

# CSCI111: Fundamentals of Programming I

Professor Sprenkle  
sprenkle@wlu.edu  
<http://cs.wlu.edu/~sprenkle/cs111>

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## Bloomberg Businessweek

SPECIAL DOUBLE ISSUE: June 18 - June 26, 2015 | bloomberg.com

```
import datetime

class Issue():
    """TODO write doc 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

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# My Bio

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



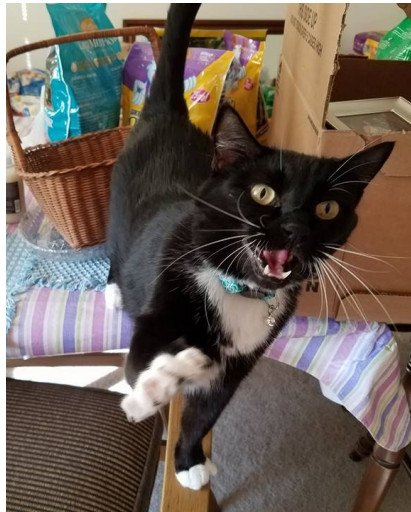
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# My Roommates



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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?

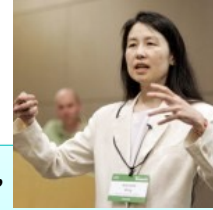
“Computer Science is no more about computers than astronomy is about telescopes.”  
--Edsger Dijkstra

- 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,
- ...

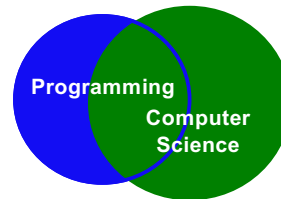
## Theory

- 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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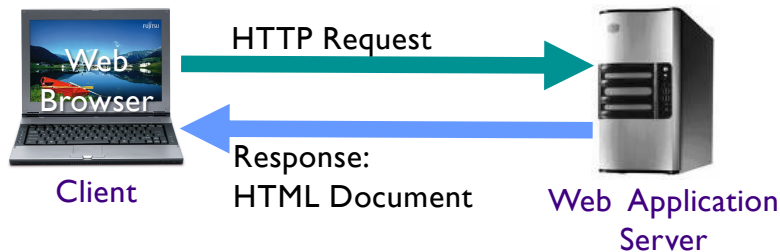
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# What I Do as a Computer Scientist

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



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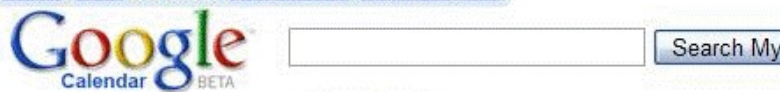
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# What I Do as a Computer Scientist

[Google](#) [Gmail](#) [Calendar](#) [Spreadsheets](#) [all my services »](#)



[Create Event](#)

[Quick Add](#)

« 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

Today Aug NaN - 27, 2006

0	1	2
7	8	9
14	15	16

**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!\*

84 Items Sort By: Price: Lowest to Highest

Items per Page: 12 48 View all 1 2



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

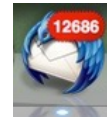
Signature Collection  
Shimmer Mist  
**Paris Amour**  
~~\$14.00~~ Now \$4.00  
Limited Time Only! Save Over 70%

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



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## 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 >

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\*[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

OK

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):



APCCX7o9ykoEOR:fxRMS1h1bvcGqo-1tQ3Y4JW3rdyXWxKjK7HfYK2  
m1DXG859DmMfANSQgluctx9VrNBPFA0jfydg\_5BAN01k6-KM85  
aeV\_MYUUr:5z8NC\_XL7bAMEKDe8V2eLpy7z\_djLLCLOB1COYUsg8IA4M  
fcgR\_j3VENK01hzaUOH091MAQ1KmiPQtePq-C4nF3BAJgXix6vDSwit  
fjg47gAjlU0N0\_g5H1BEKXVh7Ybyp2-0wnIX8BAVMH9Q8XKCOkaas6M\_  
mzxVooK2aRba4U0emYRNRGOL40F\_juE-0ptACU3oIYAB8wepf61-GF9WZy  
ef38iW7kdu61RKEoTueUSKVX111ID13UB6MMH2KYC-infX47nuf2u0xb  
xW2mO9TJSQv2LL7N-9ehvS2fYl6iYt--BYEZFEM\_CKpuicVfXmYXTWj  
QhDJ3z-\_WhoPp8ag8c\_BdyqGf11yJw6Nw1w5V9VLJz20JwLomLb-  
ADJWKKInDf5CtJCOetVg95873bbr5141\_fjGLEBJ3\_jg7n8W0B9y  
EeahDY2Yzby9k1zV176qkU9vx4hAHM\_b7CTUOSF-aAmq6VYB\_NDBL  
uJ1iZvkrXNMVpo-aQdLDSUEMv2RHhoq60oPmg38Fc414OEBSRQ2mIOBy  
OKHs-\_RHxM529YS1OXMdoSFxdrOq:WiwOMH6Vu2V53K4V8zu02h476b  
9WML6cNu8a2k2\_SmY2QXGyKrcOU51oPq9jaIFBPMK0e1-GRMQy  
HZE2g4AQ2e28uBLDPXRMVzVfDw2-Pl0Y9w9219ceh9gWBN2abvCOUKL  
gBC1weg8BeOPN21hJ0iKNWbgBcFRDB1yW2tX6mBhCKBC01zyzT9drvLw  
cxcK150x8UyTqxizV2DM73-MQuCp4PCFzK31MGEgdUhlNkwVBM80b  
SV8z8NRycCCXyab0SBW1U0uMbh\_0b8hlc22TUT0LmewxG0e164L  
xWLAfQ22aK1yu00YwF80o974gw-pug2PhfVPA5FN-5taBtDCMuczj-  
KQK6aAos\_eVpVv9FzOmBYa-XYMakIH80587b5x-K8xvCpL0azXP2q2g5  
1tgdJ30Ndkyfh1JGAJkoIFCYkm\_ZJ0JfQdJf0qTr7hs1g8gAuyGKTV  
IGWZV0c0F7AFi8e1k8i66K5P63u8K4V0z2VavvFP1HacK14j0YqY  
YhC844G010yo---mtYqLkL2odumKYzRbeGviEwGzh17x4DpzWmtt  
BY8xzBLIX4eu3X0Yj\_tjPPV0Gr11MpnkTALqPKME7TVCaF4-XAzZh  
nND9fj03004dFT8V85yIDp3JbuJdW1eou20jakqKc8apyz38hp216gRyz  
NUT8hpc6m21M4GxulzVUW-WcaGEB1MDW0Gj35uT0NvVfK7eWg1AqkRT

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We're having a really bad day.

The Unicorns have taken over. We're doing our best to get them under control  
and get GitHub back up and running.

Contact Support — GitHub Status — @githubstatus



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# My Research Interests

## ● Emails

### Review Your Recent Purchases

o

write a review

a

write a review

u

write a review

From Kroger <noreply@kroger.com> ☆  
Subject Your null Comments Have Been Received  
To Sara Sprenkle ★

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# My Research Interests

2. Attend a workshop or webinar that addresses emotional wellbeing.
  1. On-campus events are listed on the Live Well W&L Event Calendar throughout the year.
  2. If you cannot attend one on campus, you may watch a TED Talk that relates to emotional wellbeing:
    1. Self-care topics
    2. Emotional hygiene topics
3. Utilize Care.com's eldercare advising or other care giving support resource.
  1. [Click here to get started.](#)
2. Participate in one of Live Well W&L's emotional wellbeing contests through Sonic Boom. Stay tuned for more details on our Power Down contest coming this late Fall!
  1. Live Well W&L contests will be posted on the Contests page.

Complete one of the options listed above to earn one Holistic token. Earn a token in at least four of these seven activity areas (physical, emotional, intellectual, financial, social, environmental wellbeing and Sonic Boom Engagement) to complete the holistic level.

Enter the date you completed an emotional wellbeing activity.



Please enter the number next to the activity that you completed (i.e. '2')

SUBMIT

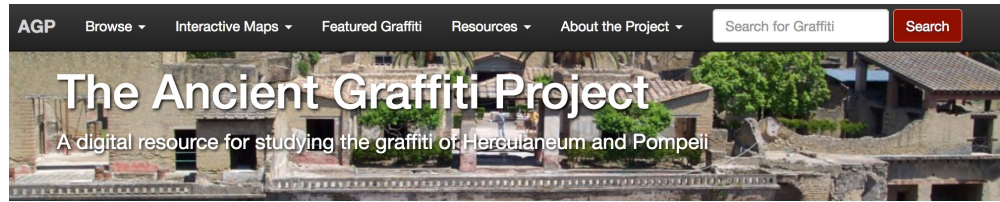
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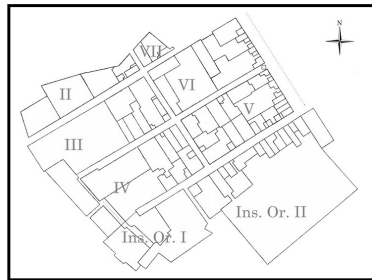
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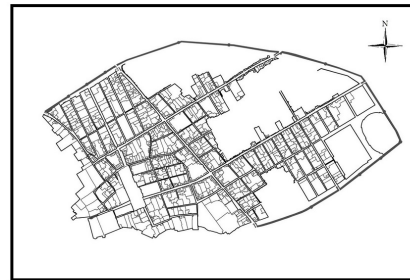
# Digital Humanities



Herculaneum



Pompeii



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# 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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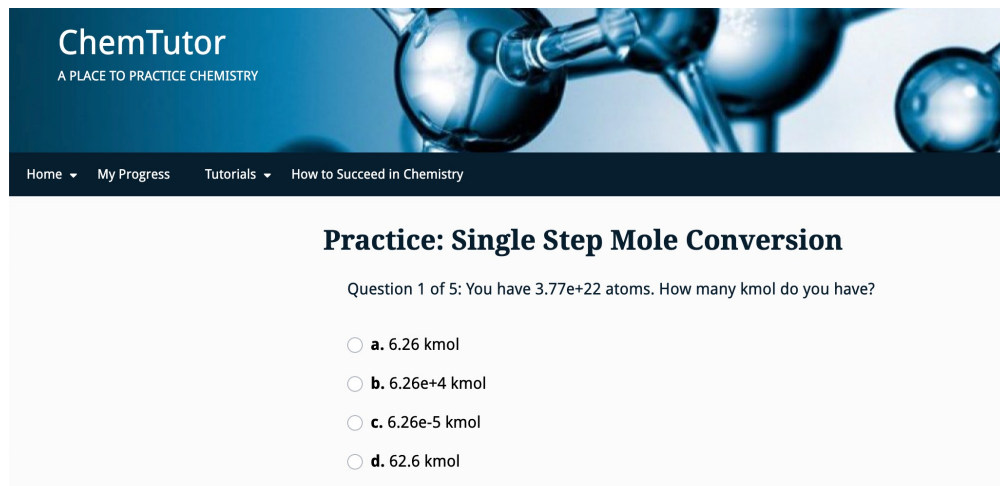
REVIEW ANSWERS

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# ChemTutor



ChemTutor  
A PLACE TO PRACTICE CHEMISTRY

Home ▾ My Progress Tutorials ▾ How to Succeed in Chemistry

### Practice: Single Step Mole Conversion

Question 1 of 5: You have  $3.77 \times 10^{22}$  atoms. How many kmol do you have?

- a. 6.26 kmol
- b.  $6.26 \times 10^4$  kmol
- c.  $6.26 \times 10^{-5}$  kmol
- d. 62.6 kmol

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## MEET SOME MORE COMPUTER SCIENTISTS

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# W&L Alumni at **amazon**

## Software Engineers



Rinn Joireman '21



George Barker '20

More alumni: Tom Wadlow '99, Jamie White '17, Alex Cantrell '19

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# Patrick Ozark '17



MD/PhD Student at  
University of Utah School of Medicine

Formerly: Bioinformatician at St. Jude Children's Research Hospital

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## PhD Students



Hammad Ahmad '19  
Michigan: Software Engineering



Sarah Anne Troise '19  
CMU: Engineering and  
Public Policy

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## Lucy Simko '11 and Camille Cobb '12



Worked for the Dept  
of Defense on  
Cybersecurity



**SECURITY & PRIVACY**  
RESEARCH LAB  
UNIVERSITY of WASHINGTON



Now faculty at  
University of Illinois  
Urbana-Champaign

Example publications:

- Defensive Technology Use by Political Activists During the Sudanese Revolution
- What Makes People Install a COVID-19 Contact-Tracing App?
- Would You Rather: A Focus Group Method for Eliciting and Discussing Formative Design Insights with Children

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## Computer Science and Law



**Christyann Pulliam**

- CS and **Political Science major**
- **Law Degree** - Wake Forest
- Patent Examiner at the US Patent and Trademark Office

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➤ **Focus: AI, DB apps**



**Julianne Campbell '18**

- Computer Science Major
- **Law Degree** – Vanderbilt '21
- patent litigation support in electrical and computer technologies

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## Samantha O'Dell '15

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



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## More at Google



Abby Nason '20  
Information Technology  
Resident



Ruinan Liu '20  
Technical Account Manager  
Cloud Technical Resident

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Erich Geist  food banks

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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Personal Correspondence

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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!



From  
*30 Rock*

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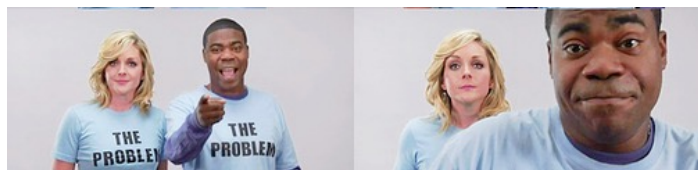
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## Computational Problem Solving 101

- **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, step-by-step process 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

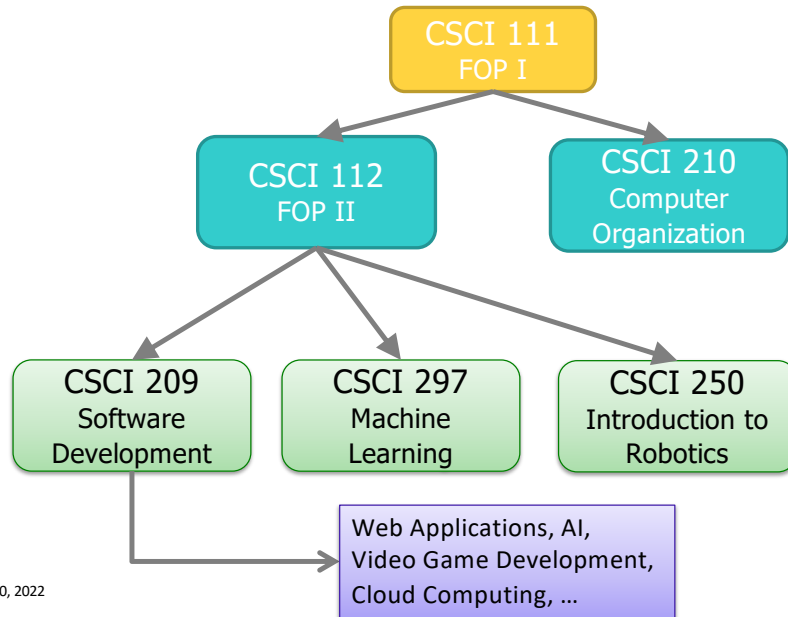
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## Where You Can Go From Here



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## Class Details

- Course web page
  - <http://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 at the *beginning of class on Friday*

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## Class Periods

- Classes are in-person
- Classes will be recorded on Zoom and posted in Yuja on Canvas
- If you're not feeling well, you can attend the class on Zoom **BUT** that should not be a frequent occurrence

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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 Canvas, due **Thursdays by 11:59 p.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:
  - Wednesdays and Thursdays: 1:30—4 p.m.
  - Email for appointments
- Respond within 24 hours to emailed questions

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## Student Responsibilities

- Outside of class:
  - Review entire syllabus online
  - Check W&L email and course web page frequently for updates
- During class
  - 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
- 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!**

## Looking Ahead

- Tomorrow is our first lab!
  - We'll get you started for the semester