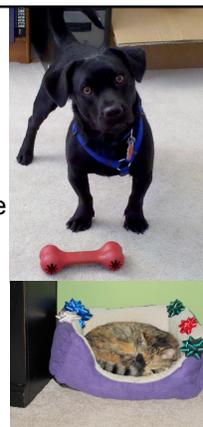


# CSCI111: Fundamentals of Programming I

Professor Sprenkle  
sprenkles@wlu.edu

## My Bio

- From Dallastown, PA
- B.S., Gettysburg College
- M.S., Duke University
- Ph.D., University of Delaware
- For fun: pop culture, ultimate, gardening
- Volunteer at Rockbridge SPCA



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## Your Bios

- Where you're from
- Your major
- Your year
- Your favorite sport (spectator or participant)
- What activities you're involved in, what you do in your free time

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## Survey Says...

- What year are you?
- Who has used a computer regularly?
- Who has used the Internet regularly?
- Who has made a web page?
- Who has written a program?
- Why are you taking this course?
- What is computer science?

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## Discussion

What is Computer Science?

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## What is Computer Science?

"Computer Science is no more about computers than astronomy is about telescopes."  
--Edsger Dijkstra

- CS = Complexity Science
  - > Study of Complexity
  - > How can it be done?
    - Based on **information**
    - Managing, manipulating data
    - Possible algorithms
  - > How well can it be done?
    - Most **efficient** algorithm in terms of time and/or space
  - > Can it be done at all?
    - Often, proof is a program—an implementation of above

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## Jeannette Wing

- President's professor of computer science
- Head of CS at CMU



When people talk about the smart grid, smart vehicles, and smart buildings — what makes them 'smart'?

### Computer science.

When people talk about personalized medicine and personalized learning, how do you think personalization is possible?

### Computer science.

We're not there yet, but the next generation of computer scientists can help us realize these visions — with immeasurable *benefits to society and the economy.*

<http://www.nytimes.com/roomfordebate/2011/06/15/computer-sciences-sputnik-moment/writing-code-has-become-self-expression>

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(emphasis is mine)

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## CS == Complexity Science

- Study of Complexity
  - How can it be done?
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## Computer Science Fields

### Systems

- Architecture
- Operating systems
- Networks
- Distributed and parallel systems
- Databases
- ...

### Software

- Compilers
- Graphics
- Software engineering
- Software testing and verification,
- ...

### Theory

- Algorithms
- Theory of computation
- ...

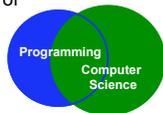
### Other

- Artificial intelligence
- Robotics
- Natural language processing
- Bioinformatics
- Visualization
- Numerical analysis
- ...

- Often research involves combinations of these fields

- Not just programming!

- But programming is a tool to do much, much more!



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## What I do **not** do as a Computer Scientist

- Fix hardware
- Fix Microsoft Windows (or other operating systems) problems
- Fix Microsoft Office (or other desktop applications) problems

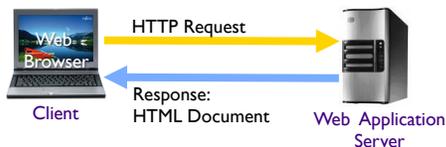
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## What I Do as a Computer Scientist

- Interests: Software testing, empirical studies, distributed systems
- Focus: Automated web application testing



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## What I Do as a Computer Scientist

Google Gmail Calendar Spreadsheets all my services >

Google Calendar BETA

Search My

Create Event

Quick Add

Today Aug NaN - 27, 2006

August 2006						
M	Tu	W	Th	F	Sa	Su
24	25	26	27	28	29	30
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

Find the error(s)!

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## Find the Errors

Dear SARA,  
You've spent \$0 in total as of September, 2010. You're almost there! Just spend \$0 more to receive your NY&C Reward!

Card Number: xxxxxxxx0710  
Total Active Coupons: 114 Total Value Available to Redeem: \$118.55

Sort By: Expiration

- Save .50 on Turkey Hill Ice Cream exp. Jan 1, 2011 [+ more info](#)
- Save \$0.50 on both BC Frosting/Cake exp. Oct 27, 2010 [+ more info](#)
- SAVE \$0.30 ON TWO Pillsbury Grands exp. Oct 27, 2010 [+ more info](#)
- SAVE \$0.50 on Bisquick Baking Mix exp. Oct 27, 2010 [+ more info](#)
- Save \$0.25 exp. Oct 30, 2010 [+ more info](#)

TOTAL Subtotal: \$12.95 Shipping: \$6.95 Total: \$19.9

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## Matt Welsh

- Senior software engineer at Google
- Research: sensor networks
  - Variety of applications: monitor volcanoes, health care, ...
- Wrote *Running Linux*




Matt at Volcán Reventador in Ecuador

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## Jennifer Chu-Carroll

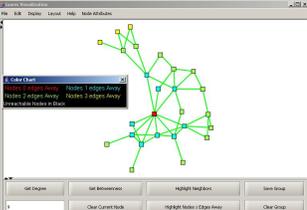
- IBM Research Staff Member
- Works on Watson
  - advanced search technology through the use of natural language processing and machine learning techniques



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## Jeff Forbes

- Associate professor of the practice at Duke University
  - Focus: computer science education
- Social networks, robotics
- Currently a program director at National Science Foundation

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## Jeannie Albrecht

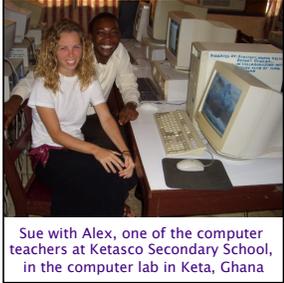
- Assistant professor at Williams College
- Research: managing software that is running and communicating on computers around the world
  - Or in a building for energy efficiency
- Hobbies: surfing, ultimate, rugby




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## Sue Lister

- Double major in CS and Psychology
- Distance Learning Officer at Infectious Diseases Institute (IDI)
- Interested in decreasing the division between the technological haves and have nots
  - Only 11% of Africans have Internet access
  - Cell phones are commonly used



Sue with Alex, one of the computer teachers at Ketasco Secondary School, in the computer lab in Keta, Ghana

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## Christyann Pulliam



- Double major in CS and **Political Science** from Gettysburg College
- **Law Degree** from Wake Forest University
- Patent Examiner at the US Patent and Trademark Office
  - Focus: Search engines, DB apps

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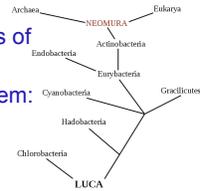
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## Tiffani Williams



- Computational biology (bioinformatics) and high-performance computing
- Develops software to analyze biological problems

- Example: analyzing collections of evolutionary trees
- Challenge beyond "real" problem: easy to use by biologists



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## Nina Bhatti



- HP Labs Principal Scientist
- Leads design for novel mobile technologies
  - System for matching your foundation, using pictures from your cell phone



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## Hilary Mason



- Chief Scientist, bitly
  - Data scientist and hacker
  - "finds sense in vast data sets"
- "Teaching someone to program is like giving them a **superpower.**" quote in *Glamour*, November 2011

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## What This Course Is About

Problem Solving!



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From *30 Rock*

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## Computational Problem Solving 101

- **Computational Problem:** A problem that can be solved by logic
- To solve the problem:
  1. Create a **model** of the problem
  2. Design an **algorithm** for solving the problem using the model
  3. Write a **program** that *implements* the algorithm



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## Computational Problem Solving 101

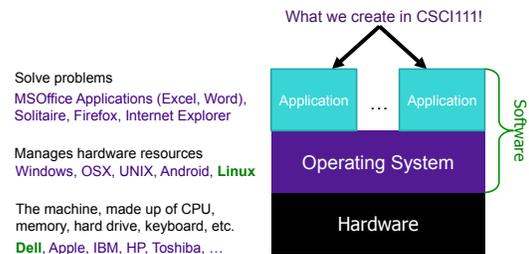
- **Algorithm:** a well-defined recipe for solving a problem
  - Has a *finite* number of steps
  - Completes in a *finite* amount of time
- Program
  - An algorithm written in a **programming language**
  - Also called *code*
- Application
  - Large programs, solving many problems

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## Basic Computer Architecture



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## What to Expect from this Class

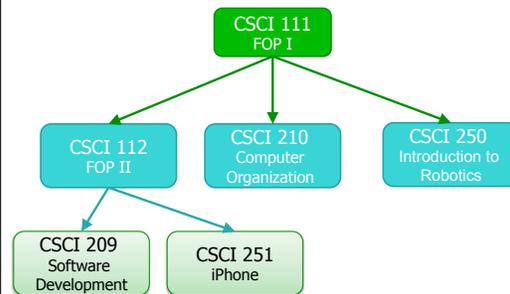
- First programming course
- Lots to learn!
  - Introductions to a lot of new ideas
- Different way of thinking
  - Similar yet different from math
  - May get stuck but ask for help!
- Writing some basic programs
  - Foundations for more complex, sophisticated code
- Great power, great responsibility

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## Where You Can Go From Here



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## Class Details

- Course web page
  - <http://www.cs.wlu.edu/~sprenkle/cs111>
  - Check schedule frequently for updates
- Monday, Wednesday, Friday lectures
  - Slides posted after class, in PDF format
  - Don't copy down slides verbatim
    - A lot isn't on the slides
    - Use PDF slides later to review
- Tuesday labs
  - Programming projects due on Friday
  - Parmlly 405

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## Class Details

- 3 Exams
  - 2 Exams (see schedule online for dates)
  - Final Exam
- Discussion of broader issues in CS
  - Articles about computer science's effect on *everything*
    - Get big picture of CS
  - Write up on Sakai, **due Fridays by 10 a.m.**
  - Discussion on Fridays
  - Opportunities for extra credit for finding, reading, summarizing additional articles

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## Instructor Responsibilities

- Keep your interest in CS
- Prompt, constructive feedback on assignments
- Office hours:
  - Wednesday: 2:30-4:30 p.m.
  - Thursday: 2:30-4:30 p.m.
  - Email for appointments
- Respond within 24 hours to emailed questions

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## Student Responsibilities

- Check W&L email and course web page frequently for updates
  - Review entire syllabus online
- Attend and participate in class and lecture
  - Mandatory attendance
  - Be respectful to other students
- Arrive promptly to lecture/lab
  - Bring your notes and handouts
- Turn off cell phone
- Be patient, flexible, and learn from mistakes

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## Textbook

- *Python Programming: An Introduction to Computer Science—2nd Edition*. John Zelle
- **Optional:** *Fundamentals of Python: First Programs*. K. Lambert
- Supplement to the material
  - Different perspective, additional practice problems

**Consequence:** my lecture slides and handouts and your notes are vitally important

- Reference *frequently*
- **Bring with you to lab!**

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## Your TODO List

- Review the course web page
  - Schedule (may change)
- Tomorrow: Lab 0
- Due Friday
  - First CS issues reading/writeup
  - Tuesday's lab/assignment

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