# CSCI 209:
# Software Development

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# How did you get to
# CSCI209: Software Development?

- CSCI111 and CSCI112:
  Fundamentals of *Programming* I and II

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# What is Programming?

> "If you don't think carefully, you might think that programming is just typing statements in a programming language."
> --Ward Cunningham

> "Any fool can write code that a computer can understand. Good programmers write code that *humans* can understand."
> -- Martin Fowler
> "Refactoring: Improving the Design of Existing Code"

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# Discussion: What Is *Good* Software?

- What are its outcomes?

- What are the characteristics of the software?

- How can we write good software?

- What are short-term vs long-term goals?

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**What are qualities of good software? What are its outcomes? What are the characteristics of the software? How can we write good software? What are short-term vs long-term goals?**

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# Characteristics of *Good* Software?

- Free of bugs (does what it is supposed to do)
  - ➢ Robust, reliability, stability
- Code is easy to read, extend, maintain
  - ➢ Readability, extensibility, maintainability
- Usability: Application is easy to use
- Efficiency
- Scalability

➔ Metrics of quality referred to as the *\*ilities*

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# My Research Interests

- General: Software engineering
- Automated testing of web applications
  - ➤ Develop algorithms
  - ➤ Implement in tools
  - ➤ Empirical studies
    - Try ideas out, see what actually happens, analyze
- Subject applications: Ancient Graffiti Project, ChemTutor

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# My Research Interests: Automatically Finding Bugs

- In an email:

**Review Your Recent Purchases**

o

write a review

a

write a review

u

write a review

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# My Research Interests: Automatically Finding Bugs

From Kroger <noreply@kroger.com> ☆

Subject **Your null Comments Have Been Received**

To Sara Sprenkle ★

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# My Research Interests: Automatically Finding Bugs

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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## Sometimes, Errors are More Obvious

Our online textbook

```
----------------- Traceback ----------------
  Traceback (most recent call last):
File "/home/bmiller/Runestone/web2py/gluon/main.py", line 444, in wsgibase
  serve_controller(request, response, session)
File "/home/bmiller/Runestone/web2py/gluon/main.py", line 179, in serve_controller
  page = run_controller_in(request.controller, request.function, environment)
File "/home/bmiller/Runestone/web2py/gluon/compileapp.py", line 657, in run_controller_in
  ccode = getcfs(layer, filename, lambda: compile2(code, filename))
File "/home/bmiller/Runestone/web2py/gluon/cfs.py", line 50, in getcfs
  data = filter()
File "/home/bmiller/Runestone/web2py/gluon/compileapp.py", line 657, in <lambda>
  ccode = getcfs(layer, filename, lambda: compile2(code, filename))
File "/home/bmiller/Runestone/web2py/gluon/restricted.py", line 205, in compile2
  return compile(code, layer, 'exec')
File "<fstring>", line 1
  (searchdict=)
              ^
SyntaxError: invalid syntax
```
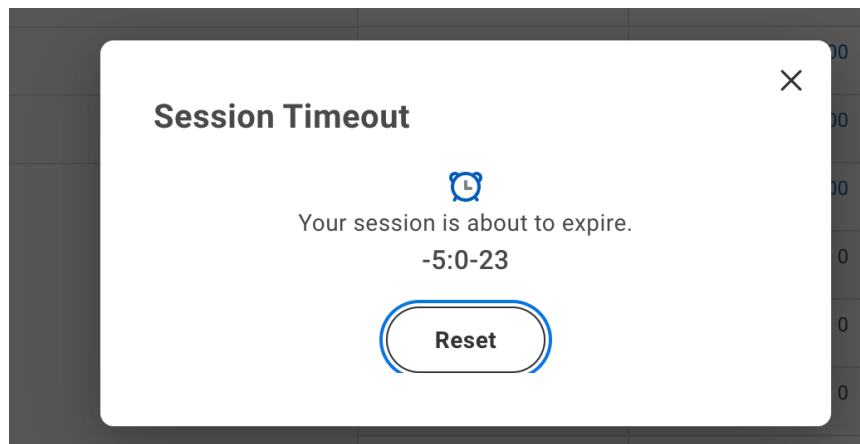
Update: "Fixed! Sorry for the inconvenience. This slipped through our automated tests and my manual testing. It is a feature that is not supported by python3.7 but is supported by python 3.8 and 3.9. Time to get all of Runestone's servers off of 3.7!!"

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## Workday!

**Session Timeout**

⏰

Your session is about to expire.

-5:0-23

Reset

×

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# Course Content

- Software Design Principles

- Java
  - ➢ **Statically** typed, compiled language

- Software development, productivity tools
  - ➢ Version Control Systems (git)
  - ➢ Eclipse

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# What to Expect from this Class

- Programming intensive
  - ➢ Variety of assignments and projects
  - ➢ More freedom in design, *ilities
    - Larger portion of your grade
    - Correctness is **NOT** enough
  - ➢ Building on large library of classes
  - ➢ Read others' code!    Learn from the good and the bad
  - ➢ Building larger applications
- Compare/Contrast with Python
  - ➢ PL design; what's the best PL for your needs
- Learning on your own
  - ➢ Online resources

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# Learning Objectives

- Discuss software development and practices knowledgably, using appropriate terminology
- Design, implement, test, and document efficient applications of increasing size and complexity
- Understand the designs and implementations of others
- Use a version control system
- Use many of the capabilities of the Eclipse IDE
- Test and debug large applications systematically, using standard tools
- Understand design principles such as DRY and shy
- Discuss the benefits and limitations of a statically typed language

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# Real Objective

- Prepare you for 300-level classes, interviews, internships, jobs
  - Programming skills
  - Proficiency with environment, tools
  - Comfort/confidence

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# Feedback from an Alumnus

"I am schooling everyone at work on OO design and Java.
Seriously, keep pounding OO design principles in.
It is incredibly practical.
I'm teaching CS majors and Computer Engineering grads about this.
It's crazy how some (good) technical schools don't stress this more."

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# Feedback from Another Alumnus

"CSCI 209 was super super helpful in my job application process. In all my interviews not only did I have to program in Java, but I also had to explain theories and design techniques used in the software development process.

Being able to explain those theories/techniques confidently and thoroughly like we had practiced during each of our class meetings made all the difference for me."

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## Class Details

- Course Web Site `https://cs.wlu.edu/~sprenkles/cs209`
  - Example code, slides, readings, resources
- One required online textbook
- Plentiful online resources
- Participation
  - Class discussions
- Use Canvas for Office Hours links
  - Canvas sites should be published later today

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## Class Details

- Programming Assignments
  - Hands-on learning
  - Various sizes
  - To start, a lot of short ones
- 1 Testing Project
- 2 Exams
- Team Final Project

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# Course Dynamics

- Professor's Responsibilities:
  - ➤ Be prepared for class
  - ➤ Provide constructive feedback to students
  - ➤ Treat students with respect
  - ➤ Challenge and encourage students
  - ➤ Make material as clear as possible

- Student's Responsibilities
  - ➤ Be prepared for class (do readings and homework)
  - ➤ Give attention and effort in class to learning
  - ➤ Ask questions (**during class** and via email)
  - ➤ Use professor's office hours
  - ➤ Let professor know if something is going wrong
  - ➤ Treat other students and professor with respect

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# Where should I go for *X*?

- **Web Site**
  - ➤ Slides
  - ➤ Assignments
  - ➤ Example programs
  - ➤ Readings, e.g., the textbook

- **Canvas**
  - ➤ Recordings from class
  - ➤ Zoom links (office hours, class)
    - Office hours – always online
    - Zoom for class if you're sick
  - ➤ Occasional assignments
  - ➤ Some class handouts

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# Changes from 111/112 to 209

- No lab! No student assistants!
  - Need to work on your own
  - Recommendation: Schedule your own lab time to work
- Emphasis changes
  - Not just about efficiency/correctness but about maintainability and human readability
- Python → Java

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# My Bio

July 2022

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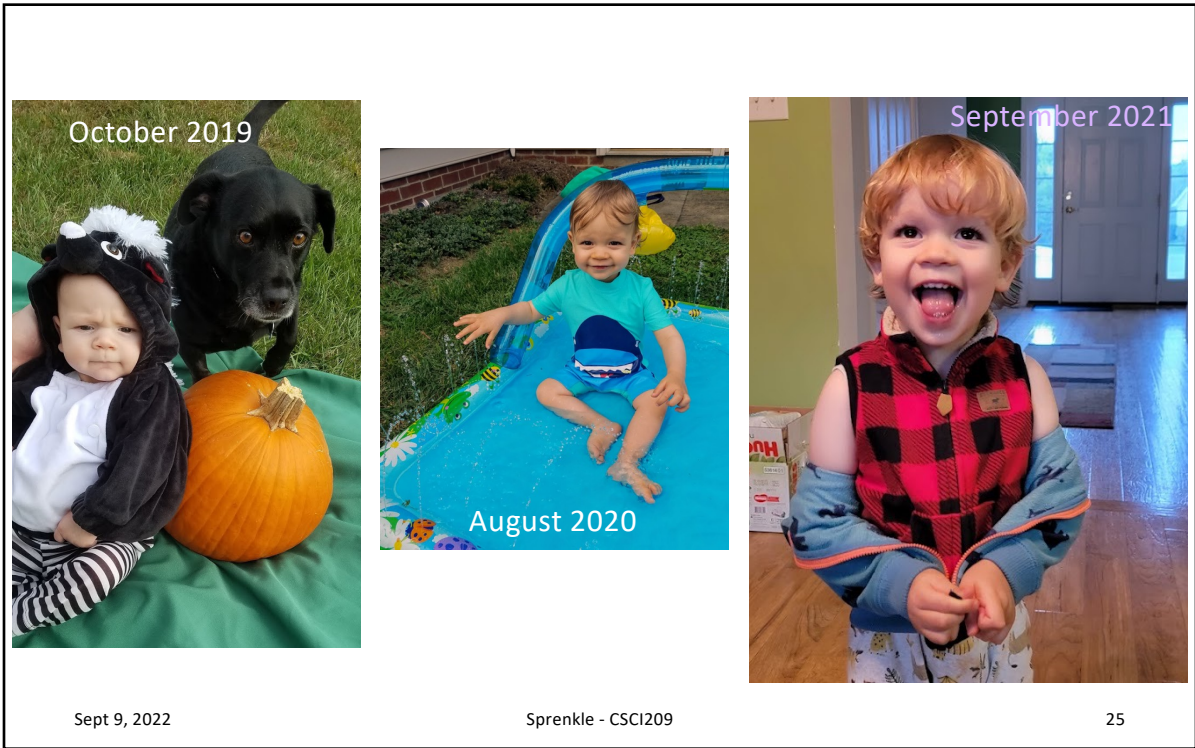- For fun: pop culture, gardening, Rockbridge Animal Alliance
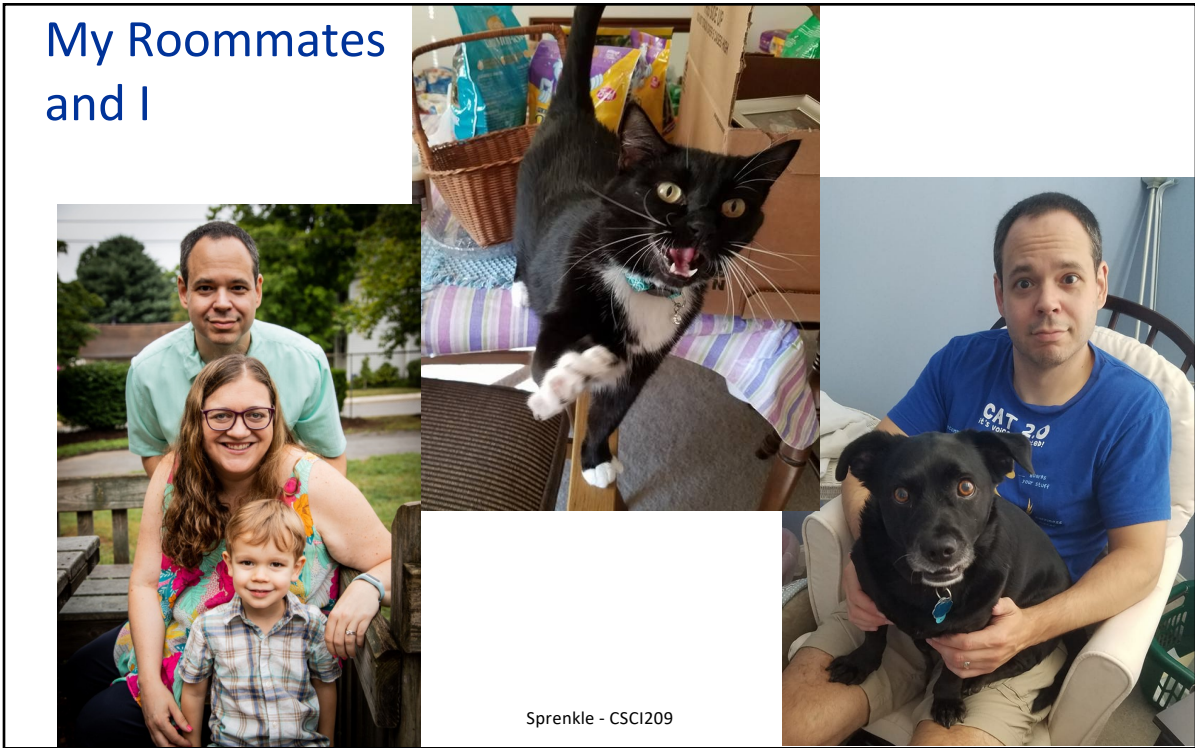


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October 2019

August 2020

September 2021

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# My Roommates and I

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# REMEMBER PYTHON?

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# Activity: Python Review

In parallel, I'm going to go around and meet everyone.

1. Go to the course web page
   ➢ How will you find it?
   ➢ Bookmark the page (or whatever you need to do to be able to access it again quickly)
2. Go to the schedule page
3. Find today's assignment→ go to that page
4. Read through assignment
5. Read through the code → get the big picture
6. Complete the table and answer the questions in the document.
   1. As much as you can, on your own (I'll tell you when to move on)
   2. With your neighbors
   3. Looking up online

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# Looking Ahead: Before Monday's class

- Bookmark course schedule page

- Register for the online textbook (see schedule page)

- Complete the table and answer the questions in the document.

  ➢ You may look up answers online

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