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

1

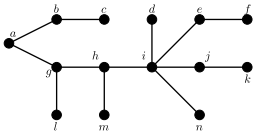
Unless You are Going to Info Science

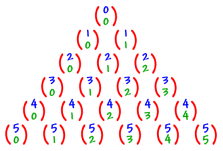
- **INFO 2950:** Introduction to Data Science
  - Gathering and recording data sets
  - Visualizing data
  - Performing statistical calculations
  - Basically more of A6 (and how to do yourself)
- Historically another Python course
  - But now Python Fall/R in Spring
  - Picking up R from Python is not too hard
  - No different than 2110/Java transition

2

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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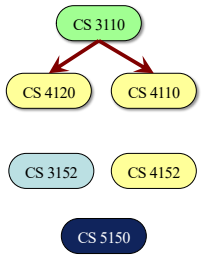
Programming Languages

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



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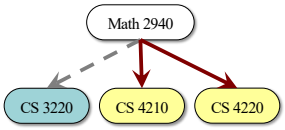
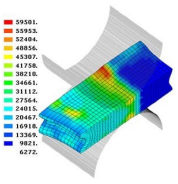
Scientific Computing

- **Calculus + Computing**
  - Problems from other science domains
  - *Used* to require MatLab
- **Applications**
  - Complex simulations
  - Physics (games!)
- **Challenge**: Performance
  - Programs can run for days!
  - How do we make faster?





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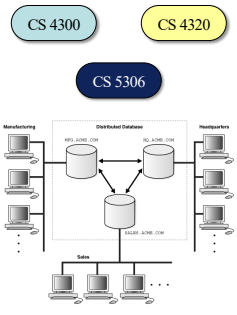
Data Management

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



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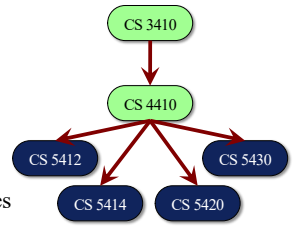
Systems

- **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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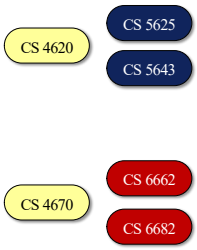
Graphics and Vision

- **Rendering & Animation**
  - **Not** modeling/art!
  - Illumination/reflection
  - Cloth/hair simulation
  - Water and fluids
- **Processing Images**
  - Recognizing shapes
  - Assembling 3D models from 2D pictures
  - Smart cameras



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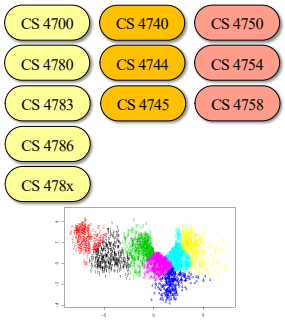
Artificial Intelligence

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



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Robotics

- 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
  - (with some in IS)

Minor is available!
Offered through MAE

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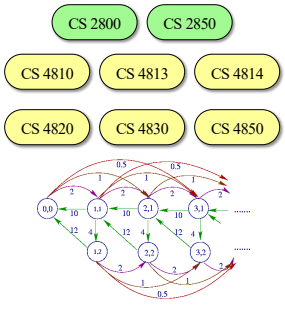
Theory

- **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



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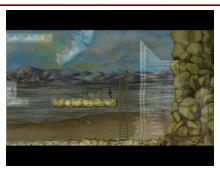
What About Games?

- 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
  - 7 to 8 people on a team
  - With artists/designers
- **Final**: public showcase



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