Postlude

Done with CS 1110
Where to Next?
## Announcements

### Finishing Up

- **Submit a course evaluation**
  - Will get an e-mail for this
  - Part of the “participation grade” (e.g. clicker grade)
- **Final, Dec 17th 9-11:30am**
  - Study guide is posted
- **Conflict with Final Exam?**
  - e.g. > 2 finals in 24 hours
  - Submit conflicts **TODAY**

### Review Sessions

- **Wednesday 1-4 (Call Aud)**
  - Call frames & diagramming
  - Classes, try-except
- **Thursday 1-4 (Call Aud)**
  - Lists, recursion
  - Open question session
- **Friday 2-5 (Call Aud)**
  - Invariants, algorithms
  - Open question session
Obvious Next Step: CS 2110

- **Programming in Java**
  - Basic Java syntax
  - Static vs. Dynamic Types
  - Adv. Java Topics (e.g. Threads)

- **OO Theory**
  - More design patterns
  - Interface vs. Implementation

- **Data Structures**
  - Binary Trees
  - Linked Lists
  - Graphs

(java specific topics: Java Specific)

(language independent topics: Language Independent)

(Major CS topic: Major CS Topic)
CS 2110 Immediately Opens your Options

CS 2110 → CS 4620
CS 2110 → CS 3410
CS 2110 → CS 3152
CS 2800: The Other Important Course

• CS requires a lot of math
  ▪ Analyzing code performance
  ▪ Analyzing data
  ▪ Proving code correctness

• Calculus is “wrong math”
  ▪ Data is rarely “continuous”
  ▪ Limited to specific uses (e.g. spatial data)

• “Grab-bag” course
  ▪ All math needed for CS
  ▪ Includes writing proofs
CS 2110 + CS 2880 = Even More Options

CS 2110

CS 2800

CS 3110

CS 4670

CS 47xx

CS 4810
## Higher Level Computer Science Courses

- **Programming Languages**  - x1xx (e.g. 1110, 2110)
- **Scientific Computing**  - x2xx (e.g. 4210)
- **Data Management**  - x3xx (e.g. 3300, 4320)
- **Systems**  - x4xx (e.g. 3410, 4410)
- **Computational Biology**  - x5xx (e.g. 5555)
- **Graphics and Vision**  - x6xx (e.g. 4620)
- **Artificial Intelligence**  - x7xx (e.g. 4758, 4700)
- **Theory**  - x8xx (e.g. 4810, 4820)
- **Research**  - x9xx (e.g. 4999)
Higher Level Computer Science Courses

- Programming Languages  x1xx  (e.g. 1110, 2110)
- Scientific Computing    x2xx  (e.g. 4210)
- Data Management        x3xx  (e.g. 3200, 4320)
- Systems               x4xx  (e.g. 5540)
- Computational Biology  x5xx  (e.g. 4620)
- Graphics and Vision    x6xx  (e.g. 4758, 4700)
- Artificial Intelligence x7xx  (e.g. 4810, 4820)
- Theory                x8xx  (e.g. 4999)
- Research              x9xx  (e.g. 4999)

Separation not perfect; there is a lot of overlap
Programming Languages

• Adv. Language Topics
  ▪ Functional languages
  ▪ Streaming languages
  ▪ Parallel programming

• Language Theory
  ▪ New languages/compilers
  ▪ Software verification

• Software Engineering
  ▪ Design patterns
  ▪ Architecture principles
Scientific Computing

**Calculus + Computing**
- Problems from other science domains
- Process with computer

**Applications**
- Complex simulations
- Physics (games!)

**Challenge: Performance**
- Programs can run for days!
- How do we make faster?

12/10/19

Future Courses
Data Management

• Modern Web Apps
  - Storing user/session data
  - Coordinating users

• Databases
  - Query languages
  - Database optimization
  - Organizing your data

• Information Retrieval
  - Searching
  - Data analysis
Data Management

- **Modern Web Apps**
  - Storing user/session data
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- **Databases**
  - Query languages
  - Database optimization
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- **Information Retrieval**
  - Searching
  - Data analysis

Retirements have hit this area hard. Actively recruiting to help courses.
Systems

- **Building BIG software**
  - Operating systems
  - Distributed applications (e.g. online, networked)
  - Cloud computing
- **Also System Security**
  - Though that is spread about
- **Senior/masters level classes**
  - Bulk of the 5xxx courses
  - But great project courses!
Computation Health/Biology

- **No undergrad classes**
  - Used at CornellTech
  - Too much to learn
- **Once hoped for Ithaca**
  - But hard to hire in CS
  - Faculty better fit for Bio
- **BSCB took over area**
  - Now Dept of Comp Bio
  - But part of CIS school
Graphics and Vision

• **Not** modeling/art!

• **Rendering & Animation**
  - Illumination/reflection
  - Cloth/hair simulation
  - Water and fluids

• **Processing Images**
  - Recognizing shapes
  - Assembling 3D models from 2D pictures
  - Smart cameras

CS 4620
CS 5625
CS 5643
CS 4670
Artificial Intelligence

- **Not** sentient computers
- **Machine learning**
  - Discovering patterns
  - Making predictions
- **Natural Language Processing**
  - Automatic translation
  - Searching text/books
  - Voice-control interfaces
- **Robotics**
  - Autonomous control

This area has exploded!
Machine Learning

• Also in other depts.
  - ORIE 3120
  - ECE 4200

• Many grad classes
  - ASTRO 6523
  - BME 5310
  - MATH 7740
  - NBA 4920
  - SYSEN 5880
  - And more…

Tailored to those areas

General-purpose classes are almost all in CS dept.

Narrow in scope
Robotics

• More classes in MAE
  - MAE 3780
  - MAE 4710
  - MAE 4780
  - MAE 67xx

• CS focus on algorithms
  - Planning/perception
  - Also human interaction
  - (though latter is in IS)

New minor available!
Offered through MAE
Robotics

- More classes in MAE
  - MAE 3780
  - MAE 4710
  - MAE 4780
  - MAE 67xx

- CS focus on algorithms
  - Planning/perception
  - Also human interaction
  - (though latter is in IS)

New minor available!
Offered through MAE
• Analysis of Algorithms
  ▪ What is possible?
  ▪ What is feasible?

• Analysis of Structures
  ▪ Social network theory
  ▪ Complex data structures

• Cryptography
  ▪ Theory side of security

• One of the most famous groups in the department
What About Games?

- CS 3152, Spring only
  - Prereq: CS 2110
  - But CS 3110 a big help
- Build game from scratch
  - Want it to be innovative
  - You own the IP
- Interdisciplinary teams
  - 5 to 6 people on a team
  - With artists/designers
- Final: public showcase
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- **Final**: public showcase
You Own Your IP

Underhand
- Strategic card game
- Inspired by Reigns
- 1 million Android downloads

Family Style
- Multiplayer Coop
- Featured on App Store!
- 20k daily users
Games and the Designer Track

- Coding not your thing?
- INFO 3152 (co-meets)
  - Artists/designer track
  - No formal training needed
  - Submit me a portfolio
- Recommend: INFO 2450
  - Start of the HCI sequence
  - How design effects the user experience
  - Fall course; no prereqs
Good Bye!