The Computer Science Department and its Majors

Sanjeev Setia
Chair

Department of Computer Science
Volgenau School of Engineering
http://cs.gmu.edu

Greatest Engineering Achievements of the 20th Century

• About • Timeline • The Book

Welcome!

How many of the 20th century's greatest engineering achievements will you use today? A car? Computer? Telephone? Explore our list of the top 20 achievements and learn how engineering shaped a century and changed the world.

1. Electrification
2. Automobile
3. Airplane
4. Water Supply and Distribution
5. Electronics
6. Radio and Television
7. Agricultural Mechanization
8. Computers
9. Telephone
10. Air Conditioning and Refrigeration
11. Highways
12. Spacecraft
13. Internet
14. Imaging
15. Household Appliances
16. Health Technologies
17. Petroleum and Petrochemical Technologies
18. Laser and Fiber Optics
19. Nuclear Technologies
20. High-performance Materials

Greatest Achievements

An exciting field to be in

National Academy of Engineering

Great Career Opportunities

Money Magazine, 2006, ranked “Software Engineer” as #1 job

CNNMoney
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Blocked Plug-in

BEST JOBS IN AMERICA *Money/PayScale.com's list of great careers* 2011

Best jobs for fast growth

Money

If you're stalled or burned out, these fast-growing fields (with relatively low barriers to entry) can help you earn more, get ahead and put life back into your career.

1. Software Developer

1 of 20 « BACK NEXT »

Share

Median pay: $82,400
Top pay: $118,000
10-year job growth: 32%
Total jobs: 380,000

PHOTO: THINKSTOCK

The job: As technology evolves rapidly, companies continue to need developers to design, test, and debug software programs for mobile devices and apps. Since the landscape changes so often, even longtime developers frequently need to retrain and learn new programs, lowering the barriers to entry for job switchers.

How to switch: If you have a technical background, all you need are self-study courses for vendor-specific program certifications. Tech newbies should start with a programming course at a local college.

Quality of life ratings:

Personal satisfaction	Benefit to society	Low stress	Flexibility
B	C	C	A

Money Magazine Best Jobs 2012

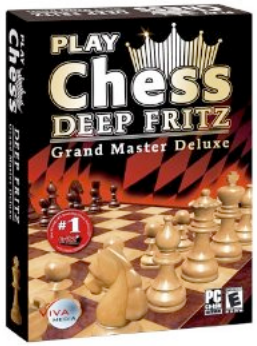
Exponential Progress in Hardware

Early Mainframe

Furby

Exponential Progress in Software

Deep Blue, 1997

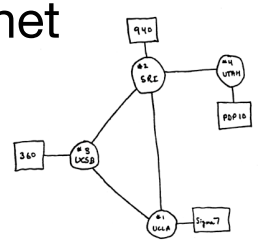


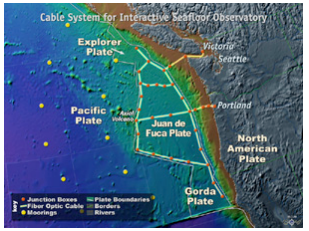
Deep Fritz, 2008

Watson, 2011

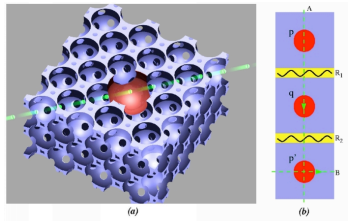
Opportunities

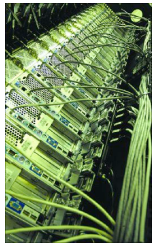
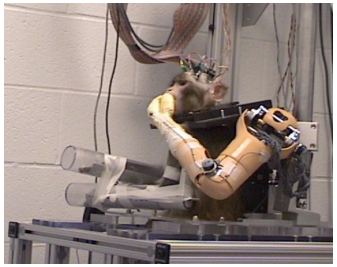
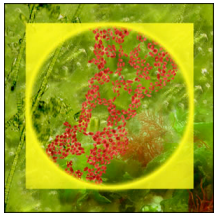
- Designing the next generation Internet
- **Driving advances in all fields of science and engineering**
- Wreckless driving
- Personalized education
- Predictive, preventive, personalized medicine
- Quantum computing
- **Transforming the developing world**
- Personalized health monitoring
  → quality of life
- Data-intensive supercomputing
- Neurobotics
- Synthetic biology
- The algorithmic lens → Cyber-enabled Discovery and Innovation










Our Graduates Work at a Variety of Companies

- IBM, EDS, AOL, ITT Advanced Engineering & Sciences, Amazon.com
- L3 Communications, Telemus Solutions, Nexus, Advanced Software Systems, Nevstar, Accenture, ICF International
- Advanced Software Systems, Rivet Logic, Matrix-DSS
- CACI, Mitre, Lockheed Martin, Northrop Grumman, SAIC
- Cardinal Health, Washington Consulting, Google
- DISA, DOE (Ames Lab), DOT, GSA, US PTO
- Freddie Mac, Sallie Mae

The Computer Science Department

- **44 Faculty Members** Wide range of research interests and expertise
- **Every Student has an Academic Advisor**
  Introduce yourself to him or her
  Office hours are on the CS Student FAQ (cs.gmu.edu/wiki) at:
  http://cs.gmu.edu/wiki/pmwiki.php/Administration/FacultyOfficeHours
- **CS Office Staff** Available to help with paperwork
- **Chair** Prof. Sanjeev Setia setia@gmu.edu
- **Associate Chair** Prof. Pearl Wang pwang@cs.gmu.edu

Faculty

- **13 Professors**
  Barbara, J. Chen, De Jong, Gomaa, Kerschberg, Menasce, Motro, Offutt, Pullen, Setia, Sood, Tecuci, Wechsler
- **16 Associate Professors**
  Ammann, Aydin, Brodsky, Carver, S. Chen, Domeniconi, Duric, Kosecka, Luke, Richards, Simon, Stavrou, P. Wang, X. Wang, White, Wijesekera
- **9 Assistant Professors**
  Allbeck, Gingold, Li, Lien, Lin, Malek, McCoy, Rangwala, Shehu
- **6 Instructional Faculty**
  Dobolyi, Kauffman, Maddox, Nordstrom, Snyder, Srinivasan
- **Various Visiting and Adjunct Faculty**

Research Expertise

- Algorithms and Theory of Computation
- Artificial Intelligence, Computer Vision and Robotics
- Computational Biology, Bioinformatics, and Biometrics
- Databases and Data Mining
- Evolutionary Computation and Machine Learning
- Graphics and Image Processing
- Information and Network Security
- Parallel and Distributed Computing
- Software Engineering
- Systems and Networks

Research Centers and Laboratories

- **Research Centers**
  C4I Center
  Center for Secure Information Systems
  E-Center for E-Business
  Learning Agents Center
  Center for Distributed
  and Intelligent Computation

- **Research Laboratories**
  Autonomous Robotics
  Computational Biology
  Biometrics and Forensics
  Computer Vision and Robotics
  Data Mining
  Evolutionary Computation
  Graphics
  Simulation of Human Movement
  Machine Learning
  in Biomedical Informatics
  Network Security
  Software Engineering
  Systems and Networking

GEORGE MASON UNIVERSITY **Department of Computer Science**
Volgenau School of Engineering

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Student Information
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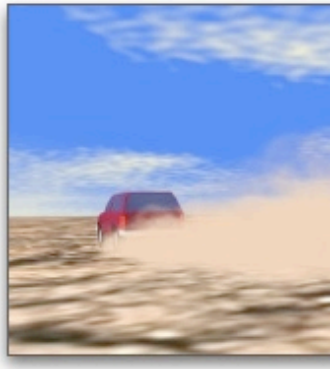
Courses and Syllabi
Student Organizations

Welcome to the **Department of Computer Science**. The department offers BS, MS, and PhD programs in Computer Science; MS programs in Software Engineering, Information Systems, and Information Security and Assurance; and a BS program in Applied Computer Science with various concentrations. The department also offers three concentrations in the PhD Program in Information Technology (in Information Systems, Information Security, and Software Engineering) and several graduate certificates.

Faculty in the department have research interests in networking, architecture, parallel and distributed computing, performance evaluation, software engineering, multimedia, graphics and visualization, databases, software engineering, data mining, security, information systems, artificial intelligence, computer vision, and robotics.

The Department is part of the Volgenau School of Engineering at George Mason University.



Realistic modeling of the dynamic
Prof. Jim Chen and the GMU Graph

Events *(Details)* *(Calendar)*

CS Undergraduate Students Welcome BBQ!

Thursday, September 15, 2011, 12:00–1:00 pm, Research I, Rm. 163
RSVP: csadmin@cs.gmu.edu

GTA Teaching Workshop

Tuesday, August 30, 2011, 10:30am–2:00pm, Eng 4201
Dr. Bethany Usher & Dr. Joshua Eyler, Associate Directors, CTE; Dr. Mary

News *(Details)*

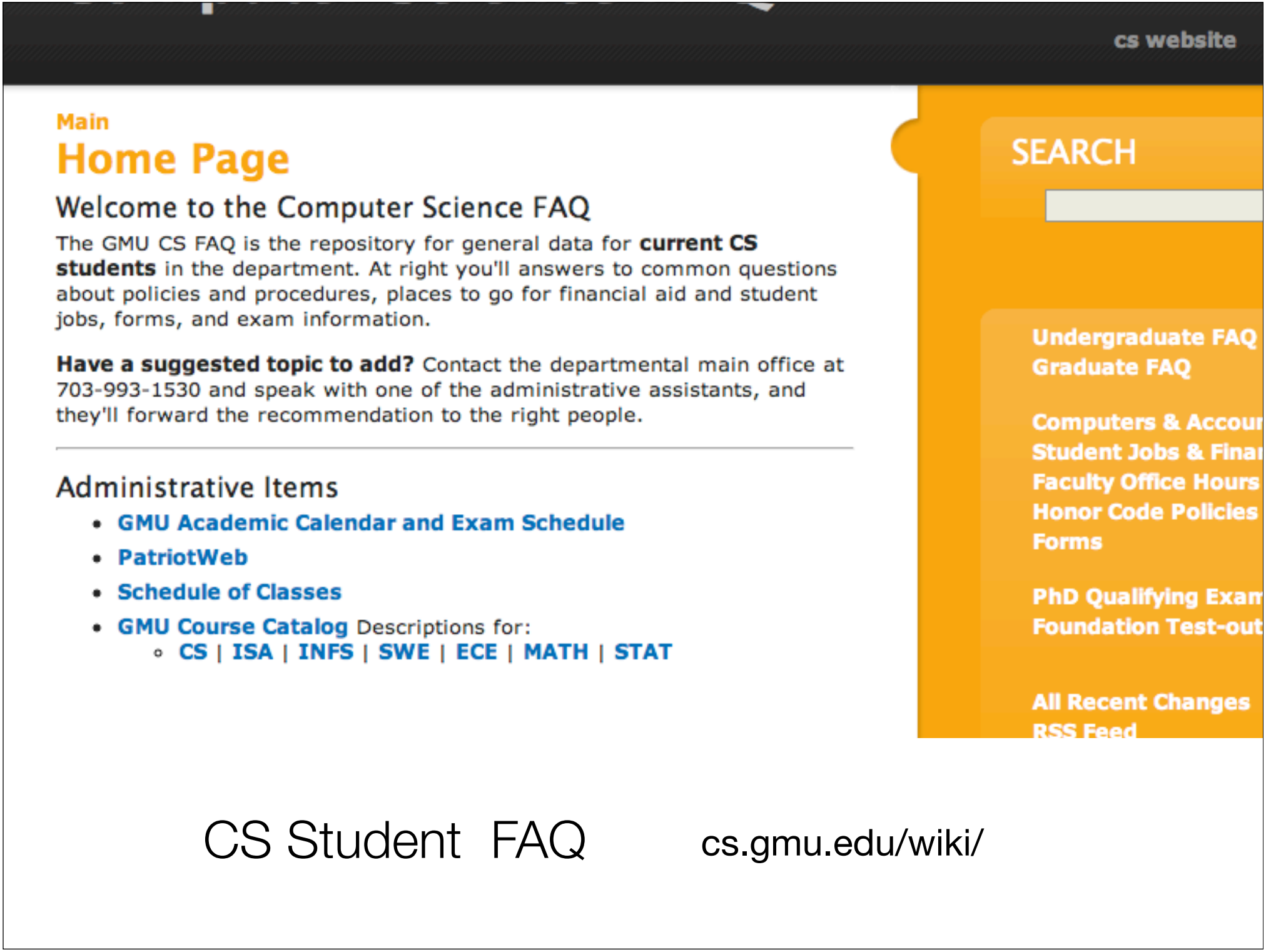
Three new faculty to join the Department (more)

The CS Dept welcomes Dr. Mark Snyder, who joins the departn 2011. Dr. Damon McCoy and Dr. Avinash Srinivasan will join th in Spring 2012.

GMU Student Team at RoboCup 2011 Istanbul (more)

Prof. Sean Luke and four PhD and undergraduate students (Keith Sullivan, Katherine Russell, Jake Scott, and Max Sumrall) traveled to Istanbul with three humanoid

CS Web Page cs.gmu.edu



CS Student FAQ cs.gmu.edu/wiki/

Programs

- **Undergraduate** **about 550 students**
  Computer Science
  Applied Computer Science
  in **Geography, Software Engineering, Bioinformatics,** and **Computer Game Design**
  Minor in Computer Science
  Minor in Software Engineering
  Undergraduate Certificate in Computer Science
  Combined BS and Accelerated MS in Computer Science (and others)

- **Masters Programs** **about 450 students**
  Computer Science, Information Systems, Software Engineering, Security
  Graduate Certificates

- **PhD Programs** **about 100 students**
  Computer Science, Information Technology

Student Organizations

- **ACM (Association for Computing Machinery) Student Chapter**
  ACM Programming Team
- **SWE (Society for Women Engineers)**
- **Applied Robotics Club**
- **Game Analysis and Design Interest Group**
- **National Association of Black Engineers**
- You can form your own interest group!
  Talk to a faculty member like Prof. Duric

Opportunities Outside the Classroom

- **Undergraduate Teaching Assistant** (UTA)
  Paying job to assist professors in running classes, doing web development for the department, you name it!

- **Participate in Research Projects!**

  - **Research Experience for Undergraduates** projects
  - **Research Apprenticeship Program**
  - **Independent Study** or **Directed Reading/Project**
  - Possibly a **Senior Design Project**

Plagiarism

- **Stealing somebody's work or idea.** The process of copying another person's idea or written work and claiming it as original.
- **Do not plagiarize.**
  Follow the GMU Honor Code.
  When in doubt, consult your instructor.
- **What is plagiarizing on programming assignments?**
  Sharing code: either by copying, retyping, looking at, helping to debug, or supplying a copy of a file.
- **What is *not* plagiarizing on programming assignments?**
  Helping others use systems or tools.
  Helping others with high-level design issues.
  Helping others understand class concepts.

Final Thoughts

- **Computer science is a great field to be in.**

- **Not all computer science students become software or hardware engineers.**

- **A computer science degree is good preparation for quite a lot areas:**
  Medicine/Biology
  Law
  Business
  Education ⬅ **Former Mason President Alan Merten is a CS PhD**

  Current President Angel Cabrera has a Computer Engineering Bachelors degree

  Geography
  Digital Art

The Programs

(Prof. Duric's Turn)

Computer Science Undergraduate Programs

- **Majors**
  Computer Science
  Applied Computer Science in Bioinformatics
  Applied Computer Science in Geography
  Applied Computer Science in Computer Game Design
  Applied Computer Science in Software Engineering

- **Minors and Undergraduate Certificates**
  Computer Science
  Software Engineering
  Undergraduate Certificate in Computer Science

- **Accelerated Programs (BS/MS)**
  Computer Science
  Software Engineering
  Information Systems
  Information Security and Assurance

CS and ACS Requirements

- **CS Requirements**

  Gen Ed 24 credits
  Foundation: Public Speaking, English
  Core: Literature, Western Civ., Social & Behavioral Science, Global Understanding, Arts

  CS Major 91 credits
  Math and Engineering: 26
  CS related electives: 6
  Natural sciences: 12
  Humanities: 3
  Required CS courses

  General Electives 5 credits

- **Additional ACS Requirements**

  Gen Ed
  Lower-division CS and Math

  ACS Core
  Many upper-division (3xx+) CS

  Concentration
  Geography, Bioinformatics, Software Engineering, Computer Game Design

- Some concentrations have special natural science / humanities reqs. The exact number of credits depends on the concentration.

Some BS CS Requirements In Detail

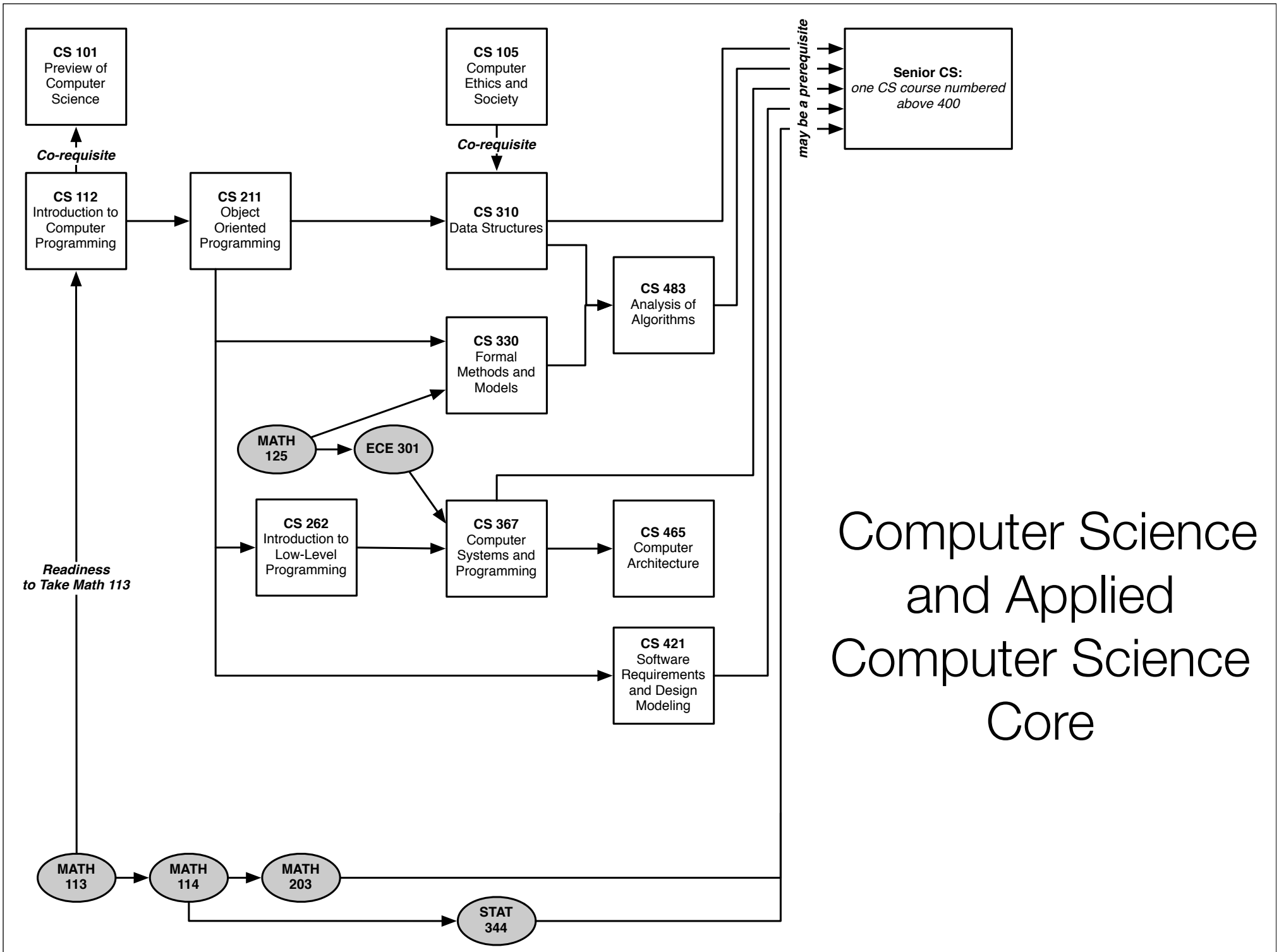
- **Mathematics and Engineering**

MATH 113, 114, 213	Calculus I, II, III
MATH 125, 203, STAT 344	Discrete Math, Matrix Algebra, Statistics
OR 481 (Math 446)	Numerical Methods in Engineering
ECE 301	Digital Electronics

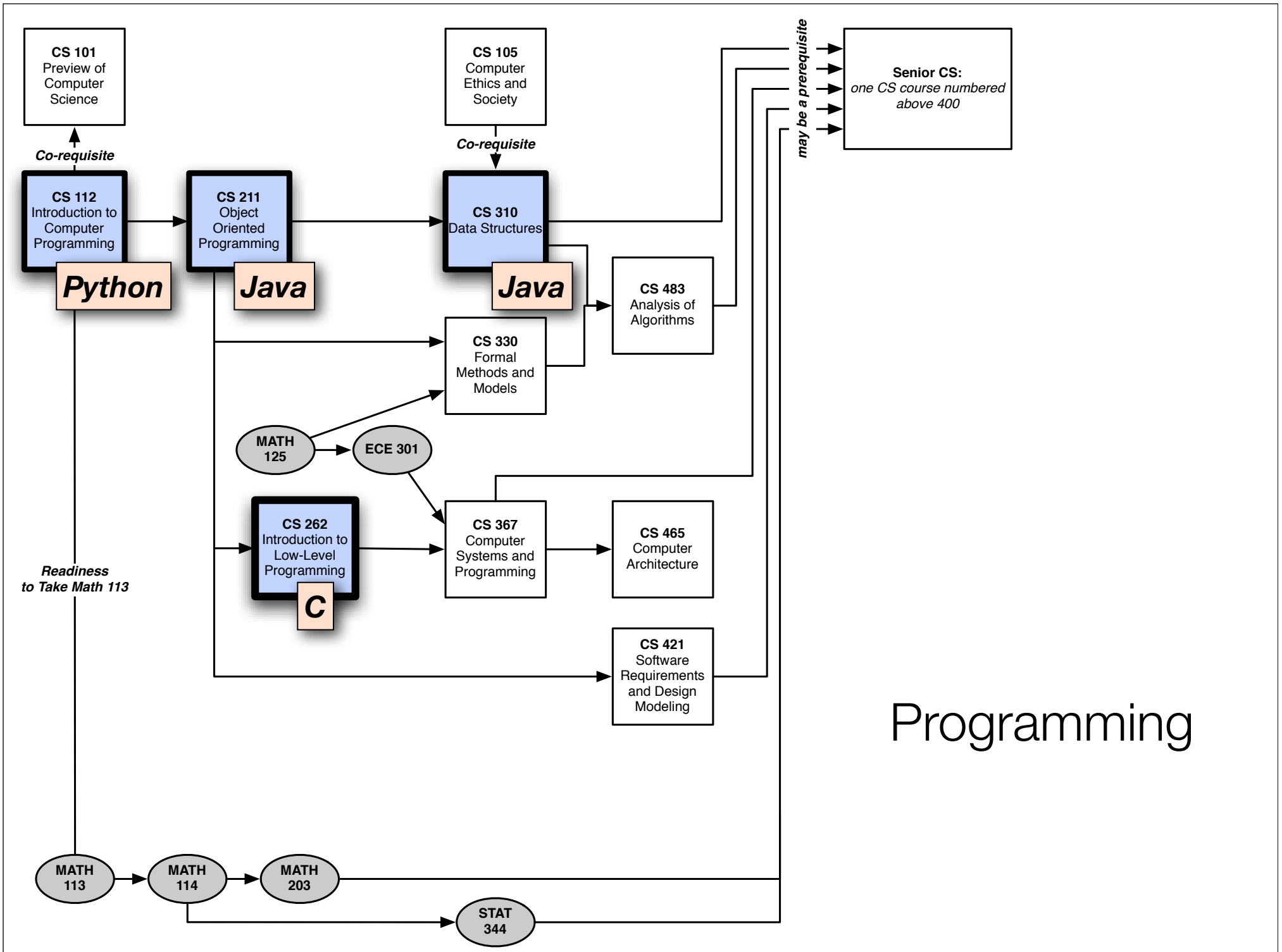
- **CS Related Elective Courses**
  Two courses selected from an approved list of ECE, OR, PHIL, STAT, SWE, SYST, MATH, or CS courses

- **Natural Science**
  Must include an **approved** two semester laboratory sequence

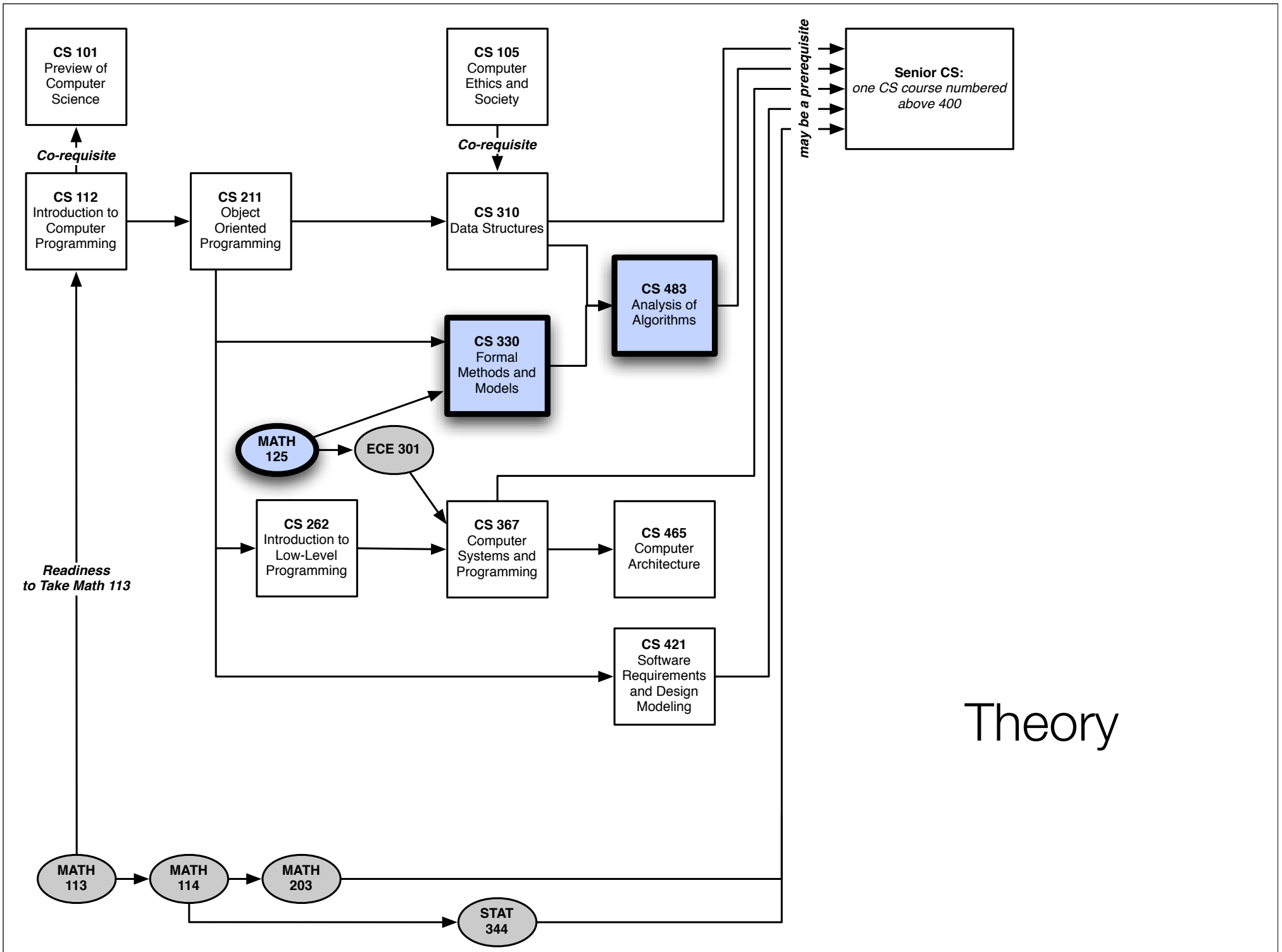
- **Humanities**
  Extra course **in addition** to the Gen Ed requirements

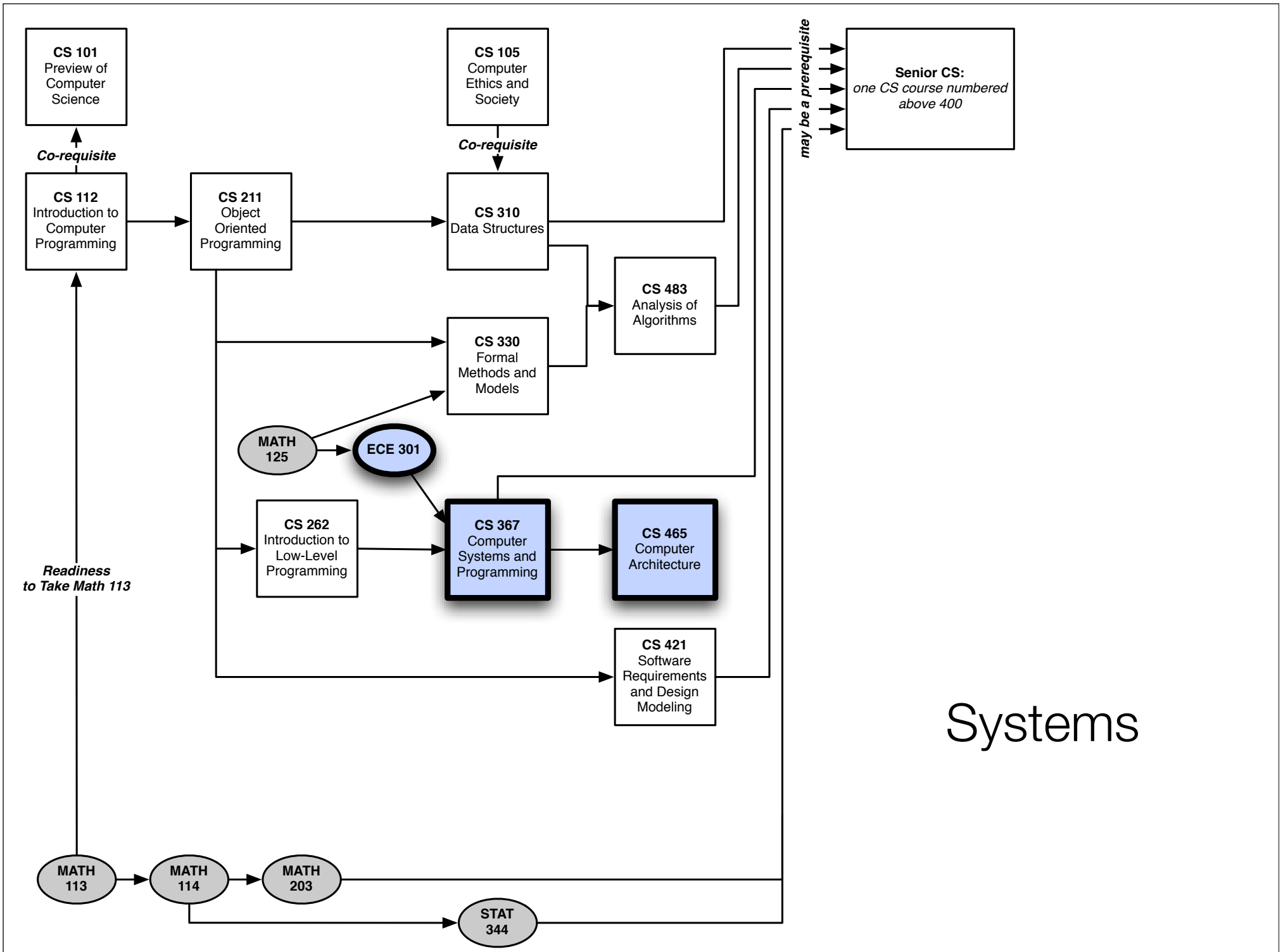


Computer Science and Applied Computer Science Core



Programming


CS 101
Preview of Computer Science
Co-requisite
CS 112
Introduction to Computer Programming
CS 211
Object Oriented Programming
CS 105
Computer Ethics and Society
Co-requisite
CS 310
Data Structures
may be a prerequisite
Senior CS:
one CS course numbered above 400
CS 483
Analysis of Algorithms
CS 330
Formal Methods and Models
MATH 125
ECE 301
CS 262
Introduction to Low-Level Programming
CS 367
Computer Systems and Programming
CS 465
Computer Architecture
CS 421
Software Requirements and Design Modeling
Readiness to Take Math 113
MATH 113
MATH 114
MATH 203
STAT 344
Theory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STAT 344
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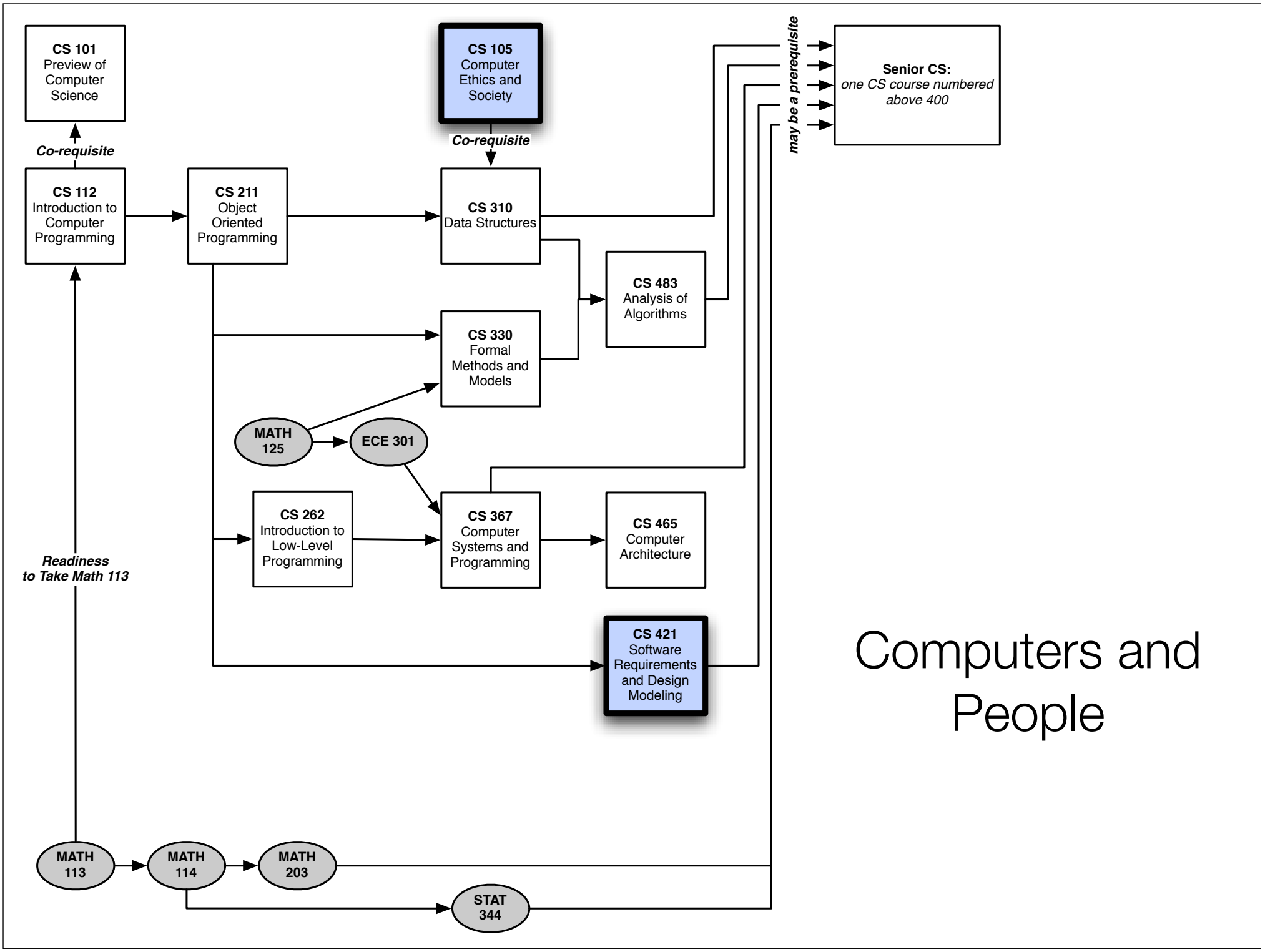
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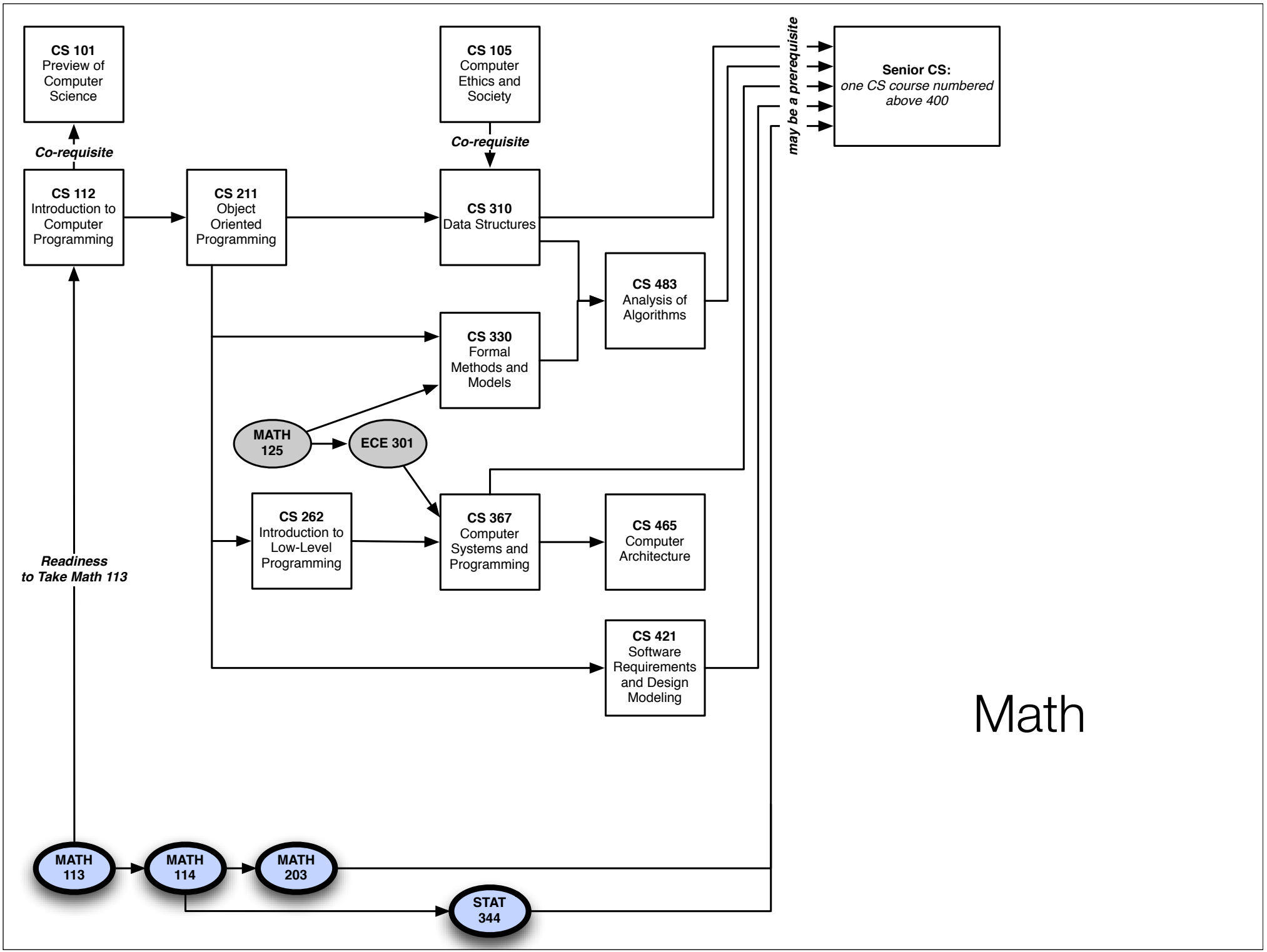
STAT 344
Computers and People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may be a prerequisite
Senior CS:
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Readiness to Take Math 113
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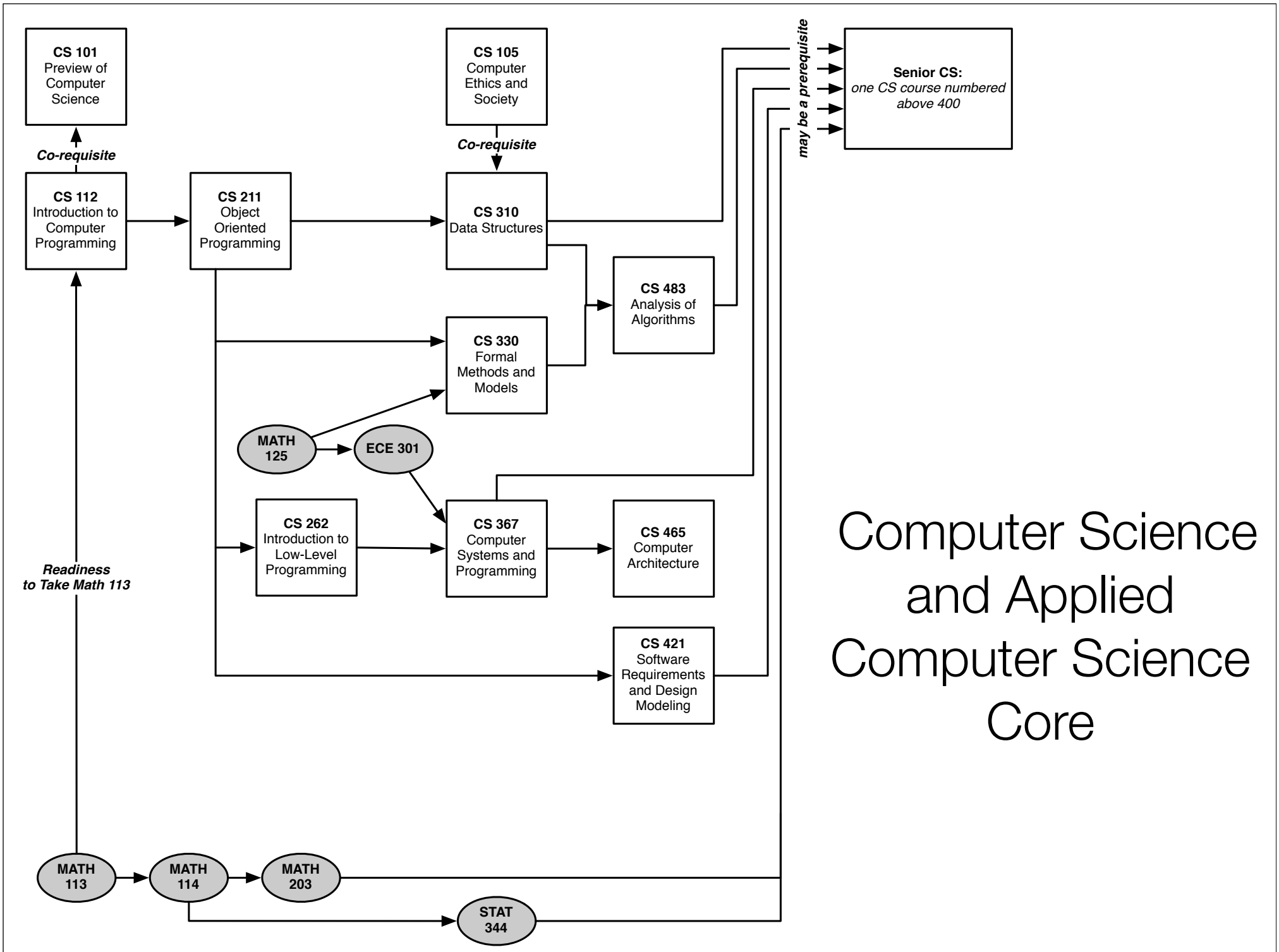
MATH 114
MATH 203
STAT 344
Math

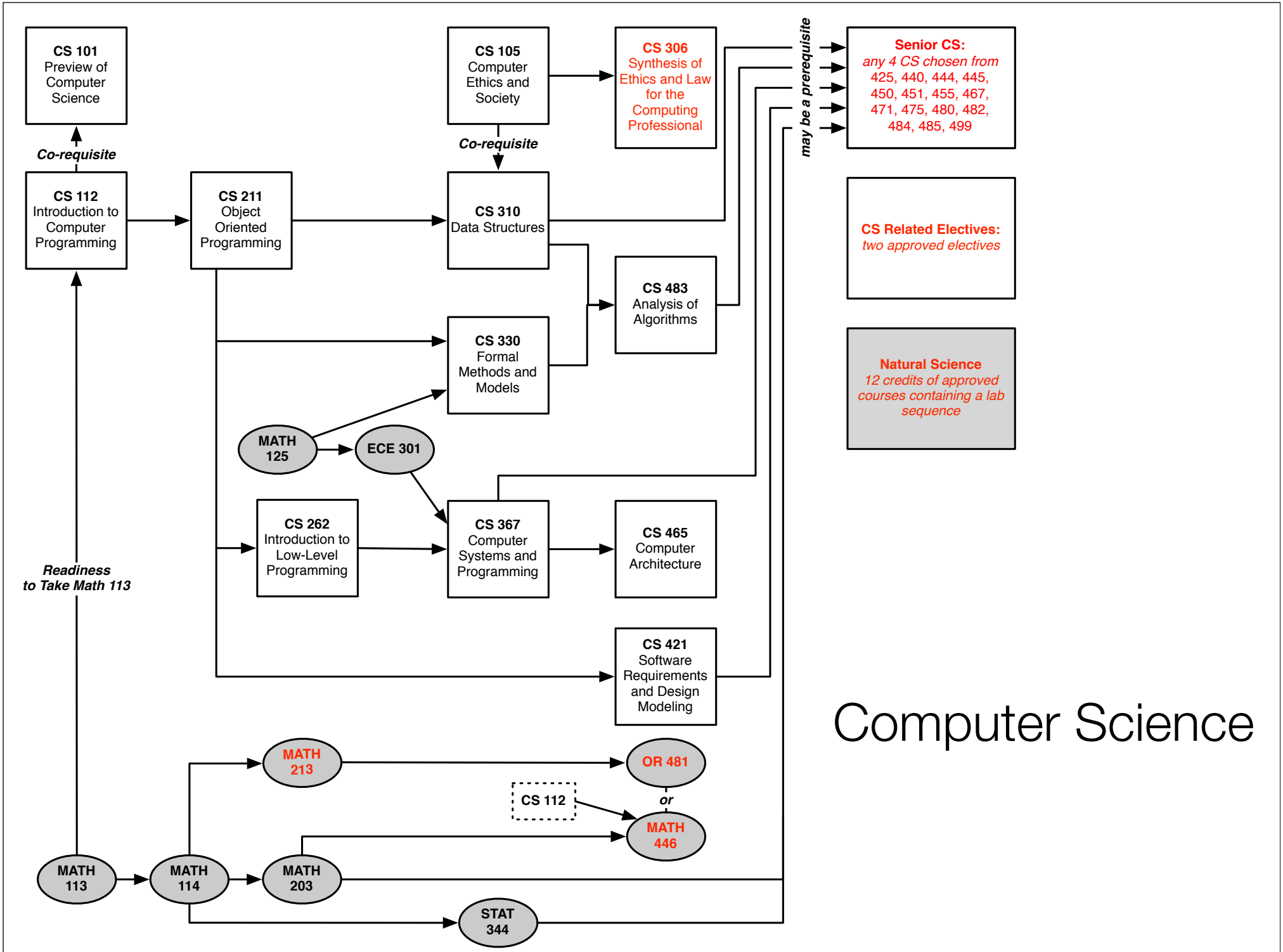
Some Senior Elective CS Courses

- CS 425 Game Programming I
- CS 440 Language Processors and Programming Environments
- CS 444 Introduction to Computational Biology
- CS 445 Computational Methods for Genomics
- CS 450 Database Concepts
- CS 451 Computer Graphics
- CS 455 Computer Communications and Networking
- CS 468 Secure Programming and Systems
- CS 471 Operating Systems
- CS 475 Concurrent and Distributed Systems
- CS 480 Intro to Artificial Intelligence
- CS 482 Computer Vision
- CS 484 Data Mining
- CS 485 Autonomous Robotics
- CS 499 Special Topics

- ***Special Mention:*** CS 490 Design Exhibition

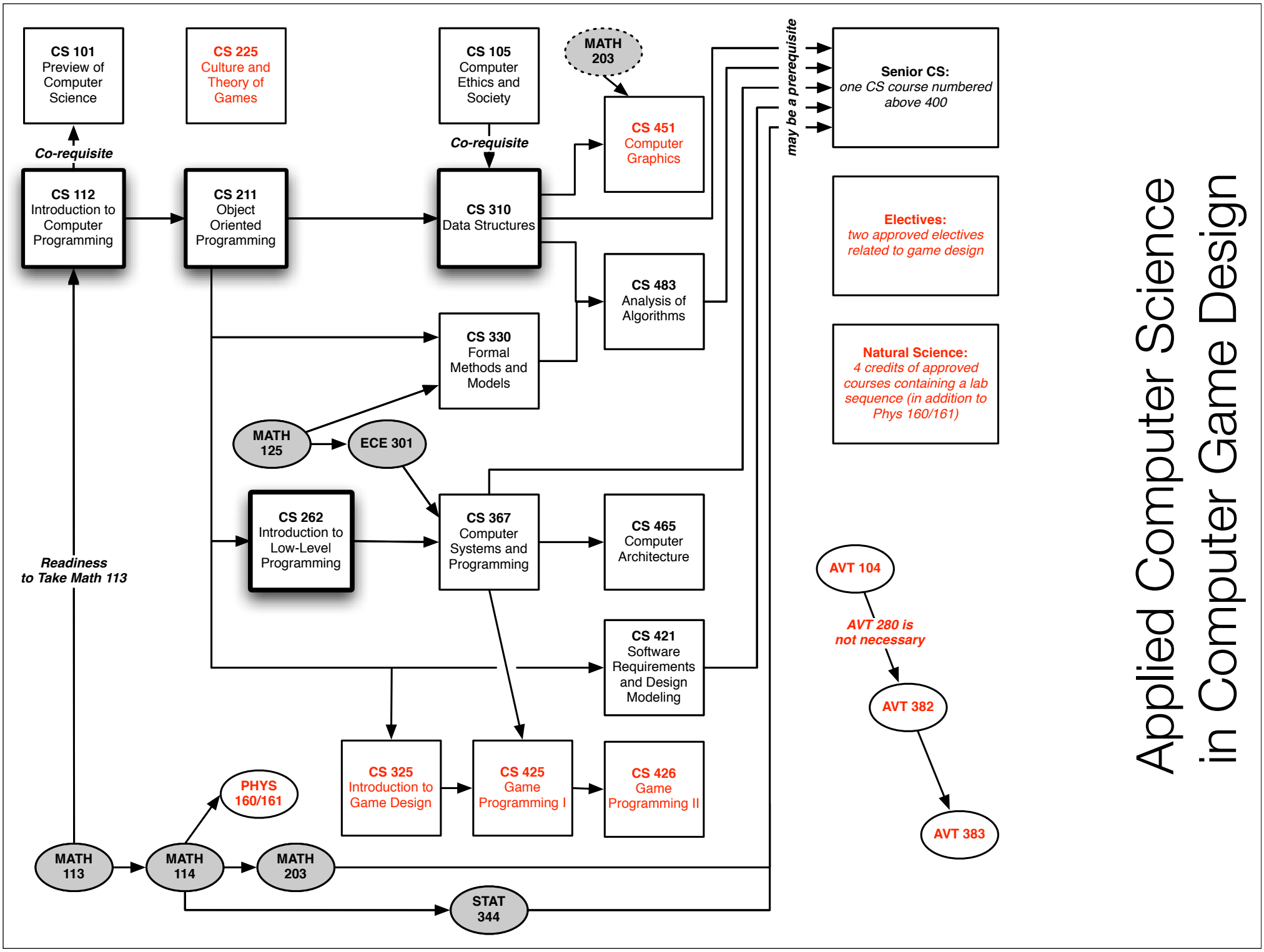


Computer Science and Applied Computer Science Core

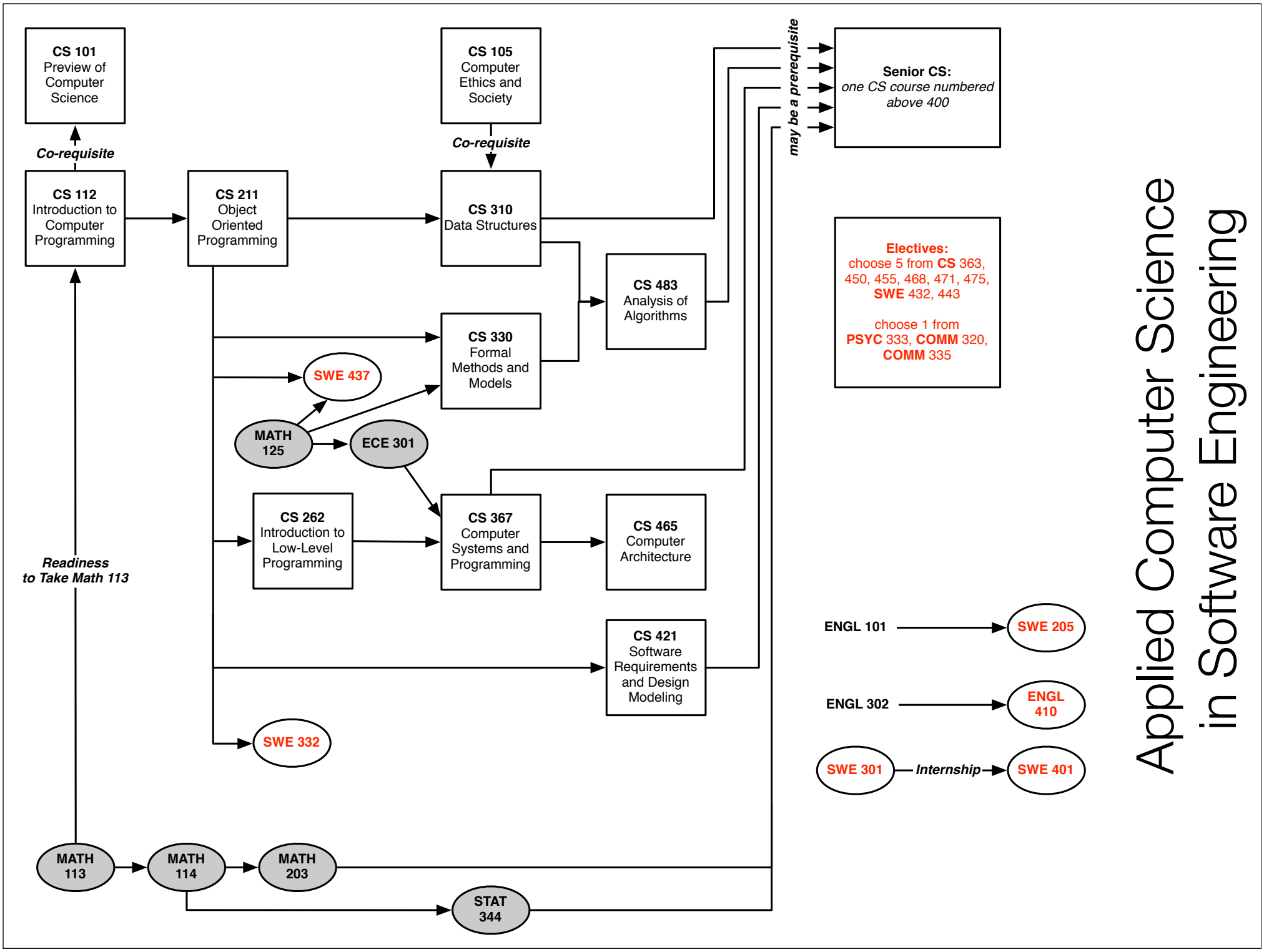


Computer Science

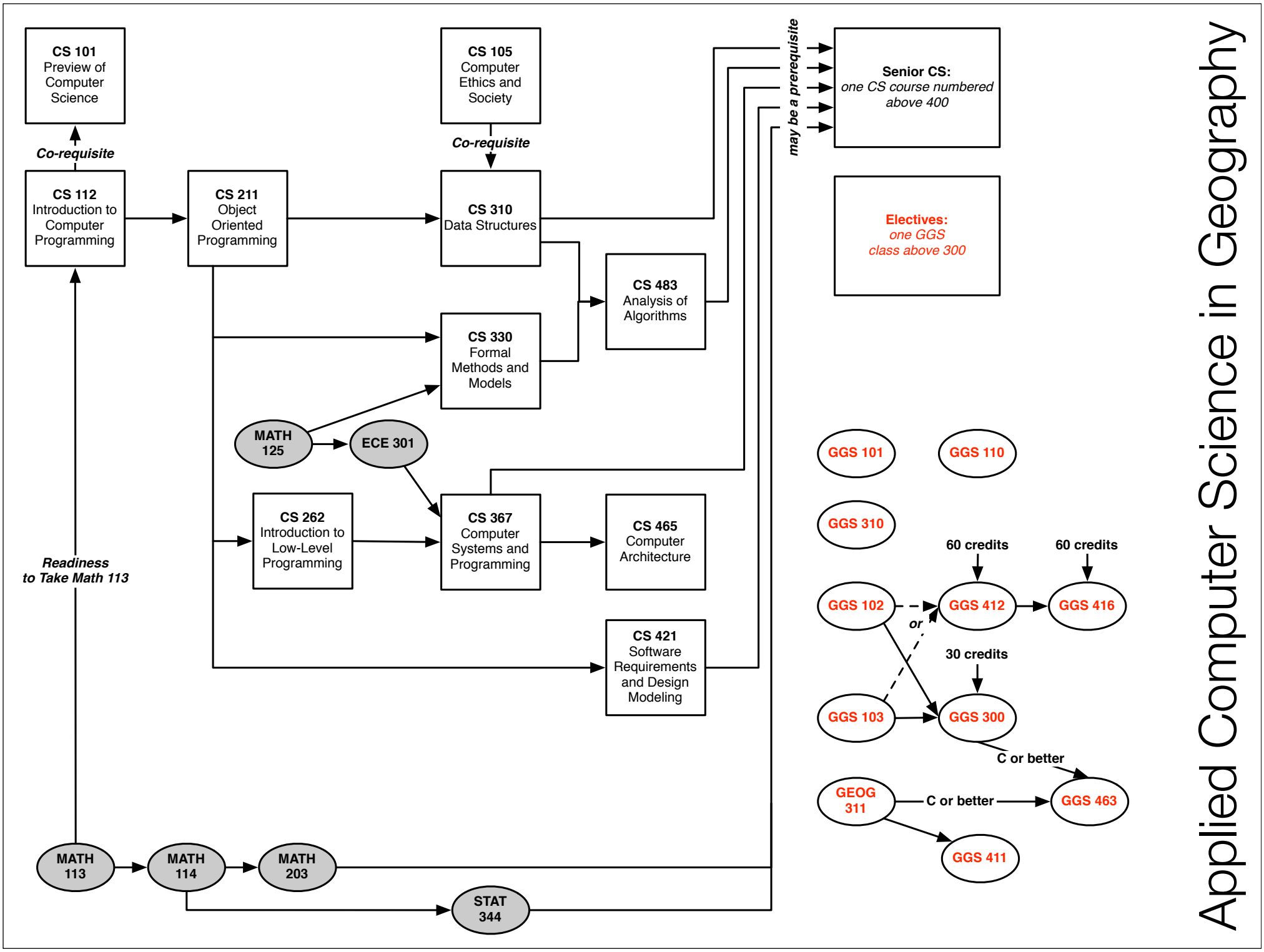
Applied Computer Science in Computer Game Design

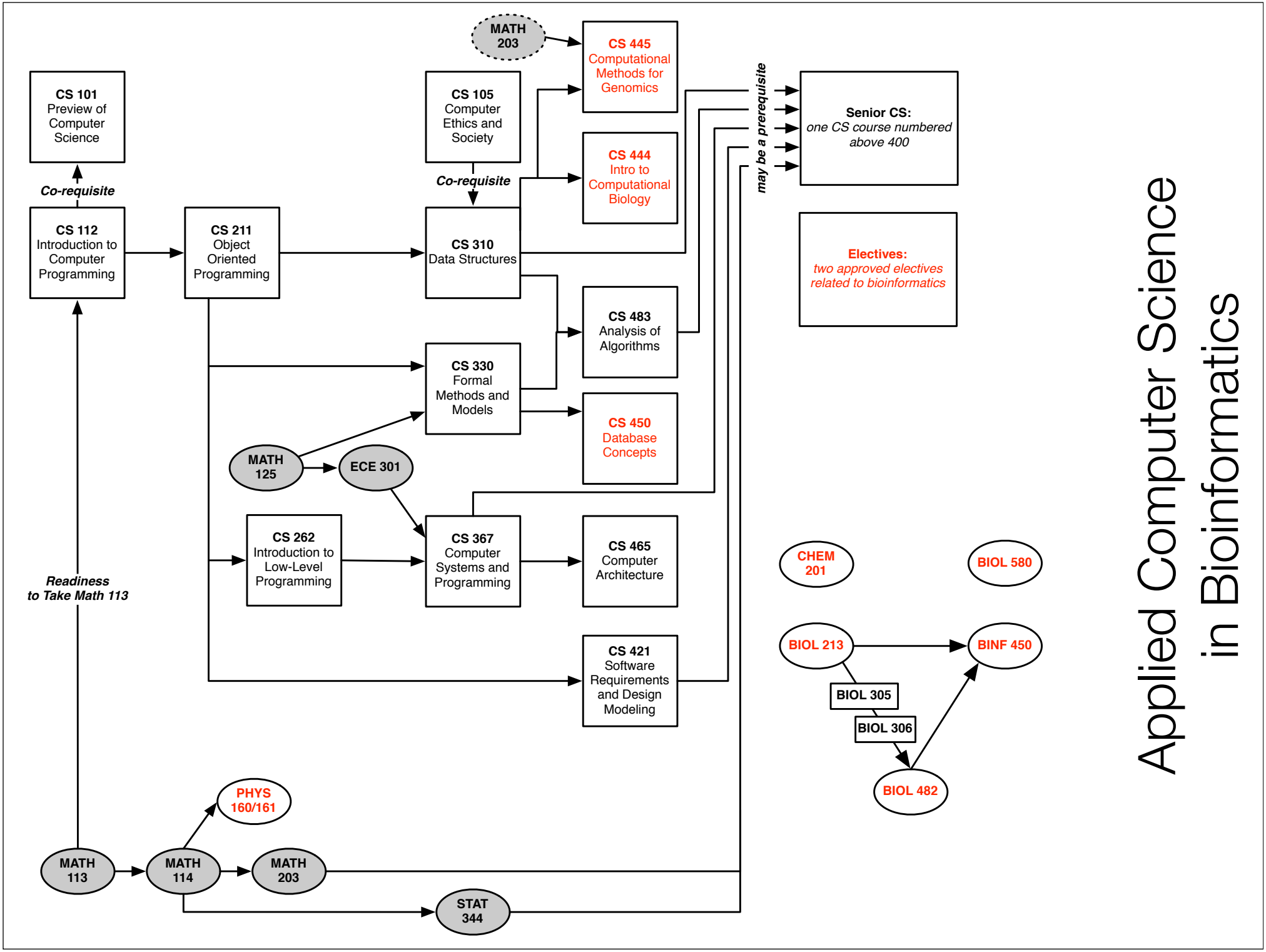


Applied Computer Science in Software Engineering



Applied Computer Science in Geography




Applied Computer Science
in Bioinformatics
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CS 101 Preview of Computer Science
CS 105 Computer Ethics and Society
CS 444 Intro to Computational Biology
Co-requisite
Co-requisite
may be a prerequisite
Senior CS: one CS course numbered above 400
CS 112 Introduction to Computer Programming
CS 211 Object Oriented Programming
CS 310 Data Structures
Electives: two approved electives related to bioinformatics
CS 483 Analysis of Algorithms
CS 330 Formal Methods and Models
CS 450 Database Concepts
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CS 465 Computer Architecture
CHEM 201
BIOL 580
Readiness to Take Math 113
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BINF 450
BIOL 305
BIOL 306
BIOL 482
CS 421 Software Requirements and Design Modeling
PHYS 160/161
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