

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**

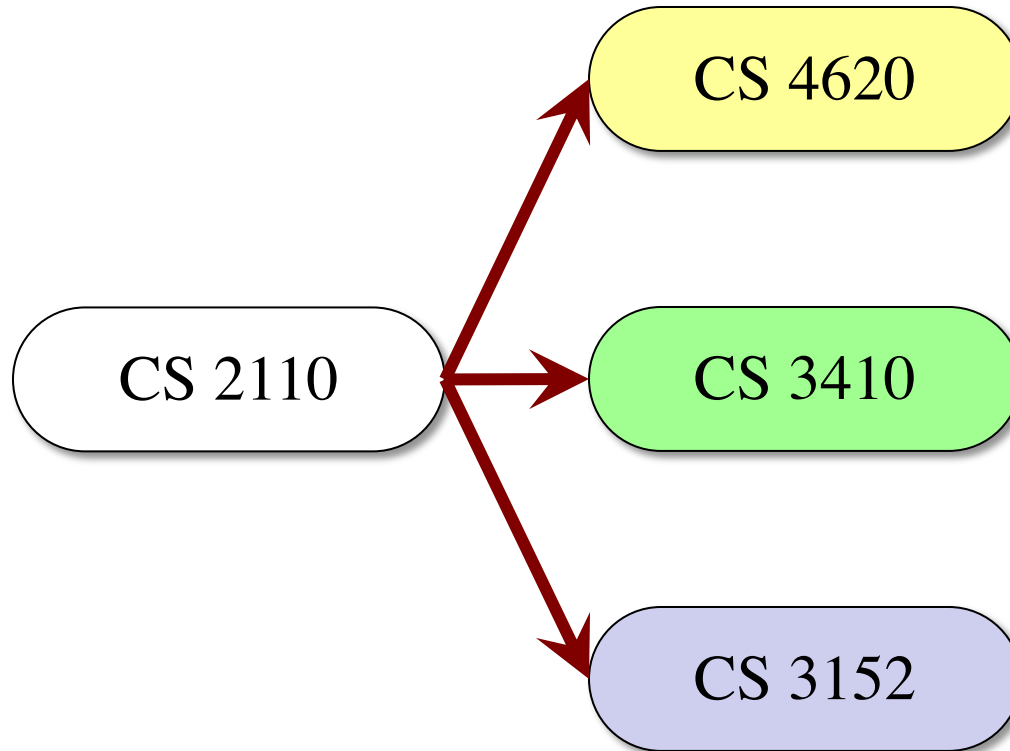
- Binary Trees
- Linked Lists
- Graphs

Major CS Topic

Java Specific

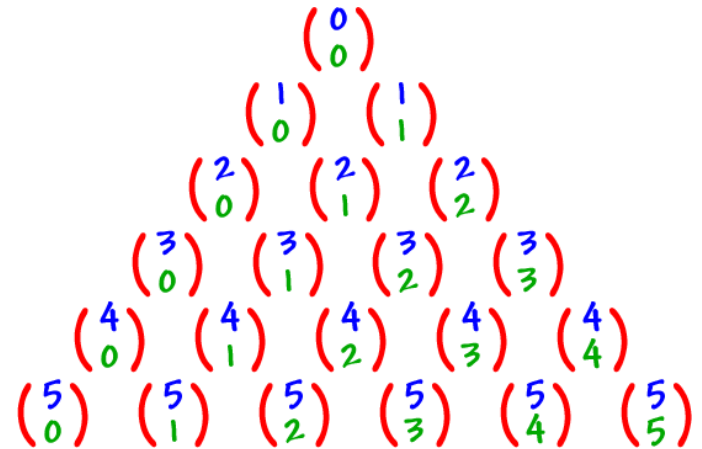
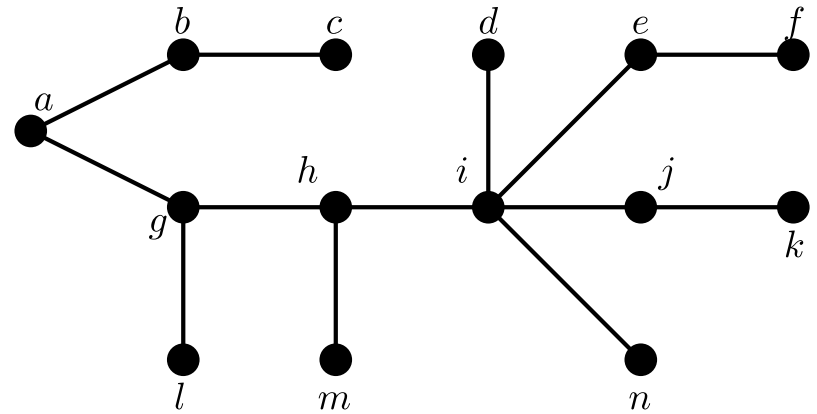
Language Independent

CS 2110 Immediately Opens your Options



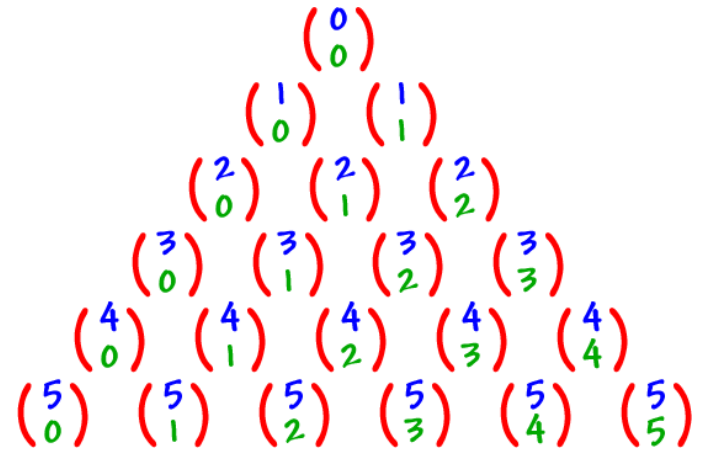
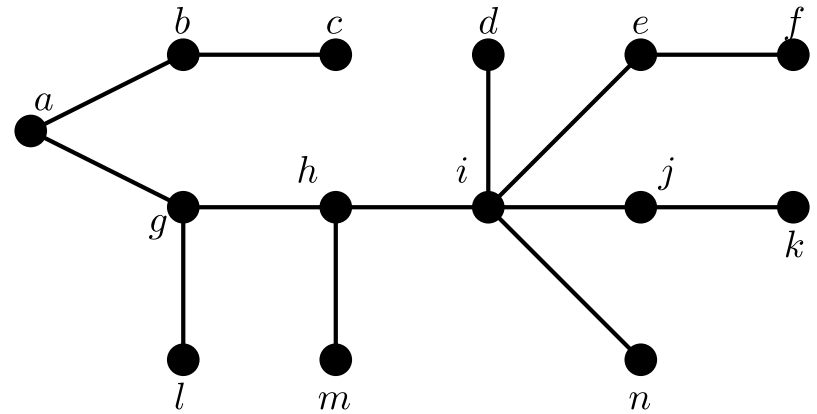
CS 2800: The Other Important Course

- 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

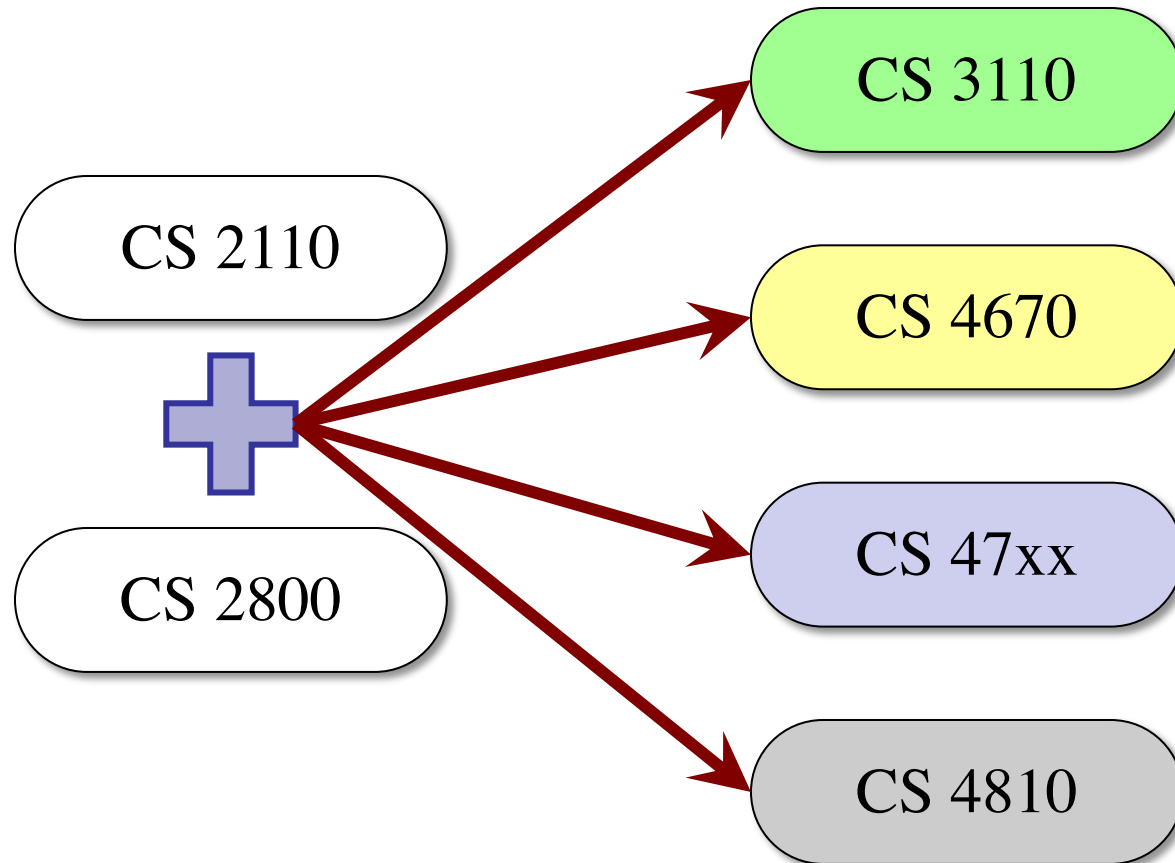


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CS 2110 + CS 2880 = Even More Options



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)

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Separation not perfect;
there is a lot of overlap

Programming Languages

- **Adv. Language Topics**

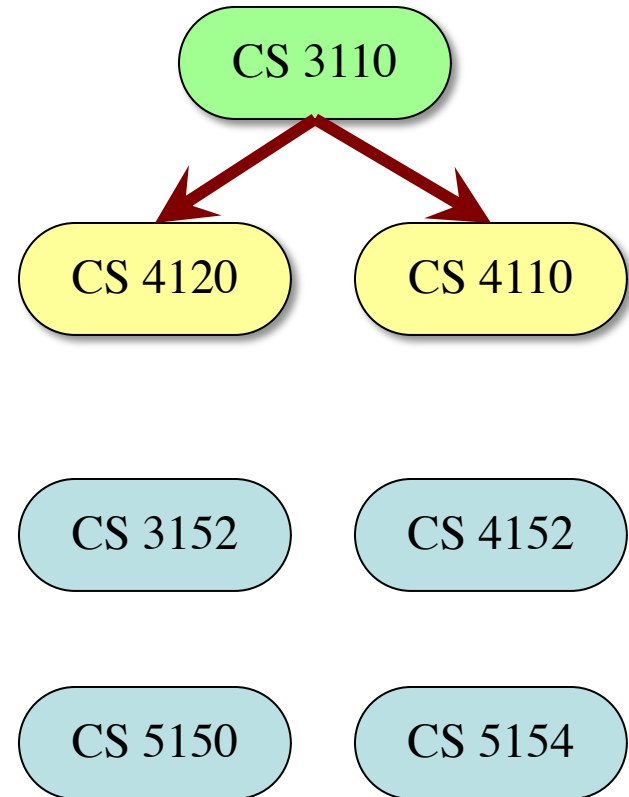
- Functional languages
- Streaming languages
- Parallel programming

- **Language Theory**

- New languages/compilers
- Software verification

- **Software Engineering**

- Design patterns
- Architecture principles



Programming Languages

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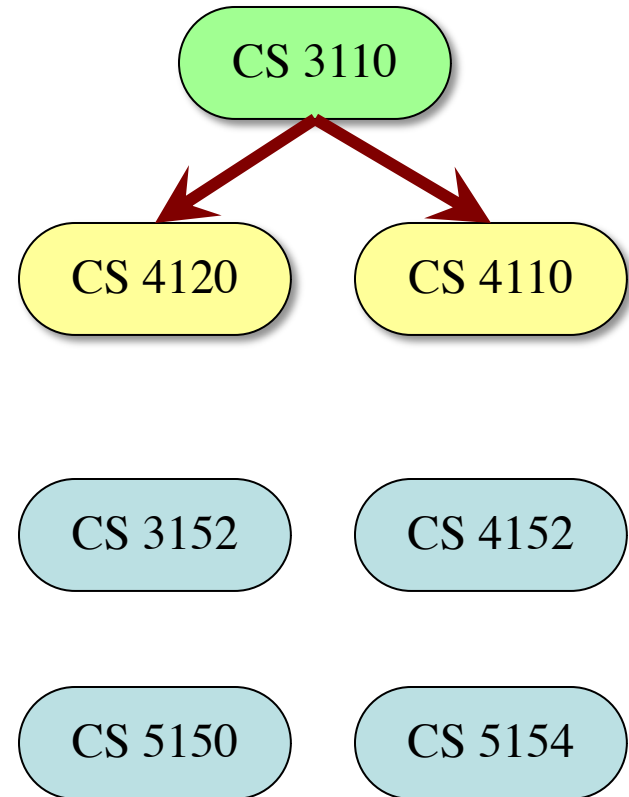
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- **Software Engineering**

Brand new professor here!



Scientific Computing

- **Calculus + Computing**

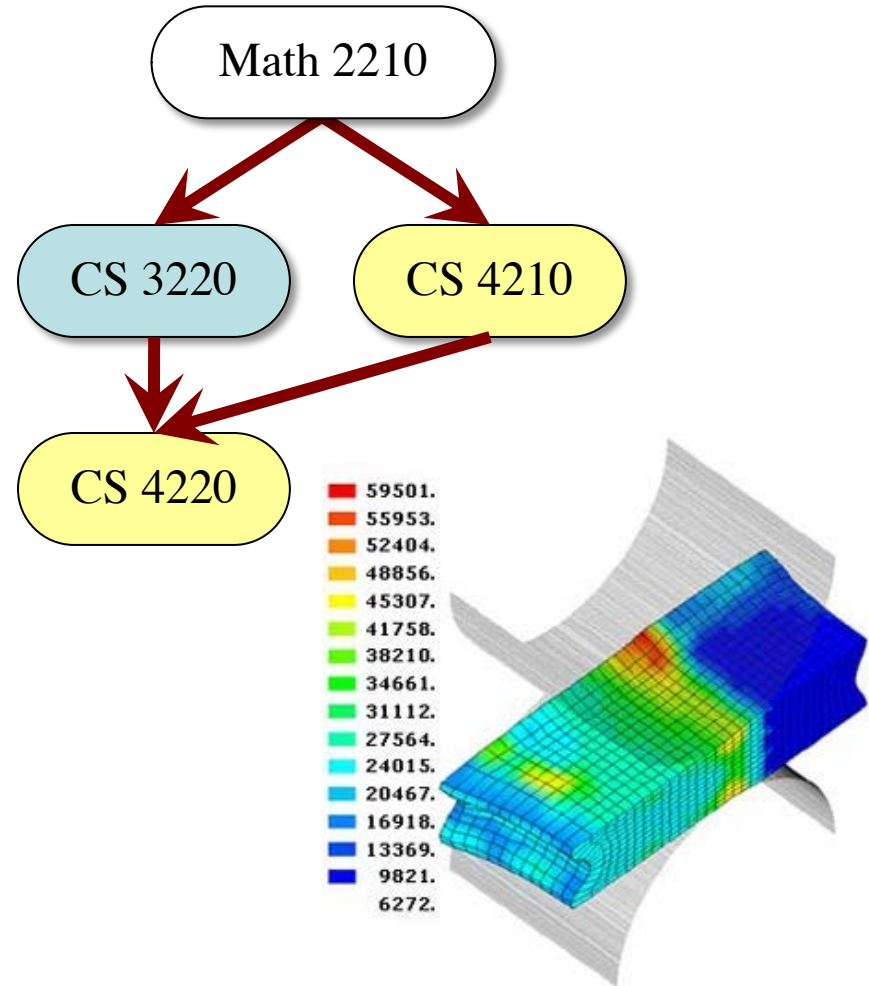
- Problems from other science domains
- Process with computer

- **Applications**

- Complex simulations
- Physics (games!)

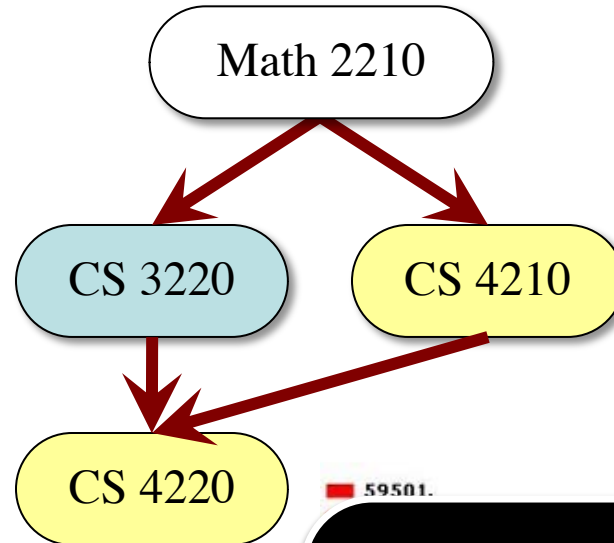
- **Challenge: Performance**

- Programs can run for days!
- How do we make faster?



Scientific Computing

- **Calculus + Computing**
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 - Process with computer
- **Applications**
 - Complex simulations
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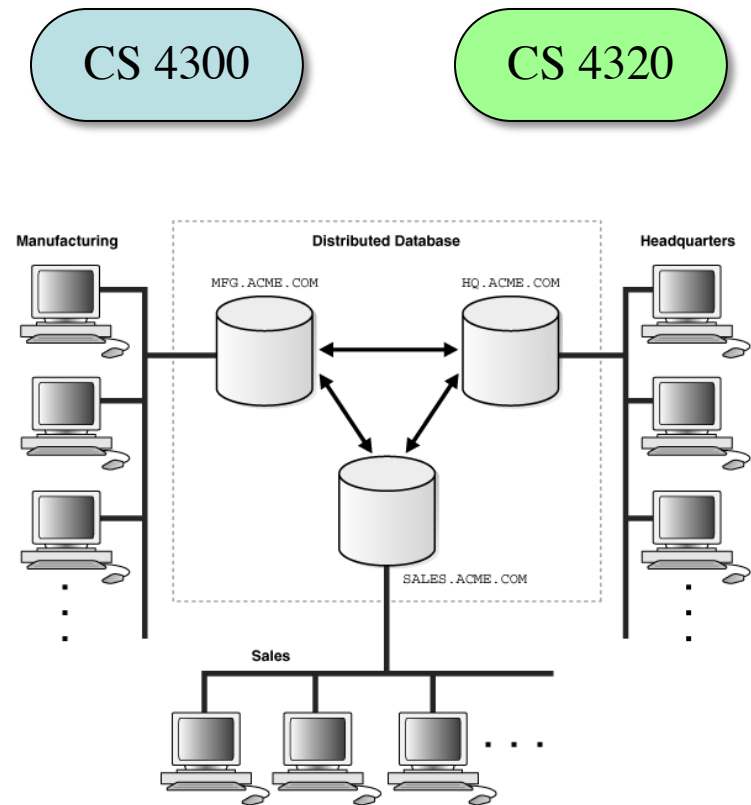


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Courses
restructured
very recently

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
- Coordinating users

CS 4300

CS 4320

- **Databases**

- Query languages
- Database optimization
- Organizing your data

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

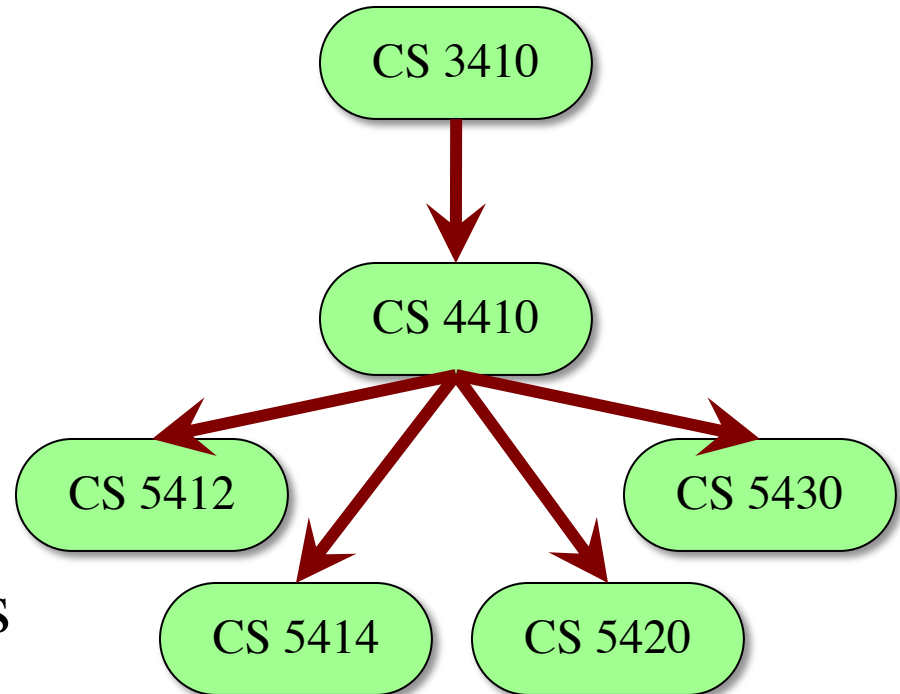
- **Information Retrieval**

- Searching
- Data analysis

- 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!



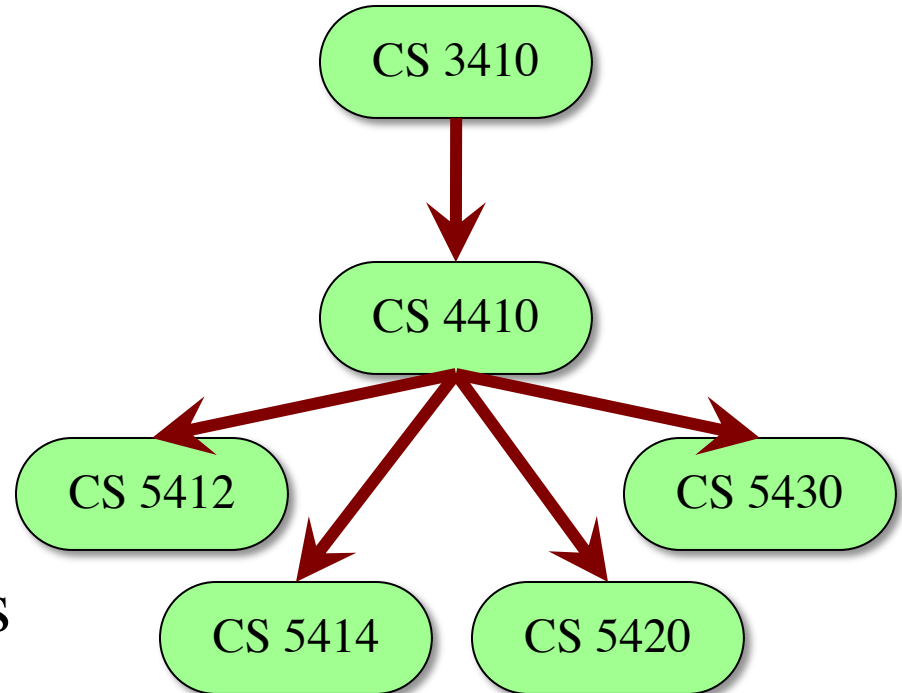
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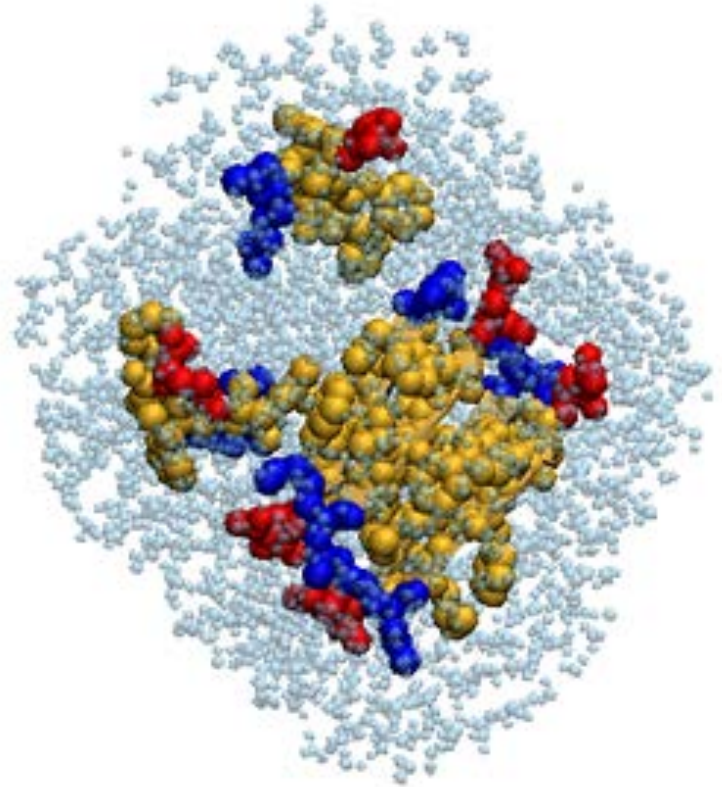
- A **Blockchains!** but
- Senior/masters level classes

- Bulk of the 5xxx courses
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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

CS 4620

CS 4670

CS 5625

CS 5678

CS 5650



Graphics and Vision

- **Not** modeling/art!
- **Rendering & Animation**

- More faculty
in Ithaca

- **Processing Images**

- More faculty
in NYC

CS 4620

CS 5625

CS 5650

CS 4670

CS 5678



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

CS 4700

CS 4740

CS 4780

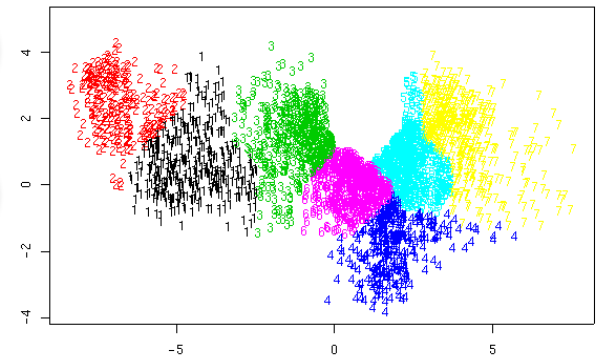
CS 4754

CS 4786

CS 4748

CS 4787

CS 4789



Artificial Intelligence

- **Not** sentient computers
- **Machine learning**
 - Huge growth in Ithaca & NYC
- **Natural Language Proc.**
 - Strong faculty found in both Ithaca & NYC
- **Robotics**
 - Trying to hire after departures

CS 4700

CS 4740

CS 4780

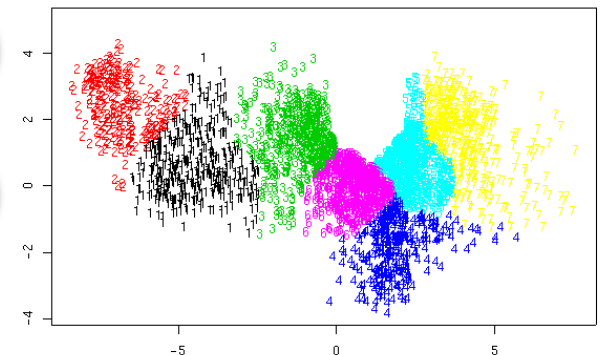
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Machine Learning

- Also in other depts.

- ORIE 3120
- ECE 4200

Tailored to those areas

- Many grad classes

- ASTRO 6523
- BME 5310
- MATH 7740
- NBA 4920
- SYSEN 5880
- And more...

Narrow in scope

General-purpose classes are almost all in CS dept.

Robotics has Shifted to MAE (for now)

- More classes in MAE
 - MAE 3780
 - MAE 4710
 - MAE 4780
 - MAE 67xx
- Pure MAE
Not cross-listed
- CS focus on algorithms
 - Planning/perception
 - Also human interaction
 - (though latter is in IS)

**New minor available!
Offered through MAE**

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Theory

- **Analysis of Algorithms**

- What is *possible*?
- What is *feasible*?

CS 4810

CS 4830

CS 4860

CS 4820

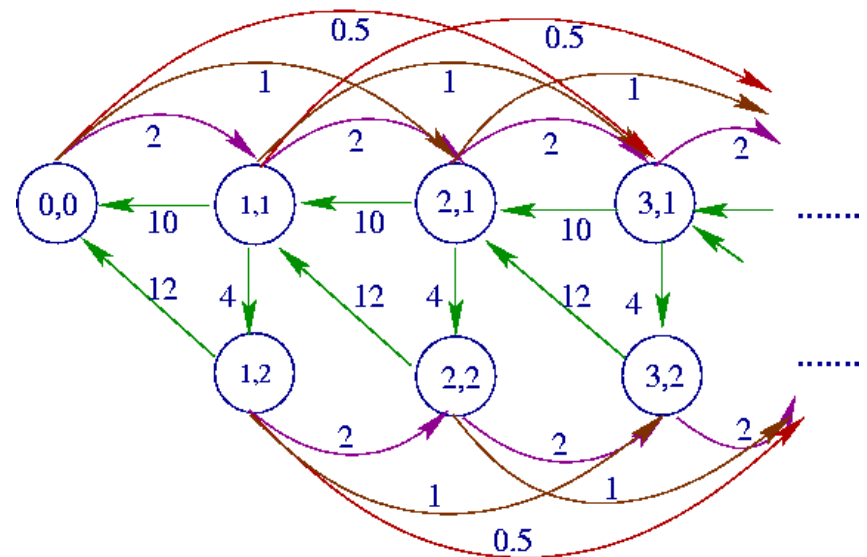
- **Analysis of Structures**

- Social network theory
- Complex data structures

- **Cryptography**

- Theory side of security

- Historically a very strong group 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

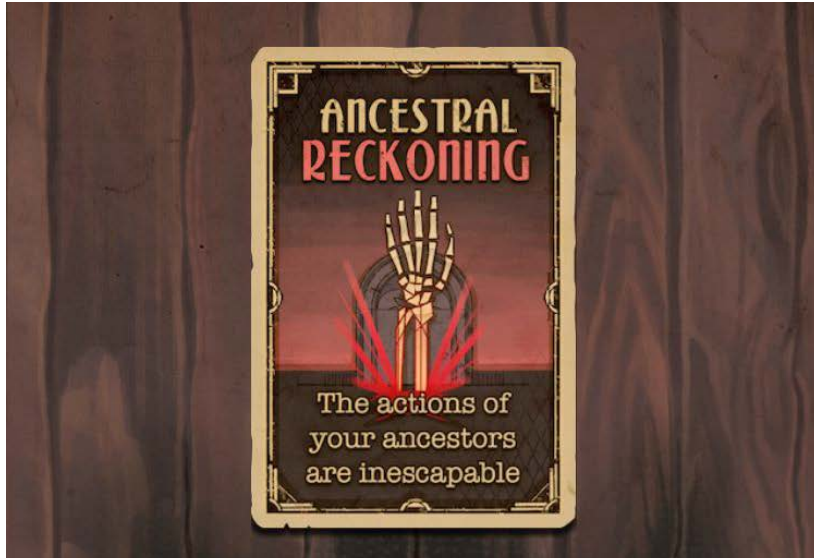


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You Own Your IP



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!