Hello World 3110:
Functional Programming & Data Structures

June Andrews

May 24, 2010

Outline
Course Logistics
Who's on First?
Functional Programming
Why Python
Syllabus

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Grading
Course Support

Grading

- *Grades are out of 200 pts.*

	no.	Total Pts
Homework	4/week	± 24
Projects	5	100
Quizzes	1/week	40
Final	1 Big One	60

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-
  - Homeworks are meant to replace recitation.
  - 3 Projects will be fill in the code type projects. 2 will be your standard undergrad project - demanding, but doable.
  - Instead of 2 midterms, quizzes every Friday for 40min.
  - 1 Big Final study & stress, but remember that required extra credit?

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- ▶ All Homework and Projects will be posted on CMS
  http://cms.csuglab.cornell.edu/web/guest/
- ▶ Course Consulant: Gautam Kamath

- ▶ Course Webpage:
  http://www.cs.cornell.edu/Courses/cs3110/2010su/
- ▶ Office Hours:
  - ▶ Gautam in the CS Undergrad lab M-F 4-5?
  - ▶ June in 657 Rhodes Hall M-Th 12:30-1:30? F 12:30 at CTB!

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Me
You

Me:

- ► '07 graduate from UC Berkeley in EECS
- ► I worked at SDSC! I love Supercomputers!
- ► Doing a stint as an Applied Mathematician in CAM.
- ► Current project is to understand how communities within networks die/evolve/form.
- ► My right arm.

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Me
You

Who are You?

- ▶ Serial Number: (name, department, year)
- ▶ Favorite programming language
- ▶ Biggest project/ Proudest cs moment

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Abstractly Defined
Benefits

What is Functional Programming?

▶ What are mathematical functions?

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What is Functional Programming?

- ▶ What are mathematical functions?
- ▶ 1. Don't change their input. No side effects.
     2. Functions can act on functions

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What is Functional Programming?

- ▶ What are mathematical functions?
- ▶ 1. Don't change their input. No side effects.
  2. Functions can act on functions
- ▶ **Understanding execution of a functional program is understanding how expressions (compilations of functions) are evaluated.**

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Who's on First?
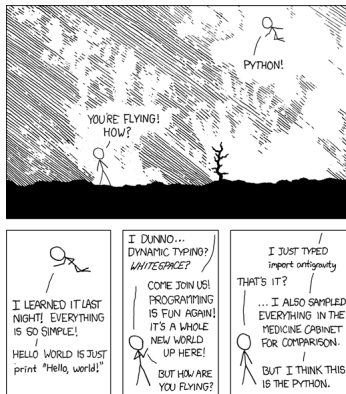**Functional Programming**
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Abstractly Defined
Benefits

Benefits of Functional Programming

- ► Easy to Debug!
- ► Easy to Understand flow of a program.
- ► Easier to understand runtime and performance.

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- Traditionally taught in ML, LISP, etc.
- *"This is one reason why we're using ML – it's different from what most of you will have seen." (spring'10)*

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- ► Traditionally taught in ML, LISP, etc.
- ► *"This is one reason why we're using ML – it's different from what most of you will have seen." (spring'10)*
- ► I agree, you should be exposed to as many languages as possible. Is there any other cs course using python?

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Praise for Python

► Beautiful

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Python can handle the job.

- ▶ IBM's take on Python as a functional language:
  http://www.ibm.com/developerworks/library/l-prog.html
- ▶ Google's take on Python:
  (Python, C++, Java) are their official languages

Python is a newish language who's core simplicity and beauty has encouraged many modules to be written to develop most any aspect of programming you'd desire.
Someone has even written a module for pure functional programming in Python, Bryn Keller's "Xoltar Toolkit."

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We will follow the guidelines of previous 3110 courses.

1. Functional Programming
2. Functional Data Structures
3. Verification
4. Performance & Optimization
5. Threading & Concurrency
6. All the Small Things