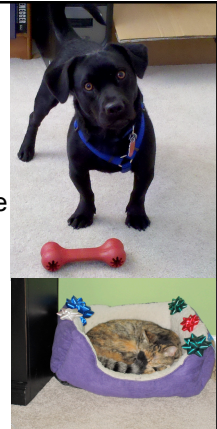


CSCI111: Fundamentals of Programming I

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
- ...

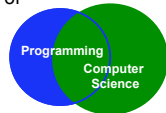
Other

- 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

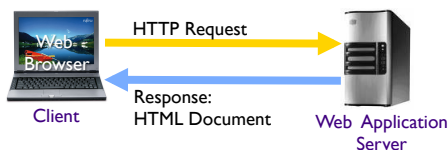
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What I Do as a Computer Scientist

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

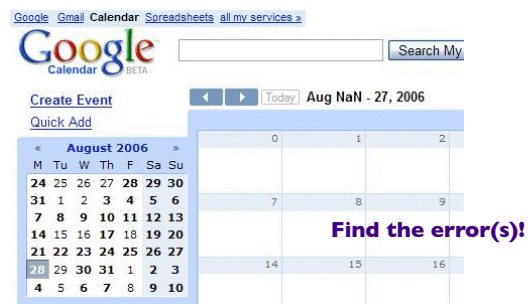


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What I Do as a Computer Scientist



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Find the Errors

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

Sort By:

Save \$.50 on Turkey Hill Ice Cream exp. Jan 1, 2011
[+ more info](#)

On any 48oz package of Turkey Hill Ice Cream

Save \$.50 on both BC Frosting/Cake Mix exp. Oct 27, 2010
[+ more info](#)

when you buy BOTH Betty Crocker® SuperMoist® Cake Mix AND Betty Crocker® Ready

SAVE \$.30 ON TWO Pillsbury Grands exp. Oct 27, 2010
[+ more info](#)

when you buy TWO any size Pillsbury Butter Pecan

SAVE \$.50 on Bisquick Baking Mix exp. Oct 27, 2010
[+ more info](#)

when you buy ONE BOX 40 OZ. Bisquick® Premium Measure

Save \$0.25 exp. Oct 30, 2010
[+ more info](#)

on any ONE (1) Fruit & Nutella® or Nutella® Spread or Bowl

Popularity ★★★★★

TOTAL

Subtotal: \$12.95
Shipping: \$4.95
Total: \$19.90

12596

Matt Welsh

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




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Jennifer Chu-Carroll


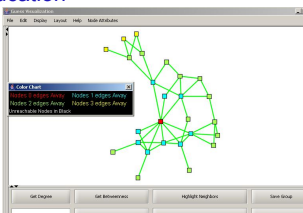
- IBM Research Staff Member
- Works on Watson
 - advanced search technology through the use of natural language processing and machine learning techniques



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Jeff Forbes

- Associate professor of the practice at Duke University
 - Focus: computer science education

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Jeannie Albrecht

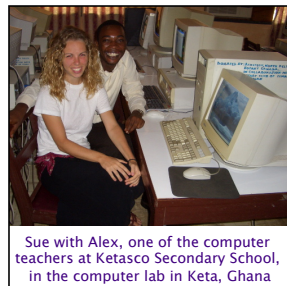
- Assistant professor at Williams College
- Research: managing software that is running and communicating on computers around the world
 - Or in a building for energy efficiency
- Hobbies: surfing, ultimate, rugby




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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



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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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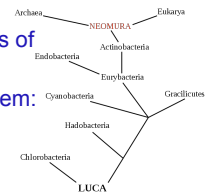
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Tiffani Williams



- 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!



From
30 Rock

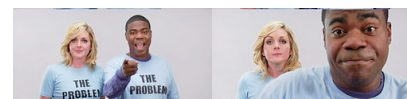
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Computational Problem Solving 101

- **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

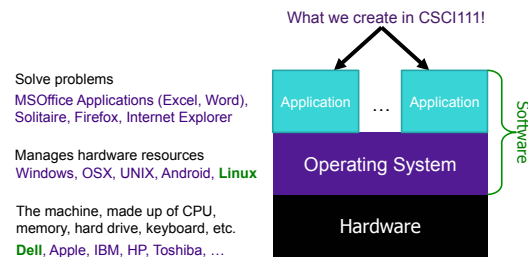
- **Algorithm:** a well-defined recipe for solving a problem
 - Has a *finite* number of steps
 - Completes in a *finite* amount of time
- Program
 - An algorithm written in a **programming language**
 - Also called *code*
- Application
 - Large programs, solving many problems

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Basic Computer Architecture



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What to Expect from this Class

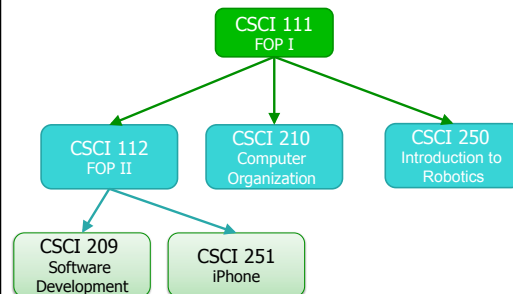
- First programming course
- Lots to learn!
 - Introductions to a lot of new ideas
- Different way of thinking
 - Similar yet different from math
 - May get stuck but ask for help!
- Writing some basic programs
 - Foundations for more complex, sophisticated code
- Great power, great responsibility

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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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