CSCI111: Fundamentals of Programming I

Professor Sprenkle

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http://cs.wlu.edu/~sprenkle/cs111

Cover Stories on Computer Science

By Code.org · April 30, 2014

Slide 3

Bloomberg Businessweek
SPECIAL DOUBLE ISSUE June 15 — June 28, 2015 | Bloomberg.com

```
import datetime

class Issue():
    """TODO write docs here"""
    def __init__(self, **kwargs):
        # TODO: Validate input
        self.__dict__.update(kwargs)

    def publish(self):
        return ('This is the {0.pubdate:%B %d, %Y} issue of {0.title}. ' +
                'It is {0.pages:,} pages long, and ' +
                'costs ${0.price:.5}. ' +
                'It is about {0.subject}.').format(self)

if __name__ == '__main__':
    bbw = Issue(title="Bloomberg Businessweek",
                price=5.99,
                # That price is only USD;
                # TODO figure out international pricing/currencies
                pages=112,
                pubdate=datetime.datetime(2015, 6, 15),
                subject="code")
    print(bbw.publish())
```
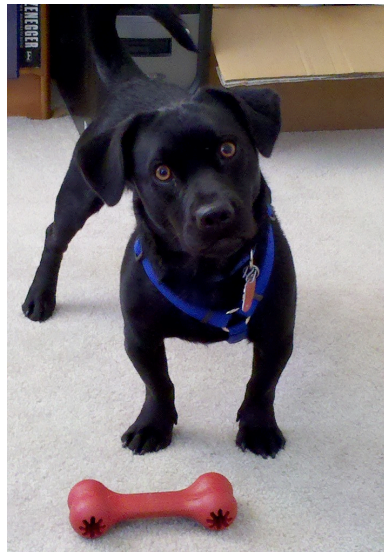
If You Can't Read That, You'd Better Read This
Code: An Essay p.13

Jan 8, 2018

3

Slide 4

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

CSCI111

4

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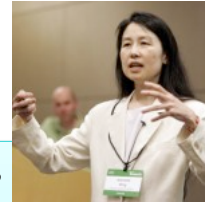
"Computer Science is no more about computers than astronomy is about telescopes."
                    --Edsger Dijkstra

- CS = Complexity Science

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
```

Jan 8, 2018   Sprenkle - CSCI111   (emphasis is mine)   7

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
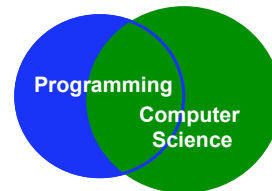- Software testing and verification,
- …

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!

Programming

Computer Science

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

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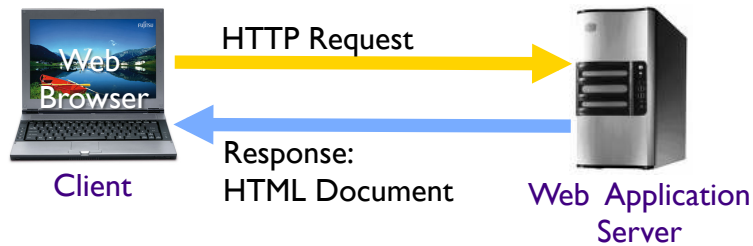- Fix Microsoft Office (or other desktop applications) problems

What I Do as a Computer Scientist

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

HTTP Request

Web Browser

Client

Response: HTML Document

Web Application Server

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

| | 0 | 1 | 2 |

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

| | 7 | 8 | 9 |

Find the error(s)!

| | 14 | 15 | 16 |

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!*

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

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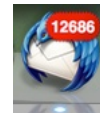
Payment details

The total amount that will be debited to your credit card is $100.36 for 52 weeks. plus $10.00 for the tip. for a total amount of $110.36

Total Cats in Household

Share the number of cats in your household and earn 100 points!

How many cats are in your household?

☐ 1

☑ 2

☑ 3

☐ 4

☐ 5+

Submit >

|FNAME| enter to win $10k for your charity today with our Favorites Givea...

Invalid SQLExec update for this type of PeopleCode program. (2,146) NY_SNDEMAIL_WRK.SENDMAILFIELD.FieldFormula
Name:validatePIN PCPC:15071 Statement:181
Called from:SUP_OB_USR_ATR.SUP_OB_VENDOR_ID.FieldChange Name:Check_Std_Id_Num Statement:38
Called from:SUP_OB_VND_WRK.STD_ID_NUM.FieldEdit Statement:18

SQLExec commands with UPDATE, INSERT, or DELETE statements are only allowed in SavePreChange, SavePostChange, and Workflow type PeopleCode programs.

☐ Prevent this page from creating additional dialogs

500 Internal Server Error

Sorry, something went wrong.

A team of highly trained monkeys has been dispatched to deal with this situation.

If you see them, send them this information as text (screenshots frighten them):

APCGX7o5ykoeEOKrfXRNISlhLbvGqo-1tQ3YY4JW3rdyXWwXjkTHTyK2
mIDXuGB5S9DMmVtN5GqUuctxdVkvRnBPFAOjfydg_5BANHOlk6-KML85
aev_MYUUr5Z8MC_XL7baMExDc8V2eLpy7z_djiLCL0BlGOYuSqH8IA4M
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ef38iwTkdu6iRKEeIueUSKVXil1ID13UbSMMHzKYC-infX47nuFZu0xb
xW2mO9TJSQv2L1TN-9ehvS2fYla6iYt--HYEZFM_CKpuiCvFXmYXTTWj
QhD3JS-s_WhoFpBgagHc_BdyWgGfllyjw6Nwlwk5VBVLJs20JwLenLb-
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0KHs-_RHxM529YSI0XMdoSTxdrOqrWfwOMM8Vu2VL53K4VSzuO2h4J6b
9MWUi6cNuTa2k2_5mYJ2QX6GYKrO0U5loPq9jaIFJBFrMXGet-GZMXQy
HZEZq4yAQ2e28ubLDPXRWYrVfDw2-PloY9w9Zi9ceh9qWBNZabvCOUkL
gBC1weqBBeOPM2thjDiKNWbgBcfRDBlyW2tX6mBhCKBCGlzyzT9drvLw
cxcXl50xSUyTxqlzV2DWY3-MQuCpdPCEPzZK31MGEdgUhiNkwVBmH8oB
SVkEkNRycCCG2XtpbDSBN1bUGzMDh_O8JhlcZ2IU7EOLmemxgGzqI64L
xWLAfQq22aKlyuOOYwF80o974gw-pugZPhfVPcA5FN-5taBtDCMUczj-
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ltqdJ30NzdkyfhIJGAJKoIFCYyKm_ZJ0JfQdJF0qTr7hsigSgAuyGKTU
IOBZV0cOFRTAFis8elkAL6Zk5Px6JuzK4VvUzYbvzFFlHacKt43gYtpY
YhC844wGO1Oyo---mtYqtIxL2cdumfKYrRbeGviEwGzhI7aXdPpzWMtt
BYSxzBLIX4euU3XQYj_tjPPVUGrllMpnkKTaLAqPXME7TVCaF4-XAzZh
nND9fjU3OO4dFTSVs5yfDp3JBujdWieu20jakqXc8spyzj8HpEl6gRyr
NUIsXhpckm2lW4Gxul2tVU-MCsGfBiWDWBQj35uTGNTvFk7eWqIAqkR7

OK

15

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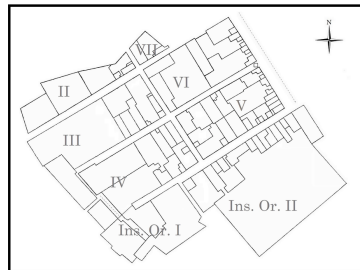
Pompeii
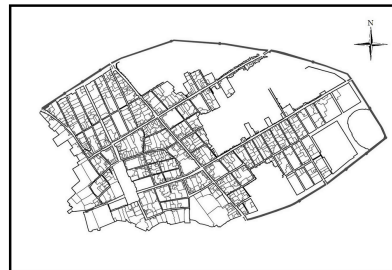
Special acknowledgements to Eric Poehler for the map of Pompeii and the creators of ImageMapster for the highlighting map feature.

Symbolic Logic Tutorial

Home Practice Exercises Quizzes Statistics Change Password Log Out Help

Dig...

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"

| ^ | ∨ | ¬ | → | ↔ | (|) |

SUBMIT   CLEAR

Jan ...   17

REVIEW ANSWERS

MEET SOME MORE COMPUTER SCIENTISTS

Jan 8, 2018   Sprenkle - CSCI111   18

9

Jamie White '17

Software Engineer at
Amazon, eBook division

Patrick Ozark '17

Bioinformatics Analyst at Northwestern University –
the Feinberg School of Medicine

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

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

Samantha O'Dell '15

- Computer Science and English double major
- Associate Technical Writer at Google

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

Jan 8, 2018   Sprenkle - CSCI111   23

Lucy Simko McGee '11 and Camille Cobb '12

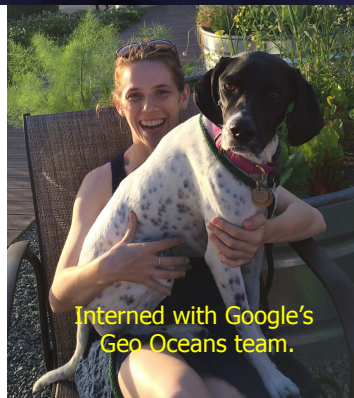UNIVERSITY of WASHINGTON

SECURITY AND PRIVACY RESEARCH LAB

Worked for the Dept of Defense on Cybersecurity

Interned with Google's Geo Oceans team.

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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

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.

Your Bios

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

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

What This Course Is About

Problem Solving!

From
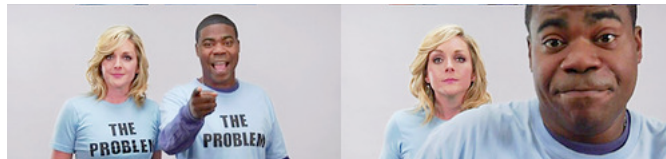*30 Rock*

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

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*

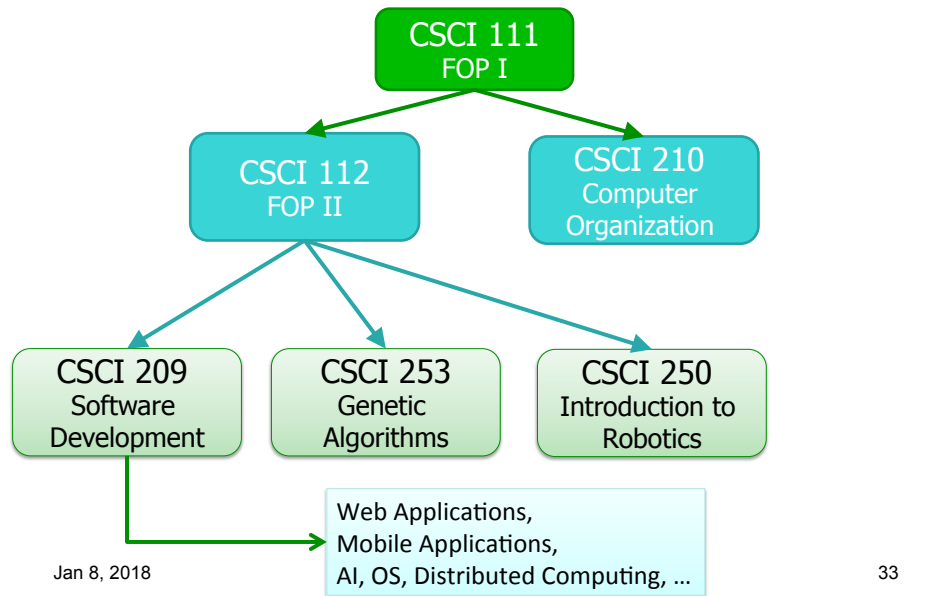# What to Expect from this Class

- 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

Where You Can Go From Here

```
                    ┌──────────────┐
                    │   CSCI 111   │
                    │    FOP I     │
                    └──────────────┘
                       ╱        ╲
              ┌──────────────┐   ┌──────────────┐
              │  CSCI 112    │   │  CSCI 210    │
              │   FOP II     │   │  Computer    │
              │              │   │ Organization │
              └──────────────┘   └──────────────┘
                ╱     │     ╲
   ┌──────────┐ ┌──────────┐ ┌──────────────┐
   │ CSCI 209 │ │ CSCI 253 │ │   CSCI 250   │
   │ Software │ │ Genetic  │ │Introduction to│
   │Development│ │Algorithms│ │   Robotics   │
   └──────────┘ └──────────┘ └──────────────┘
```

Web Applications,
Mobile Applications,
AI, OS, Distributed Computing, …

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
  - ➤ "Pre-lab" assignments in the textbook
  - ➤ Programming projects due on Friday

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 11 a.m.
  - Discussion Friday
  - Opportunities for extra credit for finding, reading, summarizing additional articles

Instructor Responsibilities

- Keep your interest in CS
- Prompt, constructive feedback on assignments
- Office hours:
  - Wednesday 2:30 – 5 p.m., Thursday: 1:30-4:30 p.m.
  - Email for appointments
- Respond within 24 hours to emailed questions

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

Textbook

- Online textbook
- Supplement to the material
  - ➢ Different perspective, additional practice problems
- Register for the class (instructions on course schedule page)

Consequence: my lecture slides and handouts and your notes are vitally important
- Reference *frequently*
- **Bring with you to lab!**

Your TODO List

- Review the course web page and syllabus
  - Schedule (may change)
- Complete the survey and submit to me tomorrow

Summary

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