

CSCI111: Fundamentals of Programming I

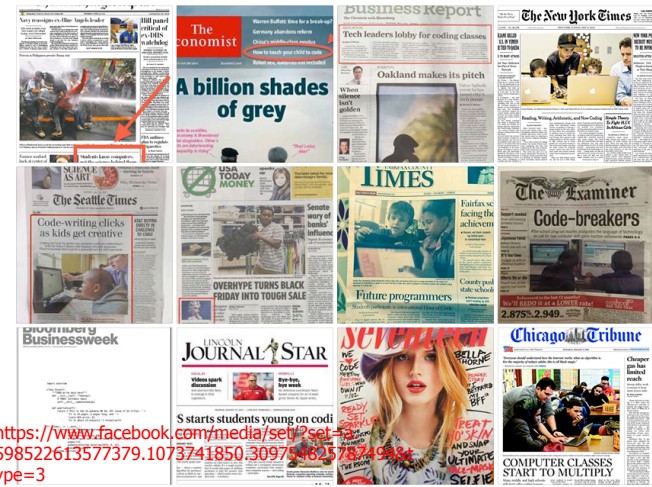
Professor Sprengle

sprengles@wlu.edu

<http://cs.wlu.edu/~sprengle/cs111>

Cover Stories on Computer Science

By Code.org - April 30, 2014



<https://www.facebook.com/media/set/?set=598522613577379.1073741850.30976482578249&type=3>

Bloomberg Businessweek

SPECIAL DOUBLE ISSUE June 11 - June 20, 2010 bloomberg.com

```

import datetime

class Issue():
    """ISSUE we're docx here"""
    def __init__(self, **kwargs):
        # TODO: fetch data report
        self.__dict__.update(kwargs)

    def publish(self):
        return ("This is the (%s) issue of (%s). It has (%s) pages, and "
                "costs $%s." % (self.issue, self.subject, self.pages,
                                self.price))

if __name__ == '__main__':
    issue = Issue(title="Bloomberg Businessweek",
                 price=5.99,
                 # That price is only USD,
                 # TODO: figure out international pricing/currencies
                 pages=150,
                 publish=datetime.date(2010, 6, 15),
                 subject="Code")
    print(issue.publish())
    
```

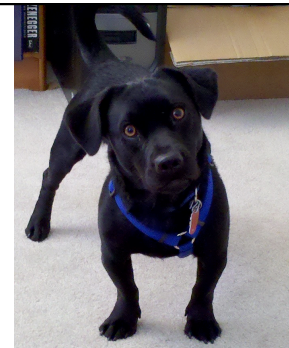
If You Can't Read That, You'd Better Read This
Code: An Essay

Jan 9, 2017

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My Bio

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



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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?

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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

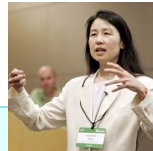
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Jeannette Wing

- Microsoft VP of Research
- Formerly at NSF, 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 or the 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 the above

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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,
- ...

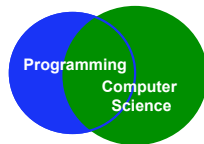
Theory

- Algorithms
- Theory of computation
- ...

Other

- Artificial intelligence
- Robotics
- Natural language processing
- Bioinformatics
- Visualization
- Data science
- ...

- 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

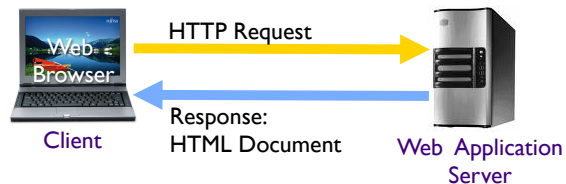
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What I Do as a Computer Scientist

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



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What I Do as a Computer Scientist

A screenshot of the Google Calendar interface. At the top, there are links for 'Google', 'Gmail', 'Calendar', 'Spreadsheets', and 'all my services'. Below these is the Google logo and a search bar. The main content shows a calendar for August 2006. The date '28' is highlighted in blue. To the right of the calendar is a 'Quick Add' form with a table of dates. The text 'Find the error(s)!' is overlaid on the calendar.

	0	1	2
7	8	9	
14	15	16	

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Find the Errors

Dear SARA,
You've spent \$0 in total as of September, 2010.¹ You're almost there! Just spend \$0 more to receive your NY&C Reward!

84 Items Sort By: Price: Lowest to Highest Items per Page: 12 48 View all 1 2

Signature Collection Shimmer Mist Paris Amour \$14.00 Now \$4.00 Limited Time Only! Save Over 70%	Signature Collection Shimmer Mist Moonlight Path \$14.00 Now \$4.00 Limited Time Only! Save Over 70%	Signature Collection Shower Gel Exotic Coconut \$11.00 Now \$2.75 Special Savings - Save over 60%	Signature Collection Shower Gel Cotton Blossom \$11.00 Now \$2.75 Special Savings - Save over 60%
--	---	--	--

Qty: 1 Add to Bag Qty: 1 Add to Bag Qty: 1 Add to Bag

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

12686

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Digital Humanities

Home Browse All Inscriptions Browse Figural Graffiti (Drawings) Search Pompeii Search Herculaneum Featured Graffiti About the Project

The Ancient Graffiti Project Search Engine
A digital resource for studying the graffiti of Herculaneum and Pompeii

Welcome to The Ancient Graffiti Project, a digital resource for locating and studying graffiti of the early Roman empire from the cities of Pompeii and Herculaneum. More than 500 ancient graffiti are now available here, ca. 300 from Herculaneum and another 200 from Pompeii (from the Lupanar, Insula I.8, and other locations). Entries for the Herculaneum graffiti now include photographs from our fieldwork in 2016.

Herculaneum **Pompeii**

Special acknowledgements to Eric Poehler for the map of Pompeii and the creators of ImageMapster for the highlighting map feature.

Digital Symbolic Logic Tutorial

Home Practice Exercises Quizzes Statistics Change Password Log Out Help

Practice Mode

Make the sentences into math

Key:

A: Apples are yummy. B: I will eat apples.

Sentence 1 of 1: If apples are yummy, then I will not eat apples.

Points Possible: 3

Unanswered

Answer:

Use & or the caret (^) for "and", | for "or", ~ for "not", -> for "conditional", and <-> for "biconditional"

^ v ~ -> <-> ()

SUBMIT CLEAR

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**MEET SOME MORE
COMPUTER SCIENTISTS**

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Haley Archer-McClellan '15

Computer Applications Programmer/Analyst
IT division, Federal Reserve Board



- Focus: web app that tracks Freedom of Information Act (FOIA) requests received by the board
 - meeting with the team that uses that app
 - developing requirements
 - monitoring legislation that impacts the Freedom of Information Act and our client's business processes
 - developing and testing our app

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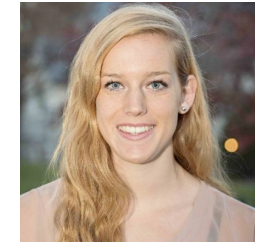
Johanna Goergen '16

Software engineer at
Optimizely,
a startup in San Francisco



Optimizely: A/B testing and personalization

Johanna: on the application backend team, writing and maintaining the company's REST API



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Samantha O'Dell '15

- Computer Science and English double major →
- Associate Technical Writer at Salesforce



<http://www.wlu.edu/transformation-education?feature=true&id=x10977>

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Olivier Mahame '14

- Software Developer at Goldman Sachs
 - Develops applications for internal use



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Alex Jackson '09

- Software Engineer II at SportsMEDIA Technology Corp
 - Develop, maintain systems for parsing and data processing of multiple sources for use with live on-air graphics during televised events.
 - Lead data processing engineer for NBC's Emmy-nominated coverage of British Premier League Soccer, 2013-2014 season.



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Lucy Simko McGee '11 and Camille Cobb '12



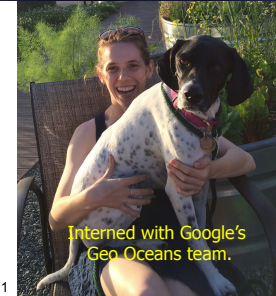
SECURITY AND PRIVACY RESEARCH LAB



Worked for the Dept of Defense on Cybersecurity

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Interned with Google's Geo Oceans team.

Sue Lister

- Double major in CS and Psychology
- Technical Associate for One Acre Fund
- Formerly Technical Lead at Clinton Health Access Initiative



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

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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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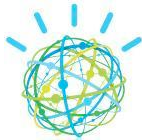
O'REILLY

MATTIAS ALLEN DAHLBERG & MATT WELSH

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Jennifer Chu-Carroll

- Former IBM Research Staff Member
 - Worked on Watson
 - Advanced search technology through use of natural language processing and machine learning techniques
- Now at Bridgewater Associatesj



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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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Erich Geist FEEDING™ food banks AMERICA

We use data analytics, computer systems, servers, programming, network and database administration all the time to provide the data necessary to inform our donors, government officials, advocates, and the general public about our mission to feed the hungry.

Without good computer science...there is no food.

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Your Bios

- Where you're from
- Your year
- A fun fact

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Hilary Mason



- Founder of Fast Forward Labs
 - a machine intelligence research company
- Formerly Chief Scientist at bitly.
- “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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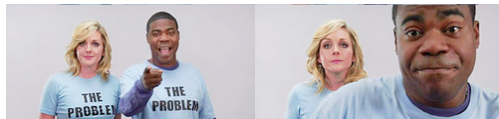
From
30 Rock

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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*
 - As code base grows, becomes an *application*

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What to Expect from this Class

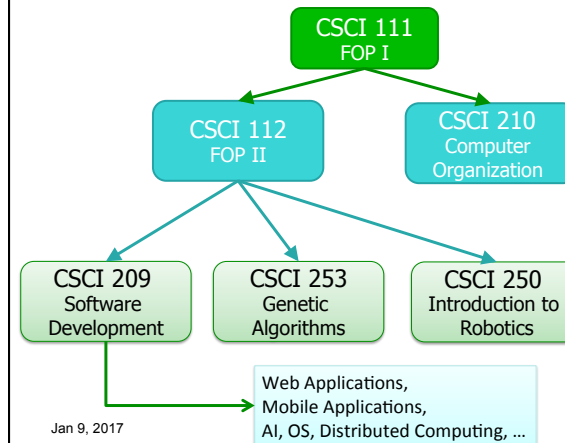
- First programming course
- Lots to learn!
 - Introductions to a lot of new ideas
- Different way of thinking
 - Similar yet different from math
 - May get stuck but ask for help!
- Writing some basic programs
 - Foundations for more complex, sophisticated code
- Great power, great responsibility

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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, 413

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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 9 a.m.
 - Discussion Friday
 - 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, Thursday: 2:30-4:30 p.m.
 - Email for appointments
- Respond within 24 hours to Piazza forum or 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

- Online textbook
- 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 and syllabus
 - Schedule (may change)
- View the “Computational Thinking” Video
- Complete the survey and submit to me tomorrow in lab

- See you in lab tomorrow!

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Summary

- Meet & greet
- What is computer science?
- What is this class?