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 12th 2-4:30 pm
  ▪ 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)
  ▪ Generators, coroutines
  ▪ Open question session
• Friday 2-5 (Call Aud)
  ▪ Lists, recursion
  ▪ Open question session

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Lists, recursion

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
Language Independent
Major CS Topic
CS 2110 Immediately Opens your Options

- CS 2110
- CS 3410
- CS 4620
- 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. 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
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?
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
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- Databases
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  - Organizing your data

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  - Searching
  - Data analysis

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

Future Courses

CS 3110
CS 3300
CS 4300
CS 4320
Data Management

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

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

- **Information Retrieval**
  - Searching
  - Data analysis

But also, this research has changed. Ideas have moved to other areas.
### 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 3410
  - CS 4410
    - CS 5412
    - CS 5414
  - CS 5430
    - CS 5430
    - CS 5420

12/7/21

Future 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 Proc.**
  - Automatic translation
  - Searching text/books
  - Voice-control interfaces

• **Robotics**
  - Autonomous control

Future Courses

- CS 4700
- CS 4750
- CS 4740
- CS 4780
- CS 4758
Artificial Intelligence

- **Not** sentient computers
- **Machine learning**
  - Discovering patterns
  - Making predictions
- **Natural Language**
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- **Robotics**
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This area has exploded!
Artificial Intelligence

- **Not** sentient computers
- **Machine learning**
  - Discovering patterns
  - Making predictions
- **Natural Language Proc.**
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Primary reason for the increase

Future Courses

CS 4700
CS 4750
CS 4740
CS 4758
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)

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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

• Area responsible for founding dept. in 1965
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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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!