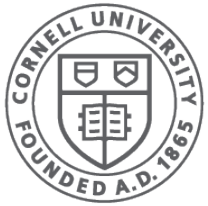
http://www.cs.cornell.edu/courses/cs1110/2019sp

Life after CS 1110

CS 1110

Introduction to Computing Using Python



Cornell CIS
COMPUTING AND INFORMATION SCIENCE

[E. Andersen, A. Bracy, D. Gries, L. Lee, S. Marschner, C. Van Loan, W. White]

Obvious Next Step: CS 2110

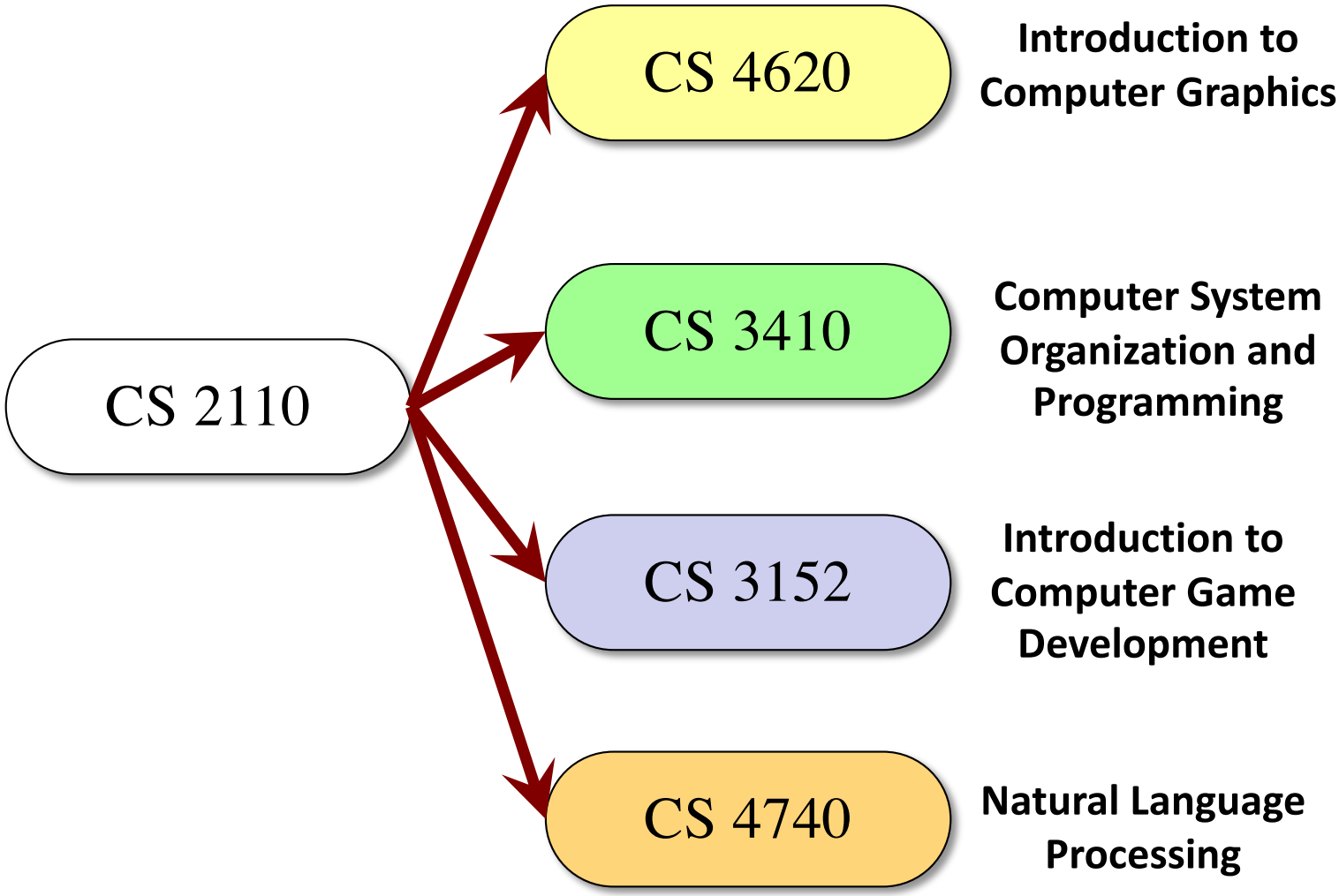
- **Programming in Java**
  - Basic Java syntax
  - Static vs. Dynamic Types
  - Adv. Java Topics (e.g. Threads)
- **OO Theory**
  - More design patterns
  - Interface vs. Implementation
- **Data Structures**
  - Binary Trees
  - Linked Lists
  - Graphs

Java Specific

Language Independent

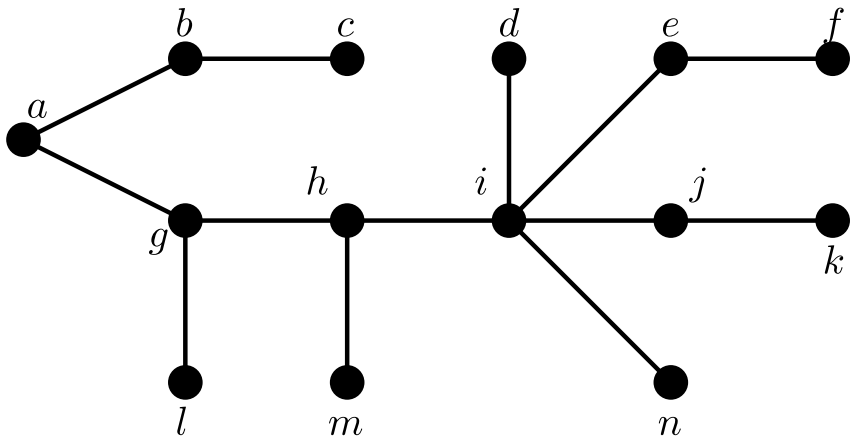
Major CS Topic

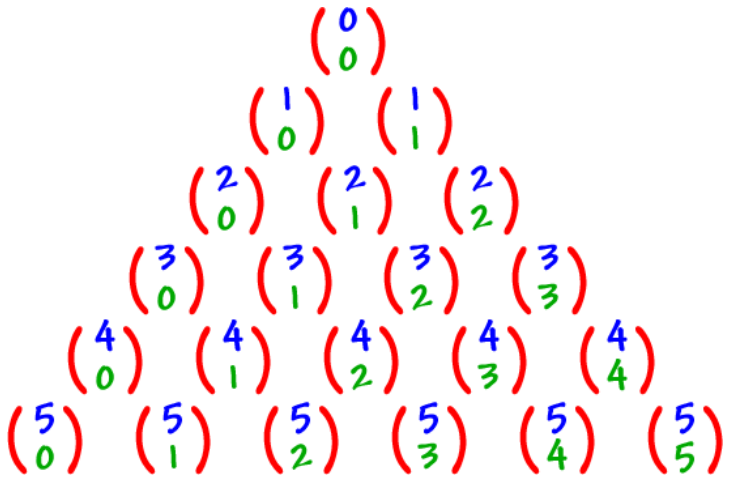
CS 2110 Immediately Opens your Options



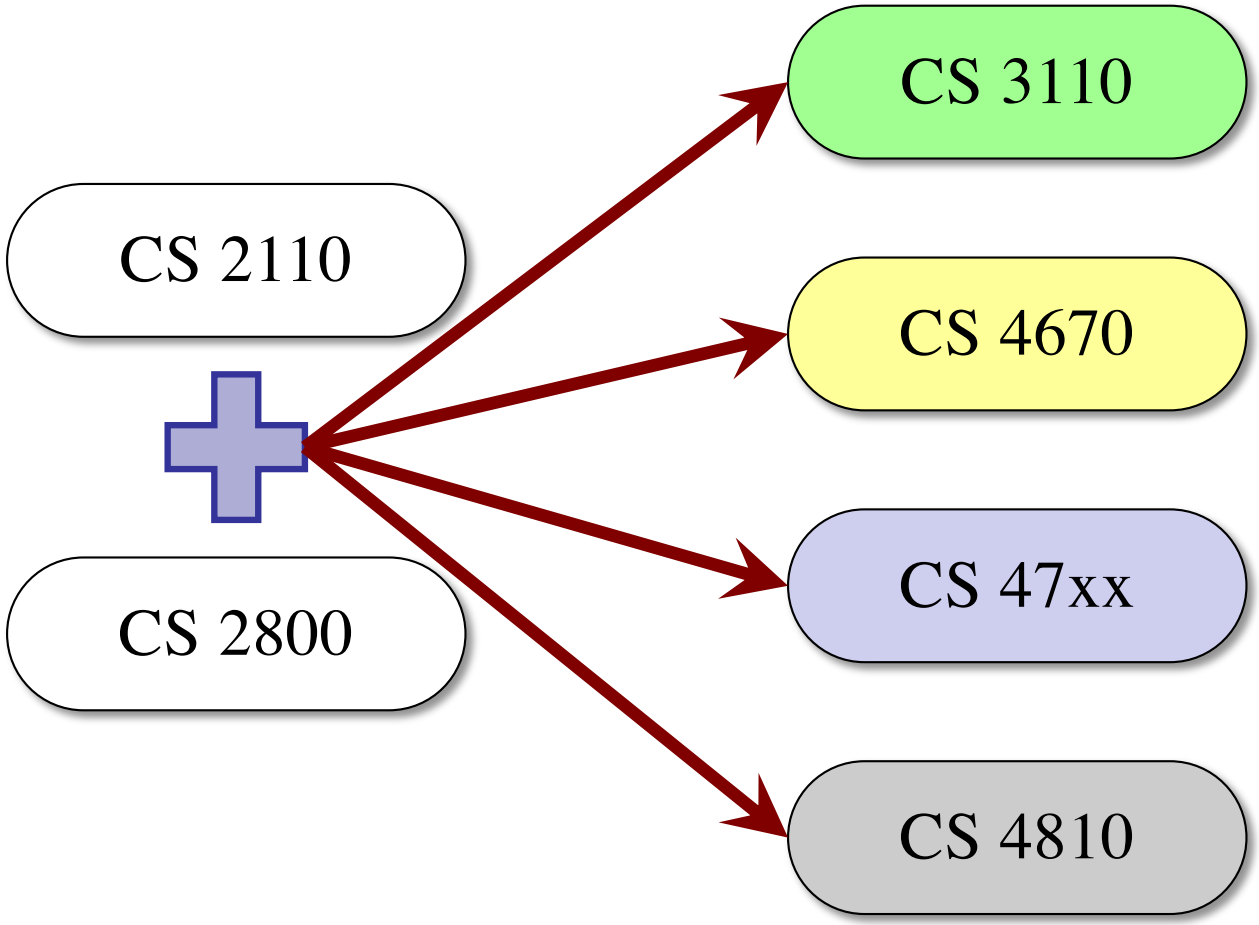
CS 2800: The Other Important Course

- 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



Data Structures and Functional Programming

Introduction to Computer Vision

Artificial Intelligence, Robotics, Machine Learning (some non-cs pre-reqs)

Introduction to Theory of Computing

Computer Science Course Numbers

• 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)

Level Area

Computer Science Course Numbers

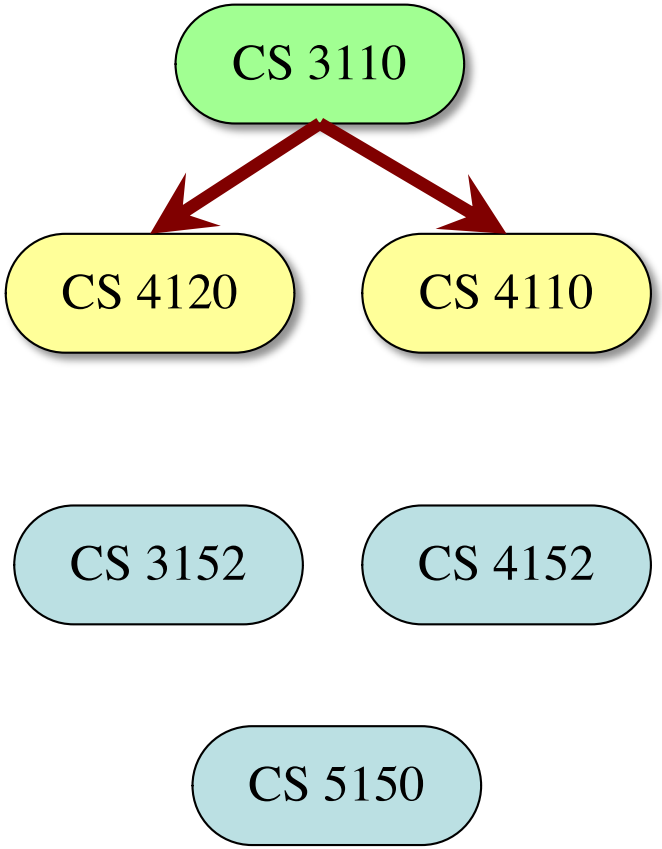
- Programming Languages x1xx (e.g. 1110, 2110)
- Scientific Computing x2xx (e.g. 4210)
- Data Management x3xx (e.g. 4320)
- Systems
- Compu
- Graphic
- Artificial Intelligence x7xx (e.g. 4758, 4700)
- Theory x8xx (e.g. 4810, 4820)
- Research x9xx (e.g. 4999)

Separation not perfect; there is a lot of overlap

Level Area

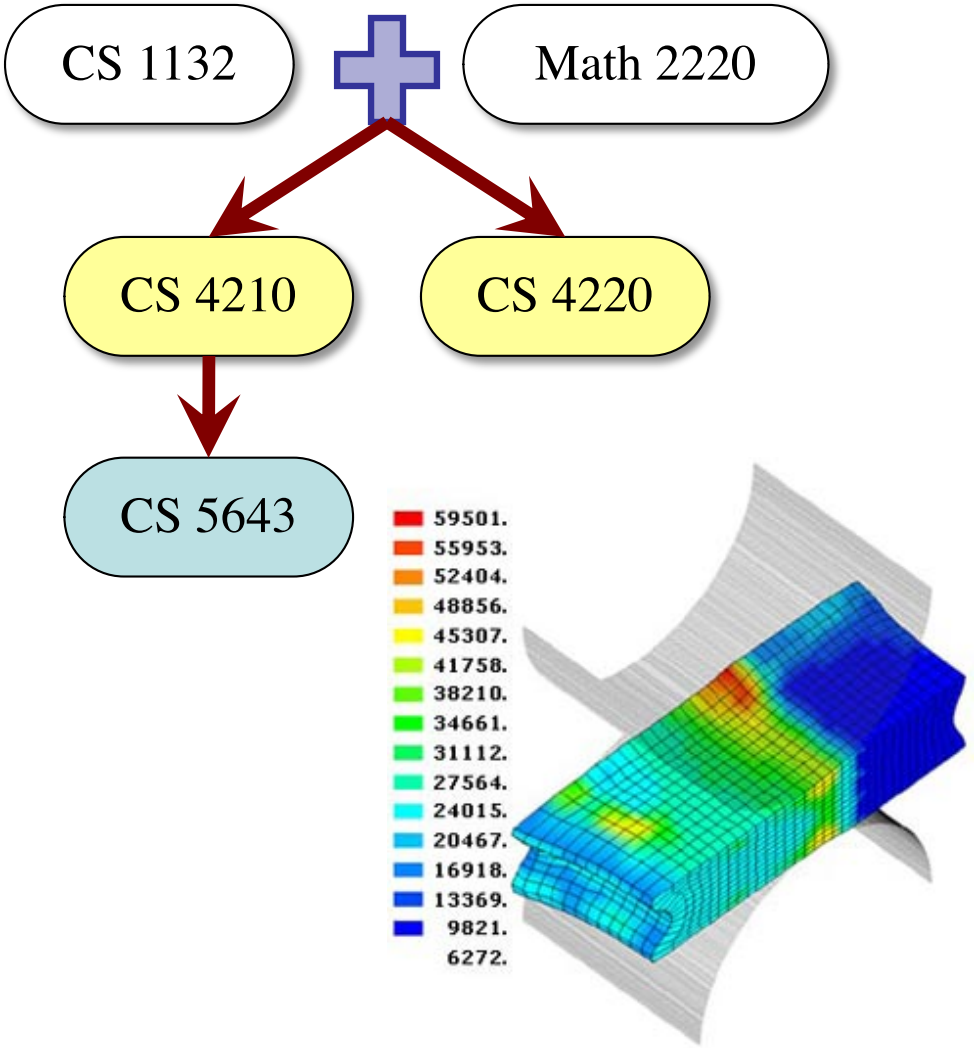
Programming Languages

- **Adv. Language Topics**
  - Functional languages
  - Streaming languages
  - Parallel programming
- **Language Theory**
  - New languages/compilers
  - Software verification
- **Software Engineering**
  - Design patterns
  - Architecture principles



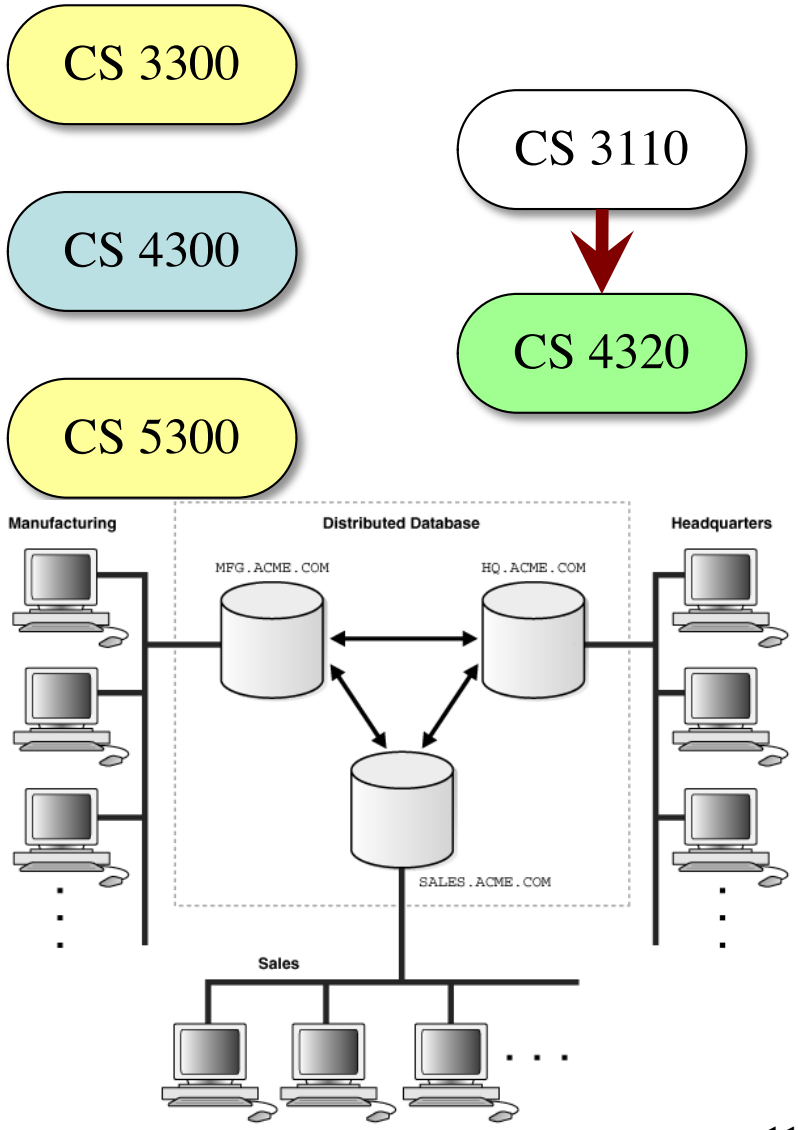
Scientific Computing

- **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?



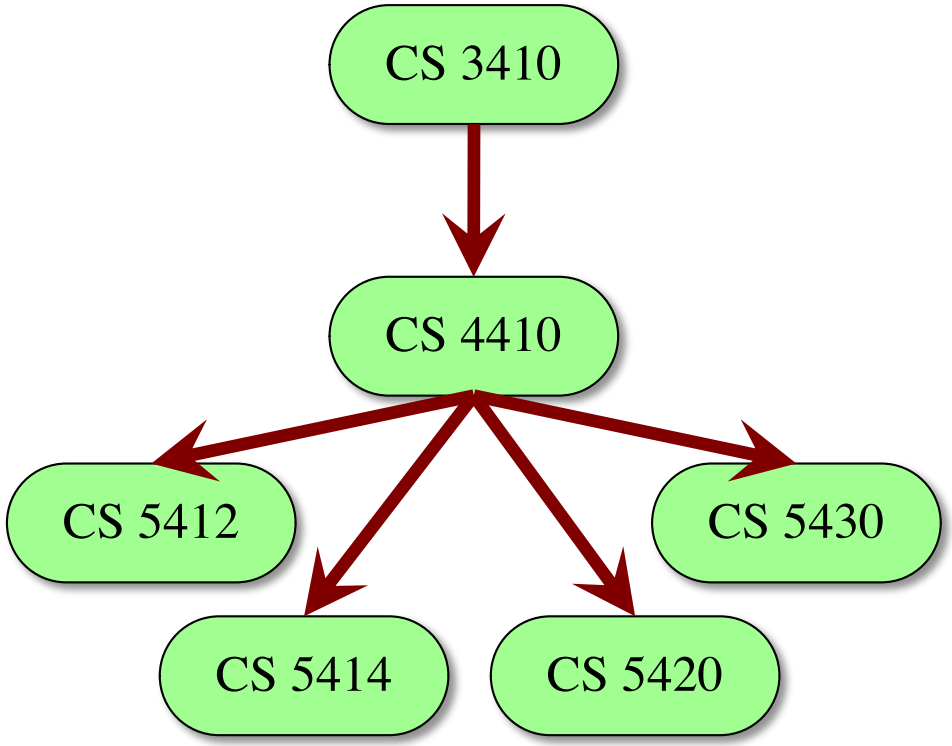
Data Management

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



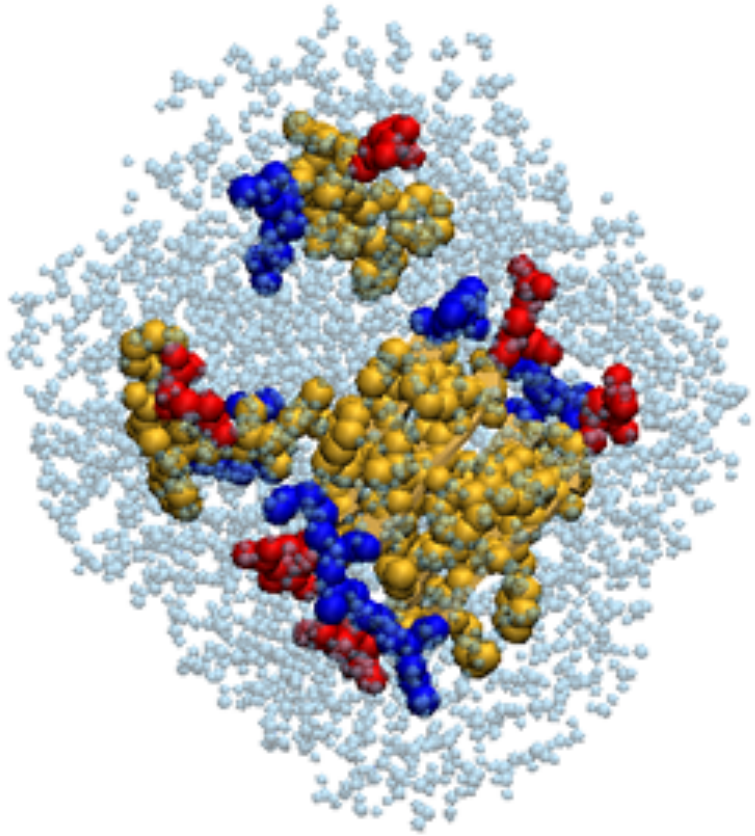
Systems

- **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 Biology

- No undergrad classes
  - Too much to learn
  - Masters/PhD level
- Undergrad options
  - **BTRY 4840**: Comp. Genomics
  - BSCB department
- Hoping to improve…



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 4670

CS 5643

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

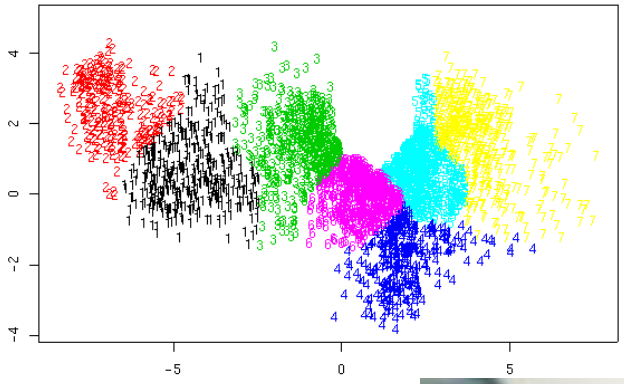
CS 4700

CS 4750

CS 4740

CS 4780

CS 4758



Theory

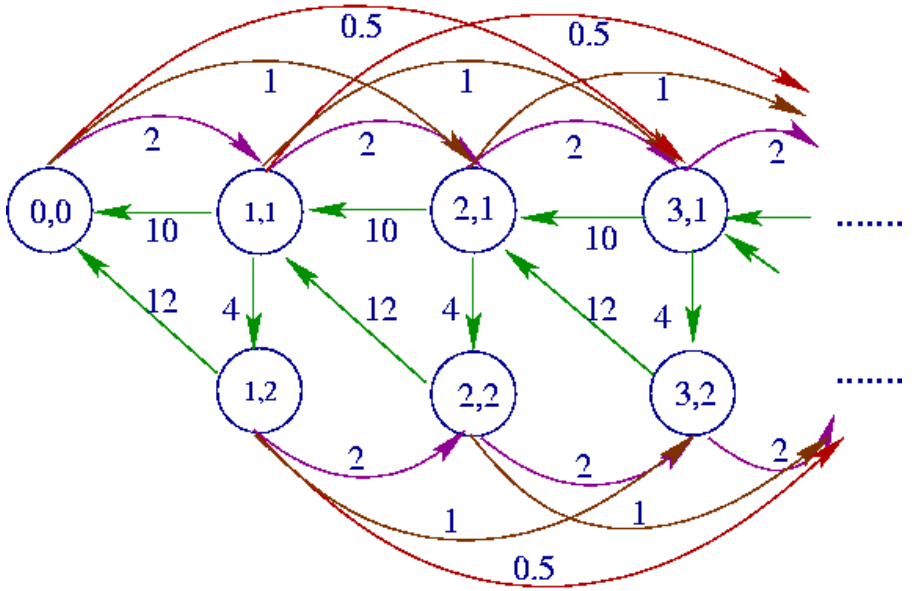
- **Analysis of Algorithms**
  - What is *possible*?
  - What is *feasible*?
- **Analysis of Structures**
  - Social network theory
  - Complex data structures
- **Cryptography**
  - Theory side of security
- Perhaps the most famous group in the department

CS 4810

CS 4830

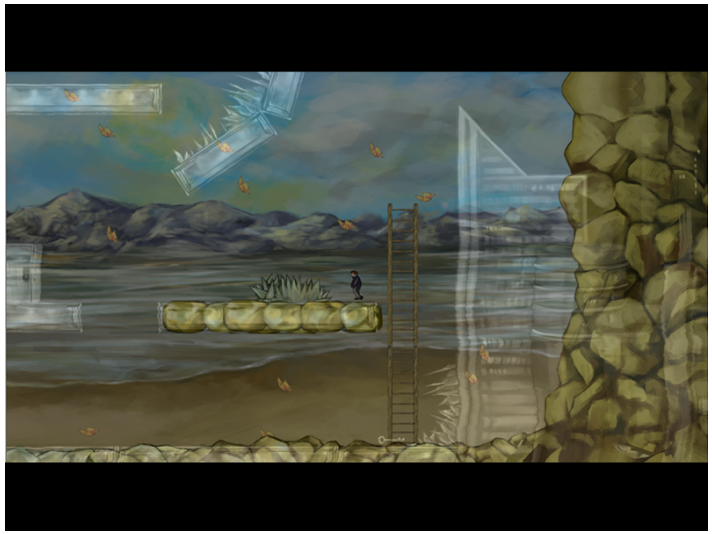
CS 4860

CS 4820



What About Games?

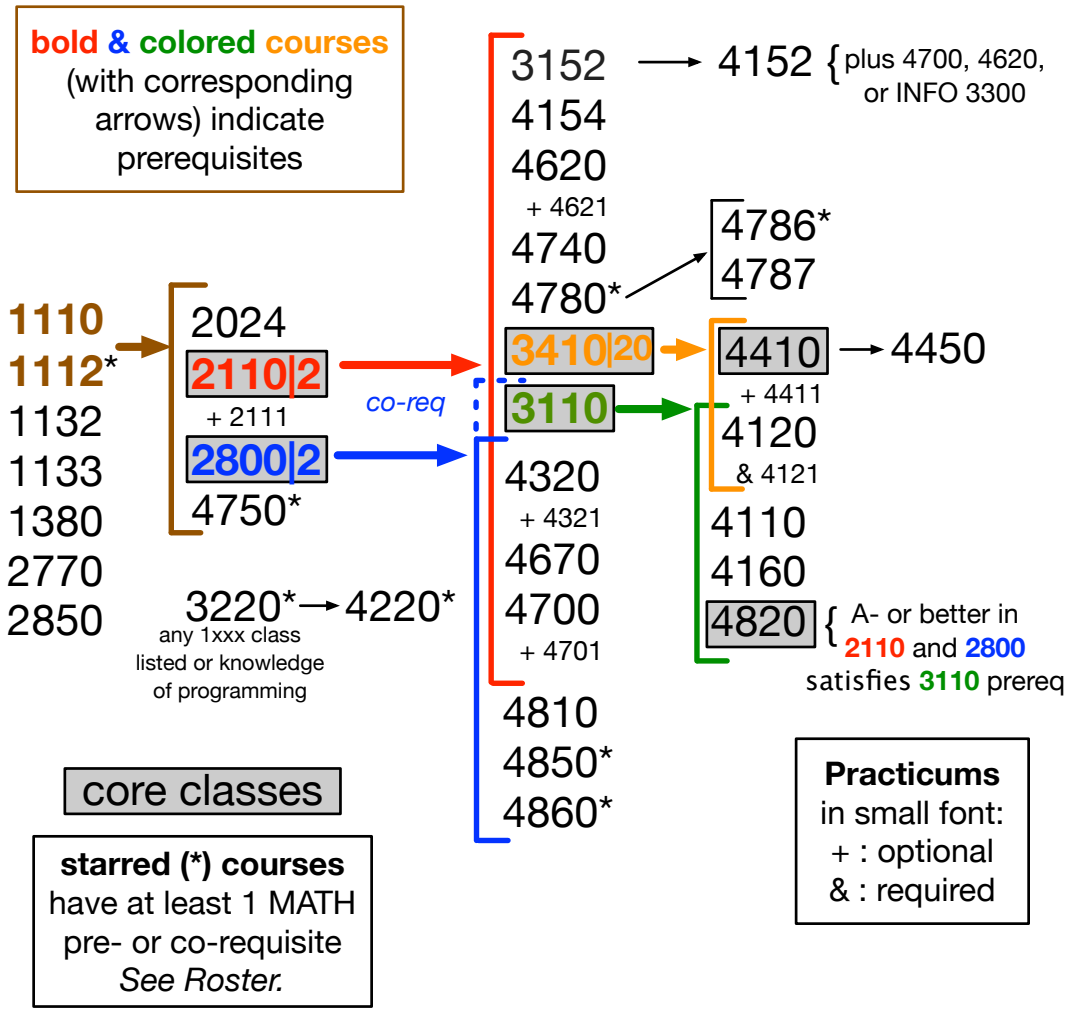
- CS 3152, Spring only
  - Prereq: CS 2110
  - But CS 3110 a big help
- Build game from scratch
  - Want it to be innovative
  - You own the IP
- Interdisciplinary teams
  - 5 to 6 people on a team
  - With artists/designers
- **Final**: public showcase



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

CS Undergraduate Prerequisite Structure



3110: Data Structures and Functional Programming
3152: Introduction to Computer Game Architecture
3220: Introduction to Scientific Computation
3410: Computer System Organization and Programming
3420: Embedded Systems *(prereq: ENGRD 2300, not shown)*
4110: Programming Languages and Logics
4120: Introduction to Compilers
4152: Advanced Topics in Computer Game Architecture
4154: Analytics-driven Game Design
4160: Formal Verification
4220: Numerical Analysis: Linear and Nonlinear Problems
4320: Introduction to Database Systems
4410: Operating Systems
4450: Introduction to Computer Networks
4620: Introduction to Computer Graphics
4670: Introduction to Computer Vision
4700: Foundations of Artificial Intelligence
4740: Natural Language Processing
4750: Foundations of Robotics
4780: Machine Learning for Intelligent Systems
4786: Machine Learning for Data Science
4787: Principles of Large-Scale Machine Learning
4810: Introduction to Theory of Computing
4820: Introduction to Analysis of Algorithms
4850: Mathematical Foundations for the Information Age
4860: Applied Logic

1110: Introduction to Computing Using Python
1112: Introduction to Computing Using MATLAB
1132: Short Course in MATLAB
1133: Short Course in Python
1380: Data Science for All
2024: C++ Programming

2110: Object-Oriented Programming and Data Structures
2112: Object-Oriented Design and Data Structures - Honors
2770: Excursions in Computational Sustainability
2800: Discrete Structures
2802: Discrete Structures - Honors
2850: Networks

Cornell CIS
Computer Science

Computer Science not your  ?

Try one of our neighbors!

- Information Science
- Statistics

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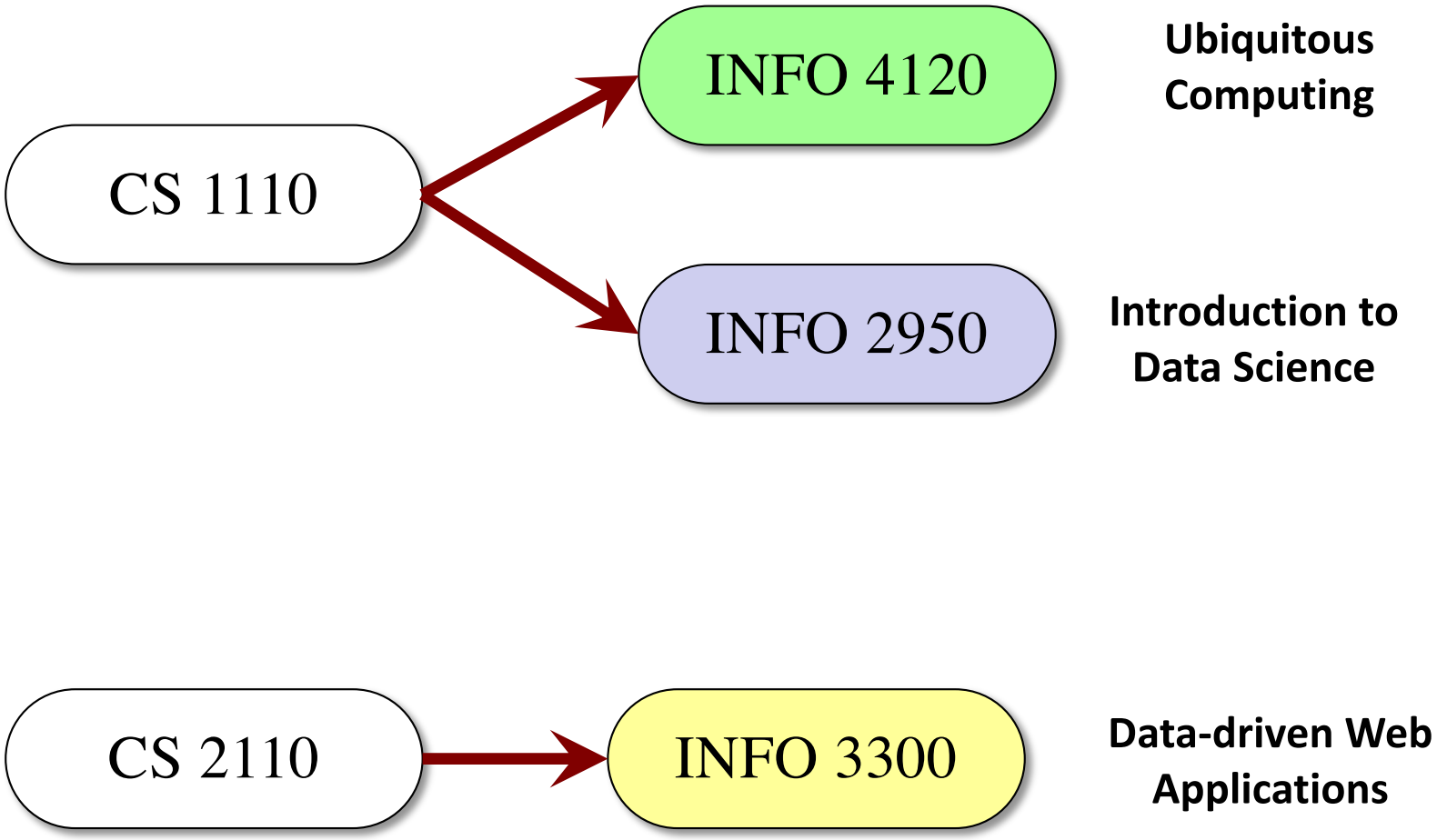
- Operations Research & Information Engineering
- Electrical and Computer Engineering
  - ECE 2400 is a good next step

InfoSci Classes you could have already taken

INFO 1300	**Introductory Design and Programming for the Web**
INFO 2040	**Networks**
INFO 2770	**Excursions in Computational Sustainability**
INFO 3140	**Computational Psychology**

InfoSci Classes you can take after some CS



Not a complete list!

It's been a great semester!
See you at the Final Exam!