to write code.

Christina Cacioppo on leaving Union Square Ventures to learn to program

Given the current state of technology, what can I do radically differently to make a discontinuity — not an incremental change, but put us in a different place?

Sebastian Thrun, cofounder of Udacity

Computer Science

What is it that distinguishes it from the separate subjects with which it is related? What is *the linking thread* which gathers these disparate branches into a single discipline? My answer to these questions is simple --- it *is the art of programming a computer*. It is the art of designing efficient and elegant methods of getting a computer to solve problems, theoretical or practical, small or large, simple or complex.

Sir Charles Antony Richard (Tony) Hoare

# Prerequisites for Compsci 101

Course Overview: Is this the right one?

- **No Experience Needed!**
  - Other options: CompSci 92, CompSci 290, ISIS courses
  - Difference? Focused on programming
  - Experience? CompSci 201

- **Collaboration encouraged!**
  - Be active, not just a sponge
  - You are an excellent resource
  - Use the discussion board

- **No curve** ☺
- **No cramming** ☹

Course Overview: Policies

- **There are details, see the <u>course web page</u>**
  - Midterms: closed book, final is open book
  - Practice, Practice, Practice: weekly programs, tested online
  - Lab: small sections with group and individual work
  - Projects: combination of smaller problems, open ended

- **Expectations of Excellence**
  - Do challenge work AND do very well on the Final
  - Exceed basic expectations

- **Why should you come to class?!?**
  - Meet people, learn things, participate in a community
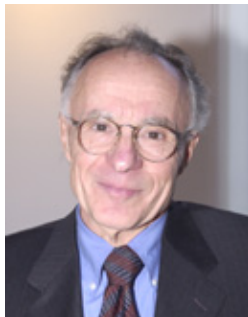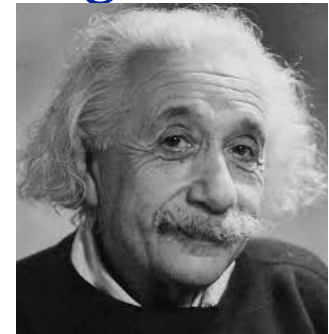
Who's taken Compsci 101?
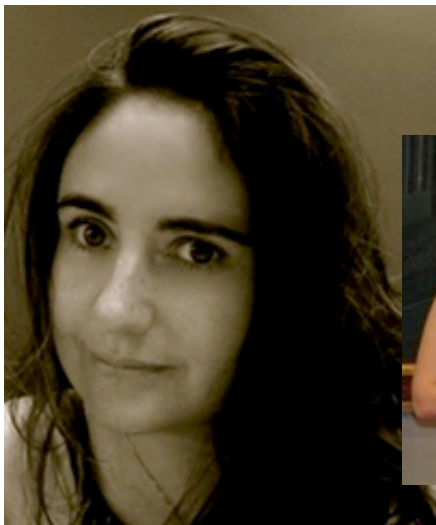
Questions

He who asks is a fool for five minutes, but he who does not ask remains a fool forever.

Chinese Proverb

The important thing is not to stop questioning. Curiosity has its own reason for existing.

Albert Einstein

What questions did you ask today?

Arno Penzias

Anatomy of a search [query]

- http://www.google.com/images?q=programming

- **What comes after the question-mark in the URL?**
  - ➤ **What is the query string?**
  - ➤ **What is constant in the search query, what changes?**
  - ➤ **How is the query *parameterized*?**
  - ➤ **How are multiple-word queries handled?**

- **What does this have to do with Computer Science and programming?**
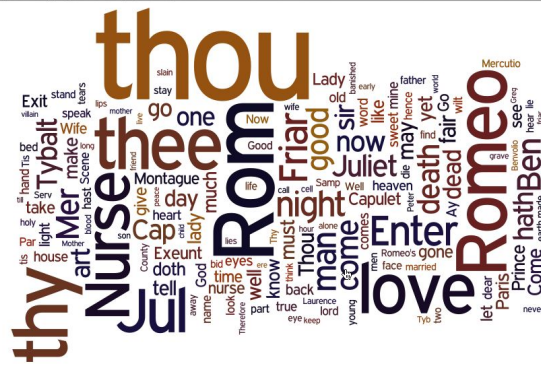
From Blog to Scientific Visualization

- **Text Cloud aka Tag Cloud?**
  - ➢ **Number of occurrences/emphasis indicated by size of word**
  - ➢ **Great visual/statistic**
    - • http://chir.ag/phernalia/preztags/
    - • http://www.nytimes.com/gst/mostsearched.html?period=30&format=tagcloud
      What information is stored in the URL of the NYTimes site above?
  - ➢ **Our Survey?**

Problem Solving and Programming

- **How many words are in a file? A webpage?**
  - ➢ **What's a word?**
  - ➢ **What's a file?**
  - ➢ **How do we solve this: simply, quickly, …?**
    - • **What's the best we can do? Constraints?**

- **How many different/unique words are in a file?**
  - ➢ **How is this related to previous task?**

- **How many words do two files have in common?**
  - ➢ **Spell-checking, Google did you mean ..?**
  - ➢ **How many codons common to DNA strands?**

Towards a Program

- **What steps are needed?**

- **What order should they be in?**
- **What kinds of things to test?**

Why is programming fun? Fred Brooks

- **First is the sheer joy of making things**

- Second is the pleasure of making things that are useful

- **Third is the fascination of fashioning complex puzzle-like objects of interlocking moving parts**

- Fourth is the joy of always learning

- **Finally, there is the delight of working in such a tractable medium. The programmer, like the poet, works only slightly removed from pure thought-stuff.**

What's in Compsci 101?

- **Learning about computing, computer science, and programming**
  - Vocabulary of Python and programming languages
  - Crafting programs from the vocabulary
  - *Power of automation, repetition, scale*
  - Understanding and changing the world
- **Programming using Python**
  - Tools: Eclipse, EPD, Libraries, ...
  - Engineering and analyzing designs and programs
  - Using mathematical and scientific techniques
  - Appreciating and learning art *and* science of programming
  - Moving toward scaling solutions (continued later courses)

Data into Information and Knowledge

Computer Science
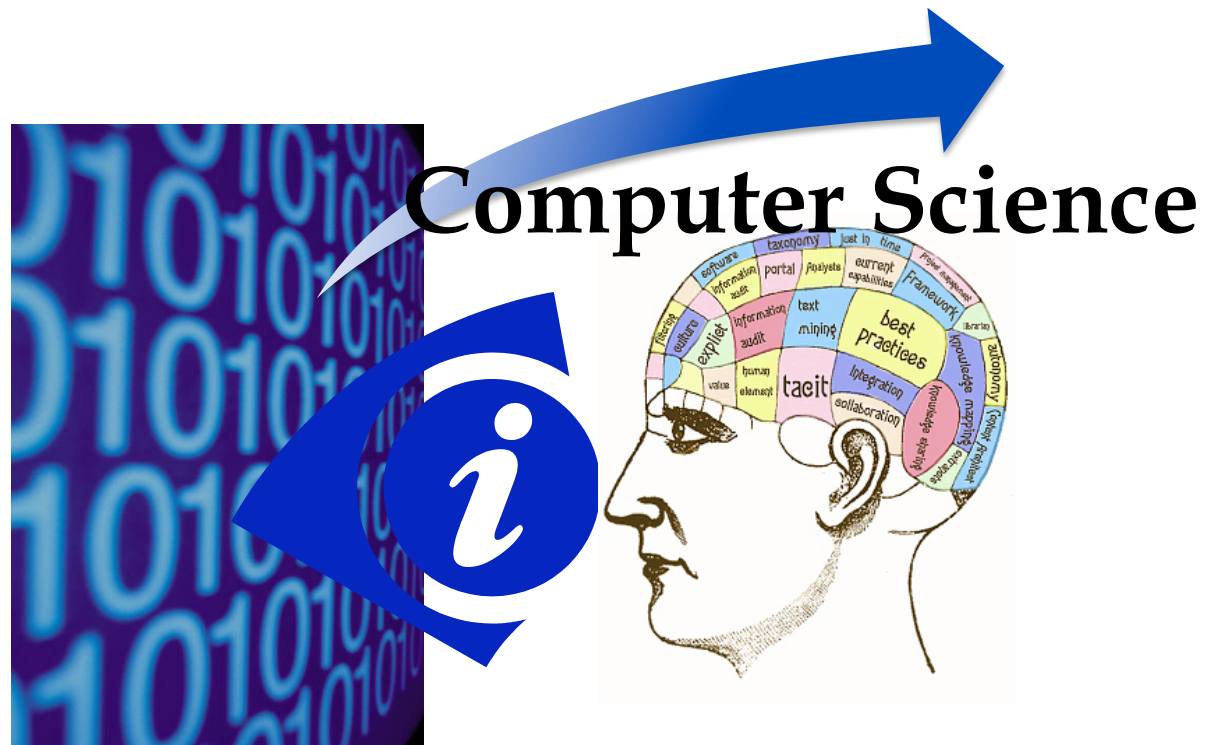
**Now - See What's Happening App
by Rahul Chaturvedi took CompSci 101 Fall 2012**