Postlude

Done with CS 1110
Where to Next?
Announcements

- Keep track of **final surveys** (participation grade)
  - Should have e-mail about course evaluation
  - Other surveys will be posted next week
- Assignment 7 is due **December 21**
  - No late submissions or extensions
  - Can use lab sections to get help
  - Consulting hours following a 10 minute rule
- Final class is just **extended office hours**
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

Language Independent

Major CS Topic
CS 2110 Immediately Opens your Options

Diagram:
- CS 2110
- CS 4620
- CS 3410
- 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

12/10/20 Future Courses
CS 2800: The Other Important Course

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CS 2110 + CS 2880 = Even More Options
Should You Take Them at Same Time?

• It is **okay** for you to take them together
  ▪ Largely separate; do not depend on each other
  ▪ Doing so gets you into upper level classes faster

• The main concern is the **workload**
  ▪ 2110 has similar workload to 1110 (maybe less)
  ▪ 2800 is a **very different** math class for most
  ▪ Engineers have a lot of other courses 1st year

• But should finish both by **sophomore fall**
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. 3300, 4320)
- Systems x4xx (e.g. 3410, 4410)
- Computational Biology x5xx (e.g. 5540)
- 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)

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
Programming Languages

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  - Functional languages
  - Streaming languages
  - Parallel programming

- **Language Theory**
  - New languages/compilers
  - Software verification

- **Software Engineering**

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Brand new professor here!
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?
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?

Courses restructured very recently

12/10/20 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

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- **Used to be a lot more**
  - Hit hard by retirements
  - I used to be in this group

- **Only 4320 is in Ithaca**
  - Other faculty in NYC
  - So courses are in NYC

- **We are looking to hire**
**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!

Diagram:

```
    CS 3410 -> CS 4410
       |           |           |
       |           |           |
       CS 5412   CS 5430
       |           |           |
       |           |           |
       CS 5414   CS 5420
```
Systems

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12/10/20
Future Courses
Computational 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

Future Courses

- CS 4620
- CS 4670
- CS 5625
- CS 5650
- CS 5678
Graphics and Vision

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12/10/20 Future Courses

More faculty in Ithaca

CS 4620
CS 4670
CS 5625
CS 5650
CS 5678

More faculty in NYC
Artificial Intelligence

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

• **Not** sentient computers

• **Machine learning**
  - Huge growth in Ithaca & NYC

• **Natural Language Proc.**
  - Strong faculty found in both Ithaca & NYC venues

• **Robotics**
  - Trying to hire after departures

12/10/20 Future Courses
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 has Shifted to MAE (for now)

- 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
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  - MAE 3780
  - MAE 4710
  - MAE 4780
  - MAE 67xx

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New minor available! Offered through MAE
Theory

• **Analysis of Algorithms**
  - What is *possible*?
  - What is *feasible*?

• **Analysis of Structures**
  - Social network theory
  - Complex data structures

• **Cryptography**
  - Theory side of security

• Historically a very strong group in the department

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12/10/20

Future Courses
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!
- Viral in Thailand (Twitch)
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!