Course Introduction

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Welcome to CS 421!

Topics for discussion:
- Logistics – instructor, course objectives
- Why study languages?
- Major themes for the course
# Me!

**Name**  Mattox Beckman  
**History**  PhD, Fall 2003, University of Illinois at Urbana-Champaign  
Lecturer 2003–2015 Illinois Institute of Technology  
**Research Areas**  CS Education, Programming Languages, Mathematical Foundations of Computer Science  
**Specialty**  Partial Evaluation, Functional Programming  
**Professional Interests**  Teaching; Computer Science Education; Functional Programming; Semantics and Types; Category Theory  
**Personal Interests**  Cooking; Go (Baduk, Wei-Qi, Igo); Philosophy; Evolution; Meditation; Kerbal Space Program; Home-brewing; ... and many many more ...
Activities

▶ This is a **flipped** classroom!
  ▶ Please watch the lecture video *before* coming to class!
▶ In class activities POGIL to reinforce learning. Worth 5% of your grade.
▶ Prairielearn activities to consolidate/apply learning. Worth 5% of your grade.
▶ There is not necessarily a post-class activity for each day.
POGIL

- Process Oriented Guided Inquiry Learning
- Based on > 20 years of research in how students best learn.
- Four roles:
  - Manager: watches time, keeps team on task, etc.
  - Recorder: will fill out the worksheet
  - Reporter: asks questions on behalf of group, communicates to class
  - Reflector: observes how team performs
- We will use breakout rooms; probably will just randomize each time.
Machine Problems

- Machine Problems – collectively worth 25%
- Designed to help you study for the exams, and to achieve major course objectives
- You are allowed one partner for the programming part, but you must cite your sources! (Place partner netids in a comment at the top.)
- Don’t use the “perturbation method” of solving machine problems! We expect you to understand the solution and the process very well.
- See the syllabus for more details.
Exams/Quizzes

- The purpose of an exam is to measure mastery of material.
  - Exams are subdivided into proficiency units.
  - The final exam will retest many of the proficiency units. If you improve your score, we update your midterm score with it!
- Two midterms: 20% each
- Final exam: 25%
Why Study Languages?

- Pai sei
- Blub – see *Beating the Averages* by Paul Graham. [Gra03]
- Language families
Pai Sei

Different languages can express different concepts efficiently!

▶ A story from human languages: pai sei
Pai Sei

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- A story from human languages: *pai sei*
- Languages and cultures grow together to shape each other.

See *Politics and the English Language* by George Orwell. [Orw46]
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Blubs

- From *Beating the Averages* by Paul Graham
- The difference between a known powerful language to a less powerful language is easy to see.
- The difference between a known less powerful language to a more powerful language is not easy to see!
Themes

The course has four major parts:

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4. Pragmatics
   You will learn some of the design decisions available to you when choosing (or creating!) a language.
So, what should you learn?

- Understand major classes of programming languages: techniques, features, styles.
- How to select an appropriate language for a given task.
- How to read a formal specification of a language and implement it.
- How to write a formal specification of a language.
- Some Powerful Ideas:
  1. Recursion
  2. Abstraction
  3. Transformation
  4. Unification

The emphasis is on learning the theory, knowing why the theory is valuable, and using it to implement a language.
Bibliography

