



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



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An exciting field to be in

National Academy of Engineering

No. 1: SOFTWARE ENGINEER

AVERAGE SALARY

\$80,500

10-YEAR GROWTH

46%

AVERAGE ANNUAL JOB OPENINGS

44,800

B

B

A

C

STRESS

FLEXIBILITY

CREATIVITY

EASE OF ENTRY

[PREVIOUS](#)[NEXT](#)[Back to feature](#)

1. Software Engineer

Why it's great Software engineers are needed in virtually every part of the economy, making this one of the fastest-growing job titles in the U.S. Even so, it's not for everybody.

Designing, developing and testing computer programs requires some pretty advanced math skills and creative problem-solving ability. If you've got them, though, you can work and live where you want: Telecommuting is quickly becoming widespread.

The profession skews young -- the up-all-night-coding thing gets tired -- but consulting and management positions aren't hard to come by once you're experienced.

1. [Software engineer](#)2. [College professor](#)3. [Financial adviser](#)4. [HR manager](#)5. [Physician assistant](#)6. [Market research](#)7. [Computer IT analyst](#)8. [Real Estate appraiser](#)9. [Pharmacist](#)10. [Psychologist](#)

Great Career Opportunities

Money Magazine, 2006, ranked "Software Engineer" as #1 job

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

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.



PHOTO: THINKSTOCK

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



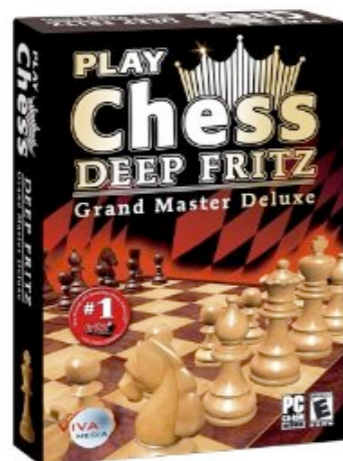
Exponential Progress in Software



Deep Blue, 1997



Deep Fritz, 2008

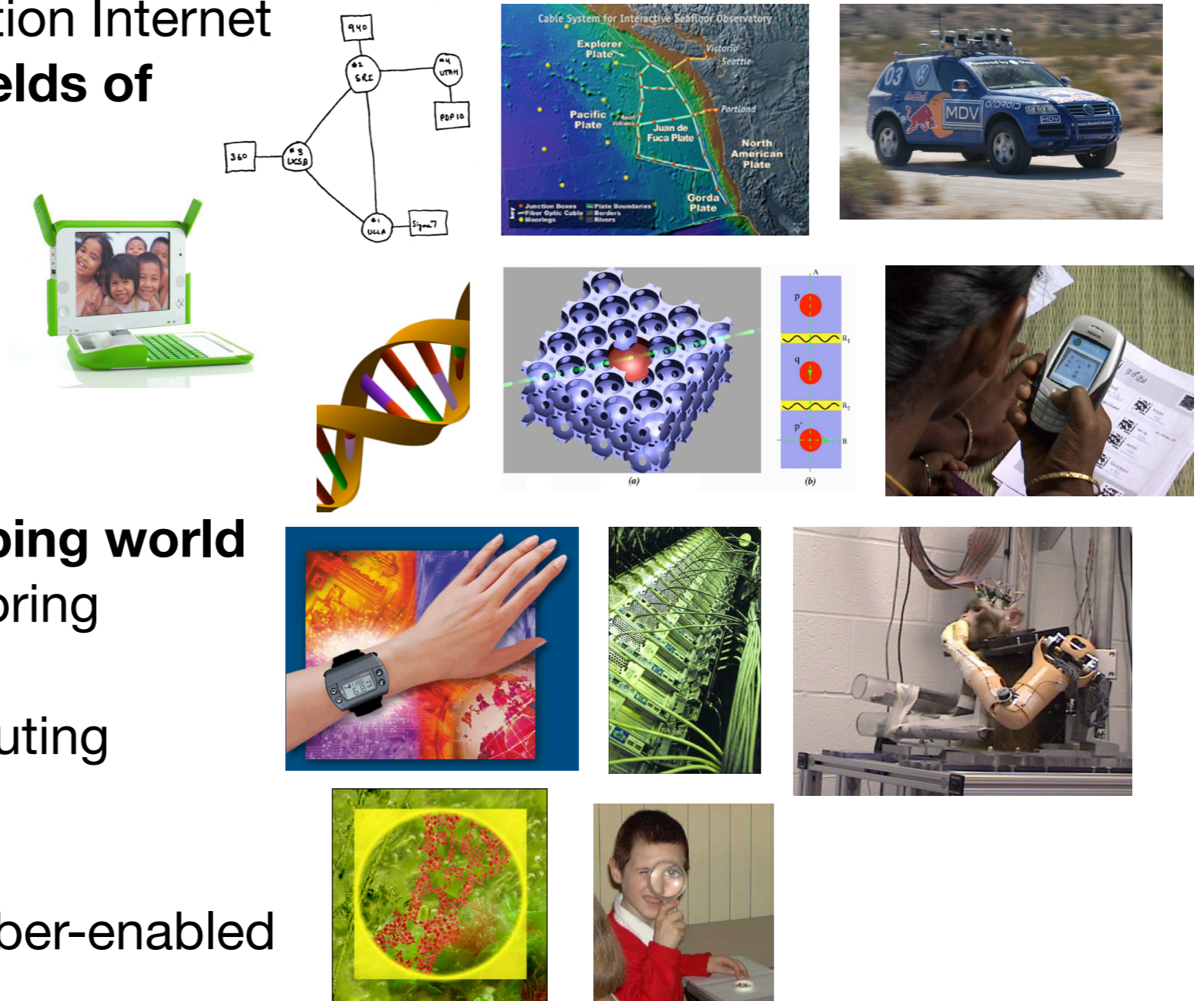




Watson, 2011

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

- **14 Professors**

Barbara, J. Chen, De Jong, Gooma, Kerschberg, Menasce, Motro, Offutt, Pullen, Setia, Sood, Tecuci, Wechsler, Wijesekera

- **19 Associate Professors**

Ammann, Aydin, Brodsky, Carver, S. Chen, Domeniconi, Duric, Kosecka, Li, Lien, Lin, Luke, Malek, Richards, Simon, Stavrou, P. Wang, X. Wang, White

- **5 Assistant Professors**

Allbeck, Gingold, 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

Search

The Department

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Research

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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

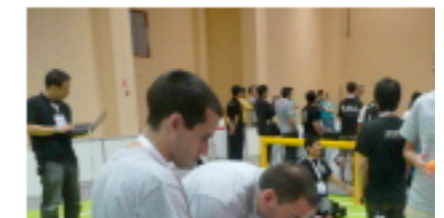
News [\(Details\)](#)

[Three new faculty to join the Department \(more\)](#)

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



[Main](#)

Home Page

Welcome to the Computer Science FAQ

The GMU CS FAQ is the repository for general data for **current CS students** in the department. At right you'll find answers to common questions about policies and procedures, places to go for financial aid and student jobs, forms, and exam information.

Have a suggested topic to add? Contact the departmental main office at 703-993-1530 and speak with one of the administrative assistants, and they'll forward the recommendation to the right people.

Administrative Items

- [GMU Academic Calendar and Exam Schedule](#)
- [PatriotWeb](#)
- [Schedule of Classes](#)
- [GMU Course Catalog](#) Descriptions for:
 - [CS](#) | [ISA](#) | [INFS](#) | [SWE](#) | [ECE](#) | [MATH](#) | [STAT](#)

SEARCH

[Undergraduate FAQ](#)
[Graduate FAQ](#)

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CS Student FAQ

cs.gmu.edu/wiki/

Programs

- **Undergraduate** **about 600 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: 23
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

ECE 301

Digital Electronics

- **CS Related Elective Courses**

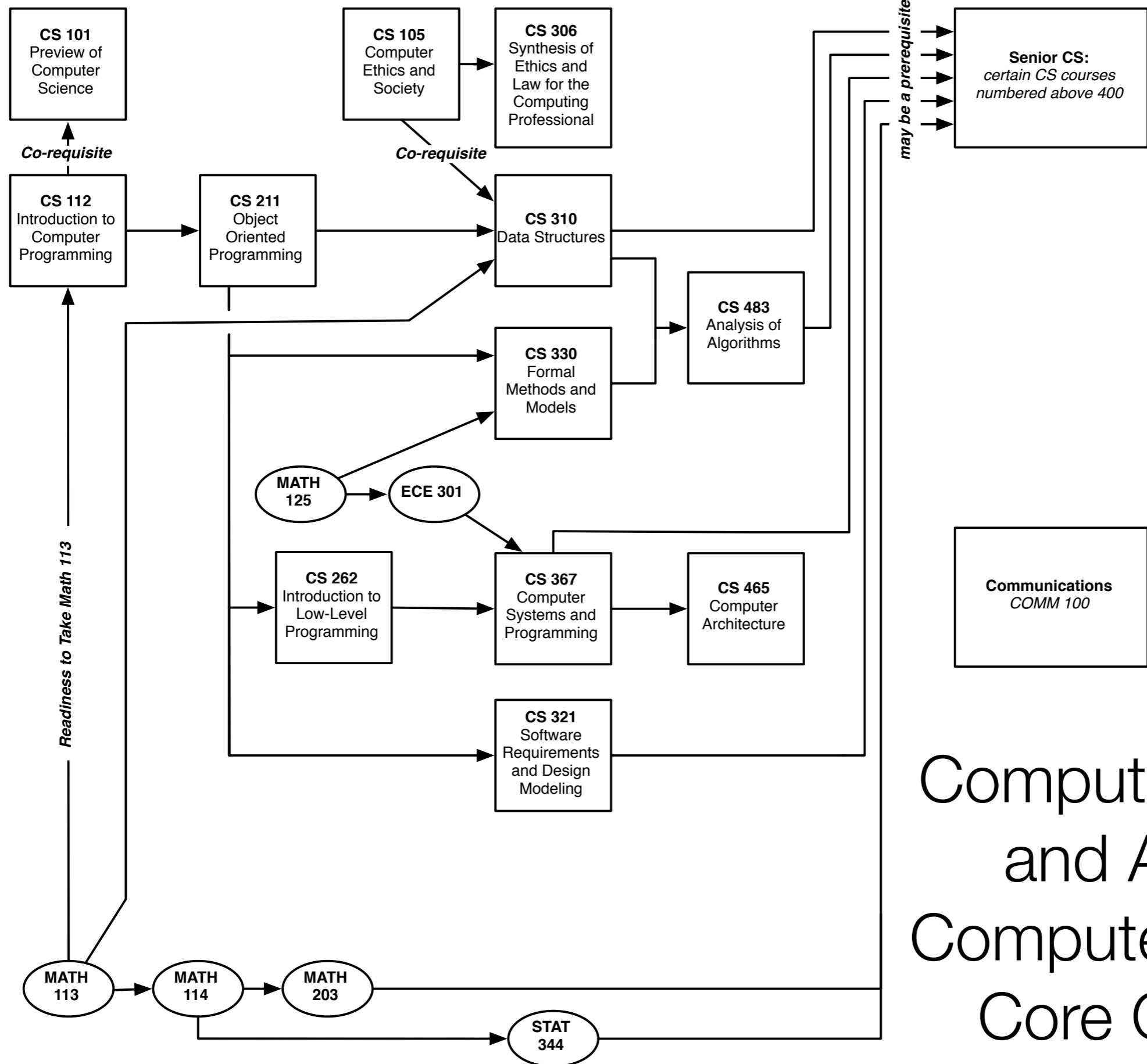
Two courses selected from an approved list of ECE, OR, PHIL, STAT, SWE, SYST, MATH, or CS courses

- **Natural Science**

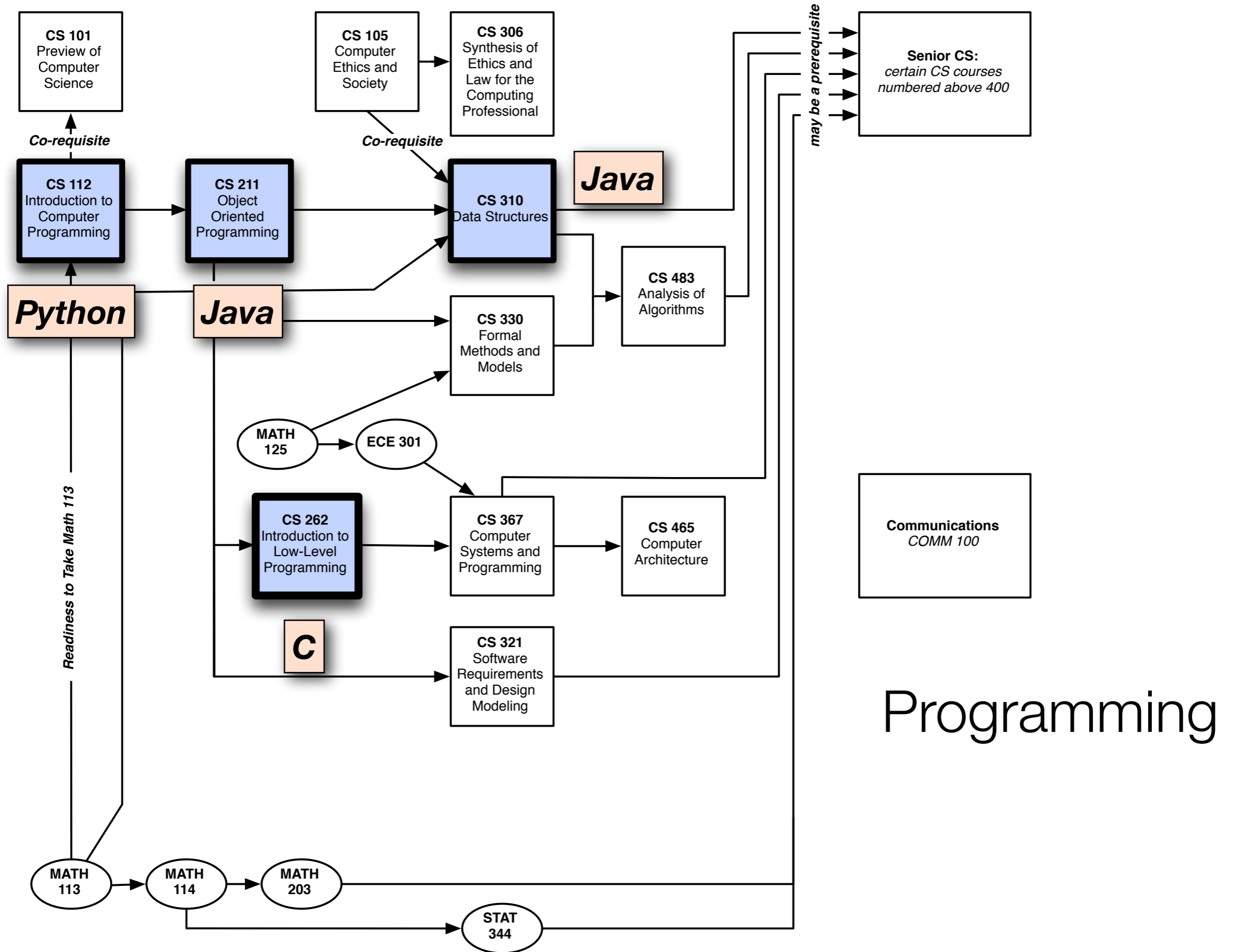
Must include an **approved** two semester laboratory sequence

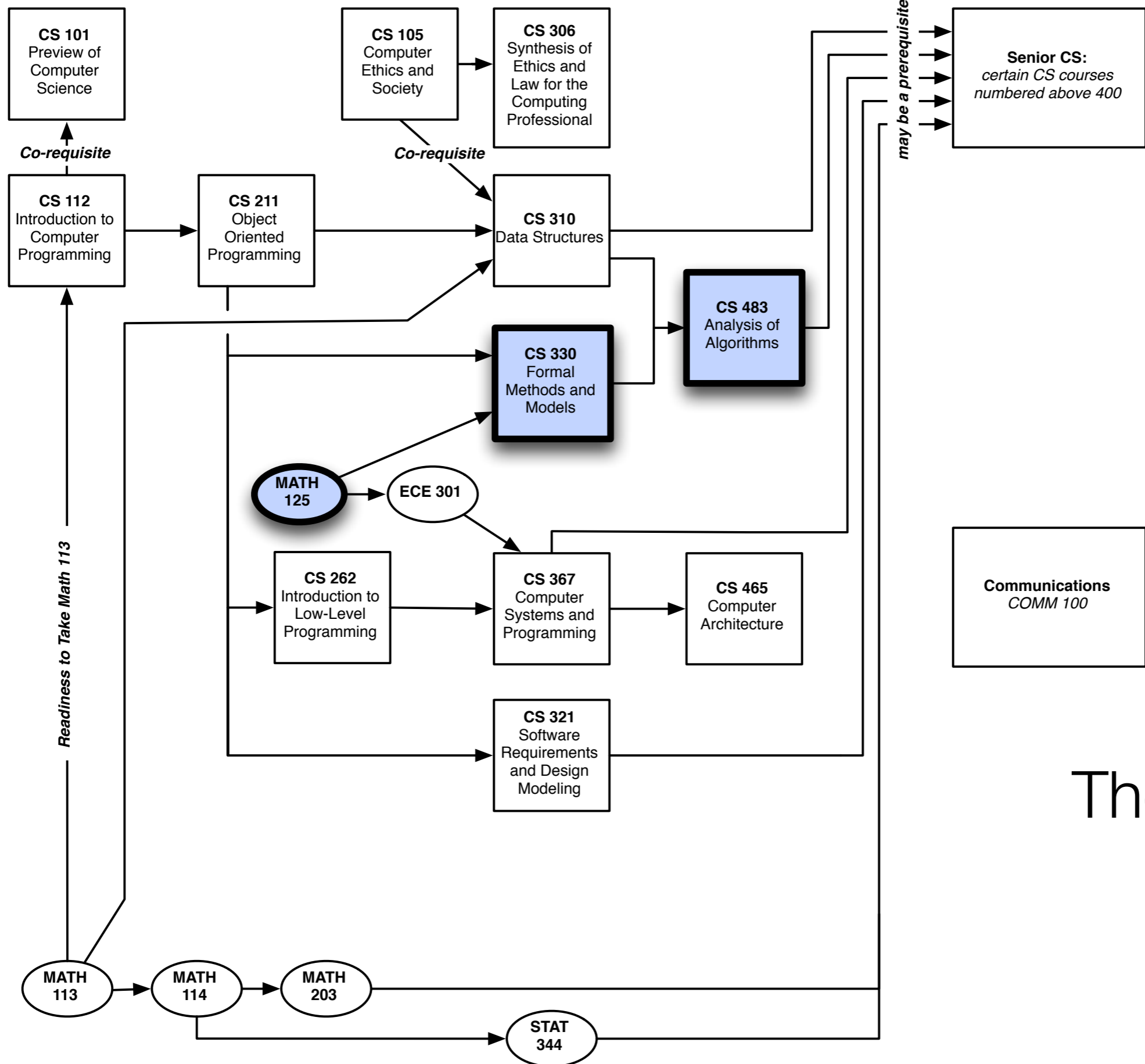
- **Humanities**

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



Computer Science and Applied Computer Science Core Courses



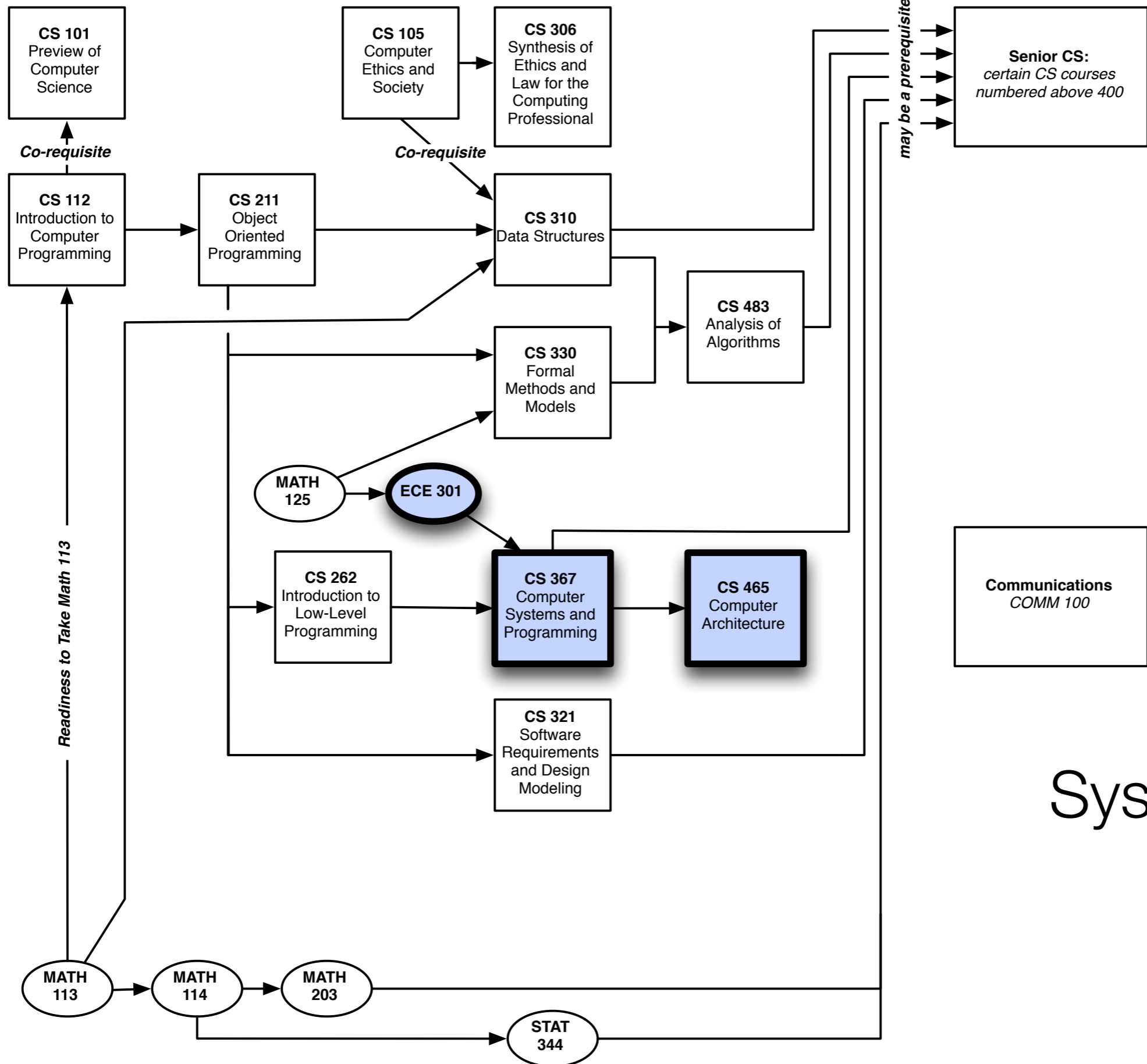


may be a prerequisite

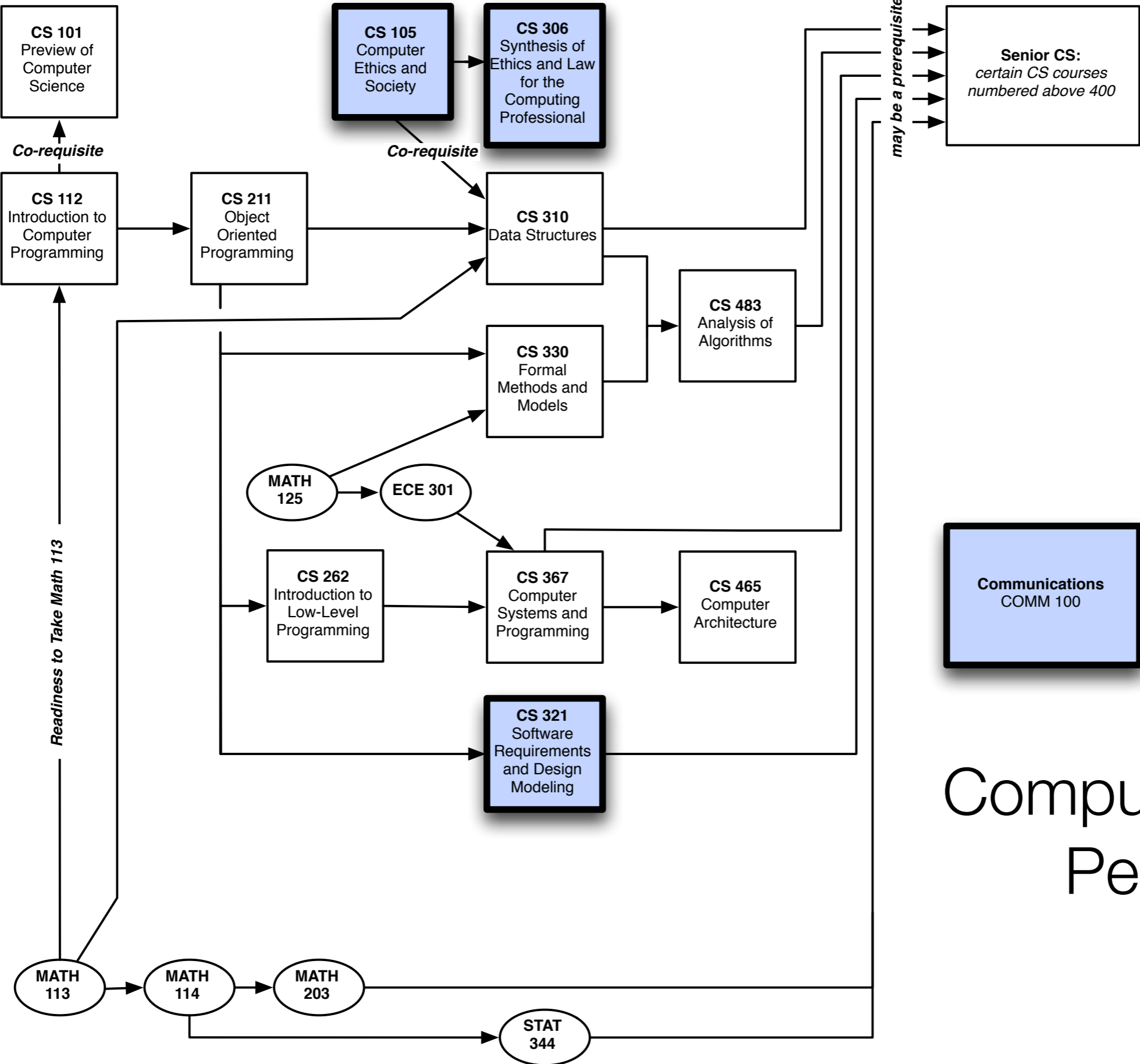
Senior CS:
certain CS courses
numbered above 400

Communications
COMM 100

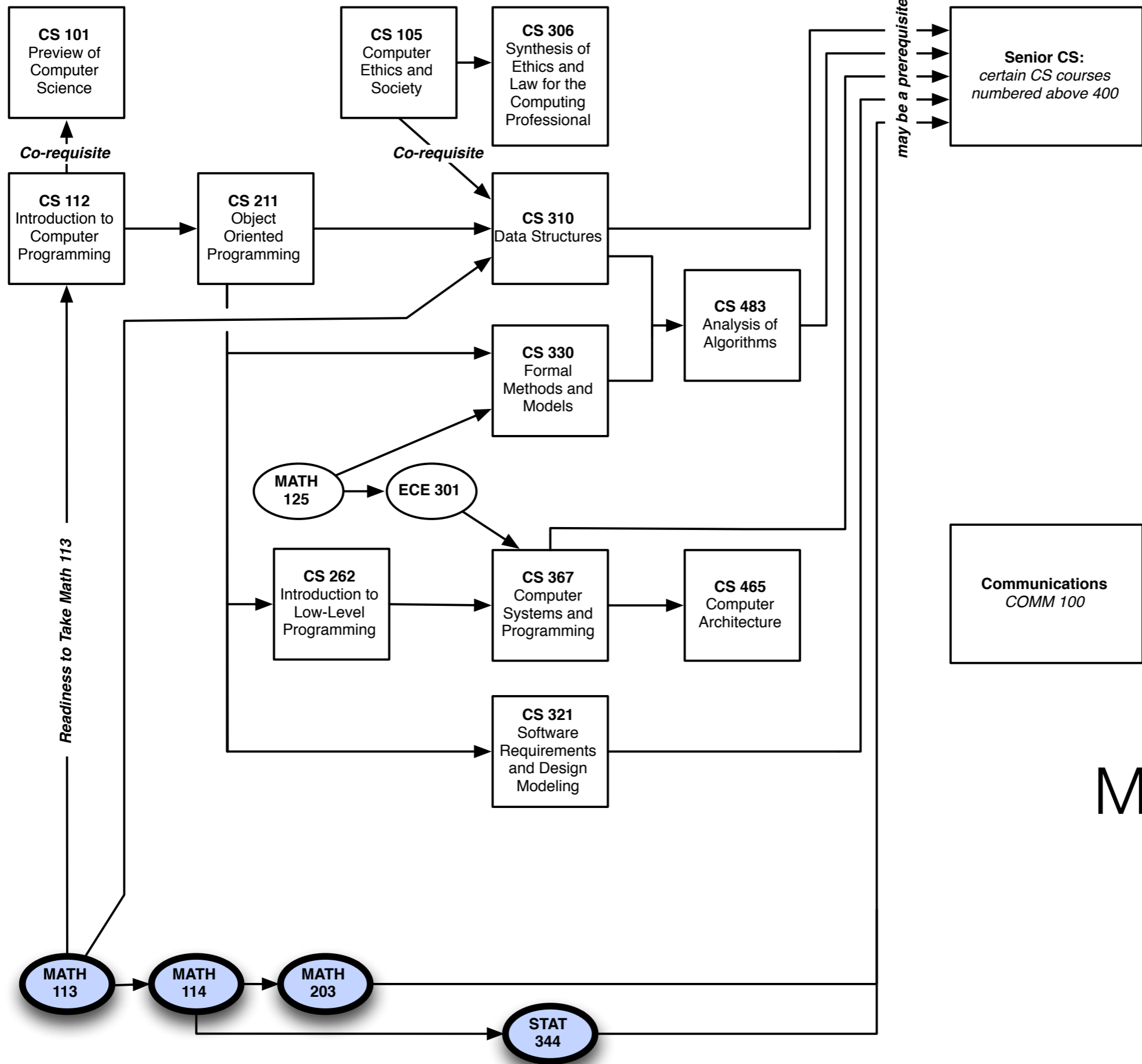
Theory



Systems



Computers and People



Math

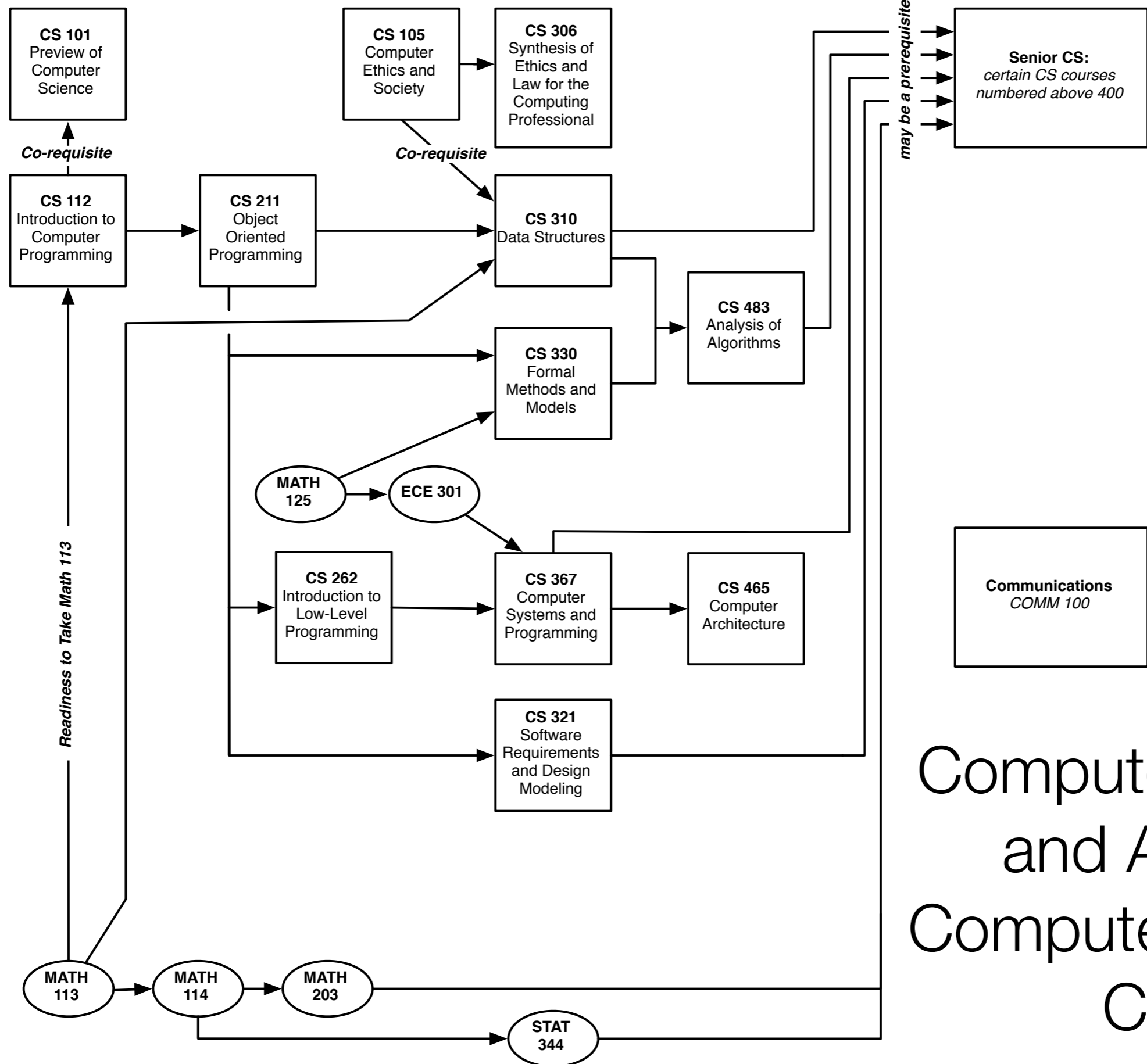
Senior CS Courses

- ***Must take one of the following***

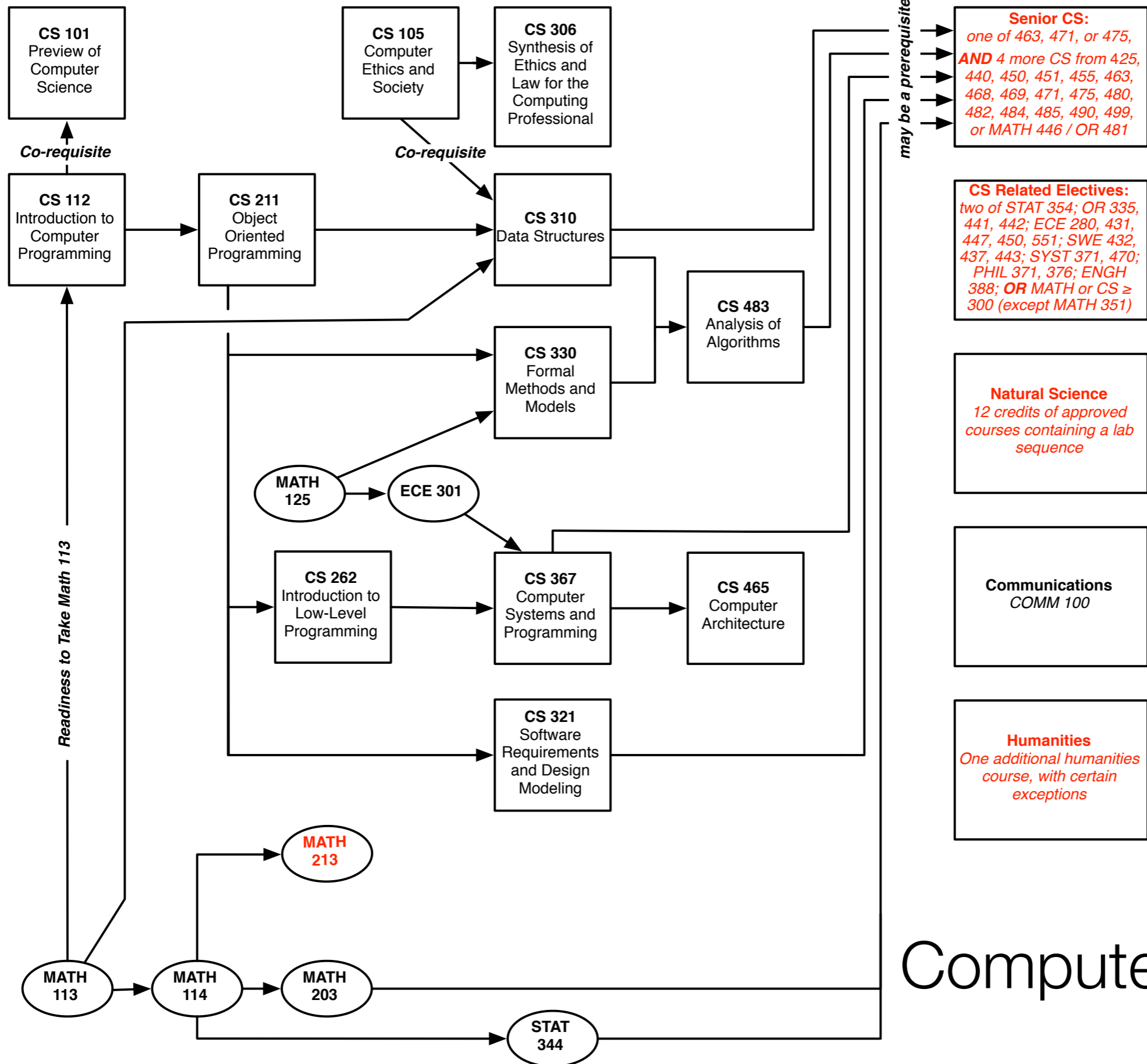
- CS 463 Comparative Programming Languages
- CS 471 Operating Systems
- CS 475 Concurrent and Distributed Systems

- ***Four chosen from these courses***

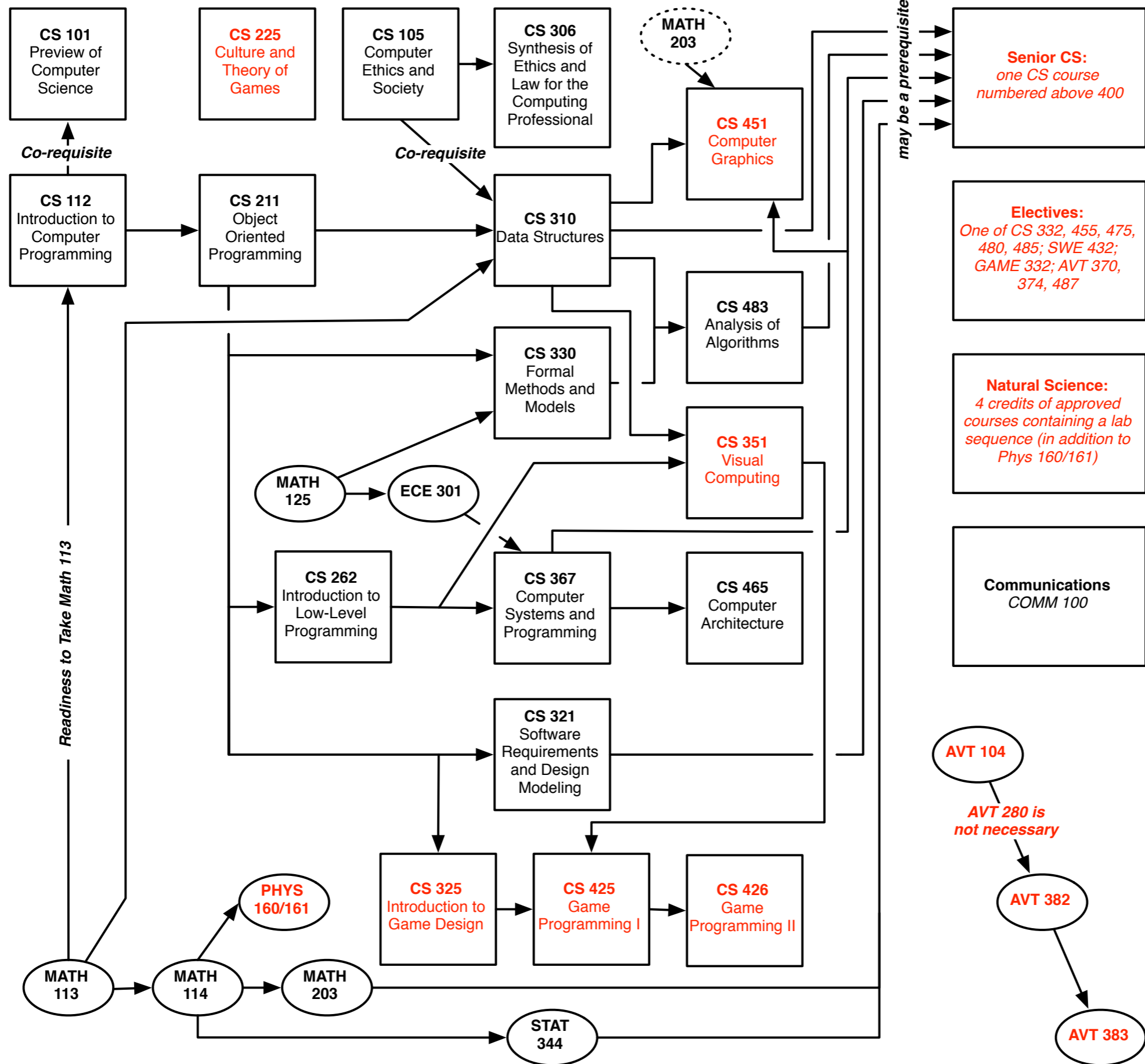
- CS 425 Game Programming I
- CS 440 Language Processors and Programming Environments
- CS 450 Database Concepts
- CS 451 Computer Graphics
- CS 455 Computer Communications and Networking
- CS 463 Comparative Programming Languages
- CS 468 Secure Programming and Systems
- CS 469 Security Engineering
- 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 490 Design Exhibition
- CS 499 Special Topics (at most 3 credits)
- OR 481 or MATH 226 Numerical Methods in Engineerin



Computer Science and Applied Computer Science Core

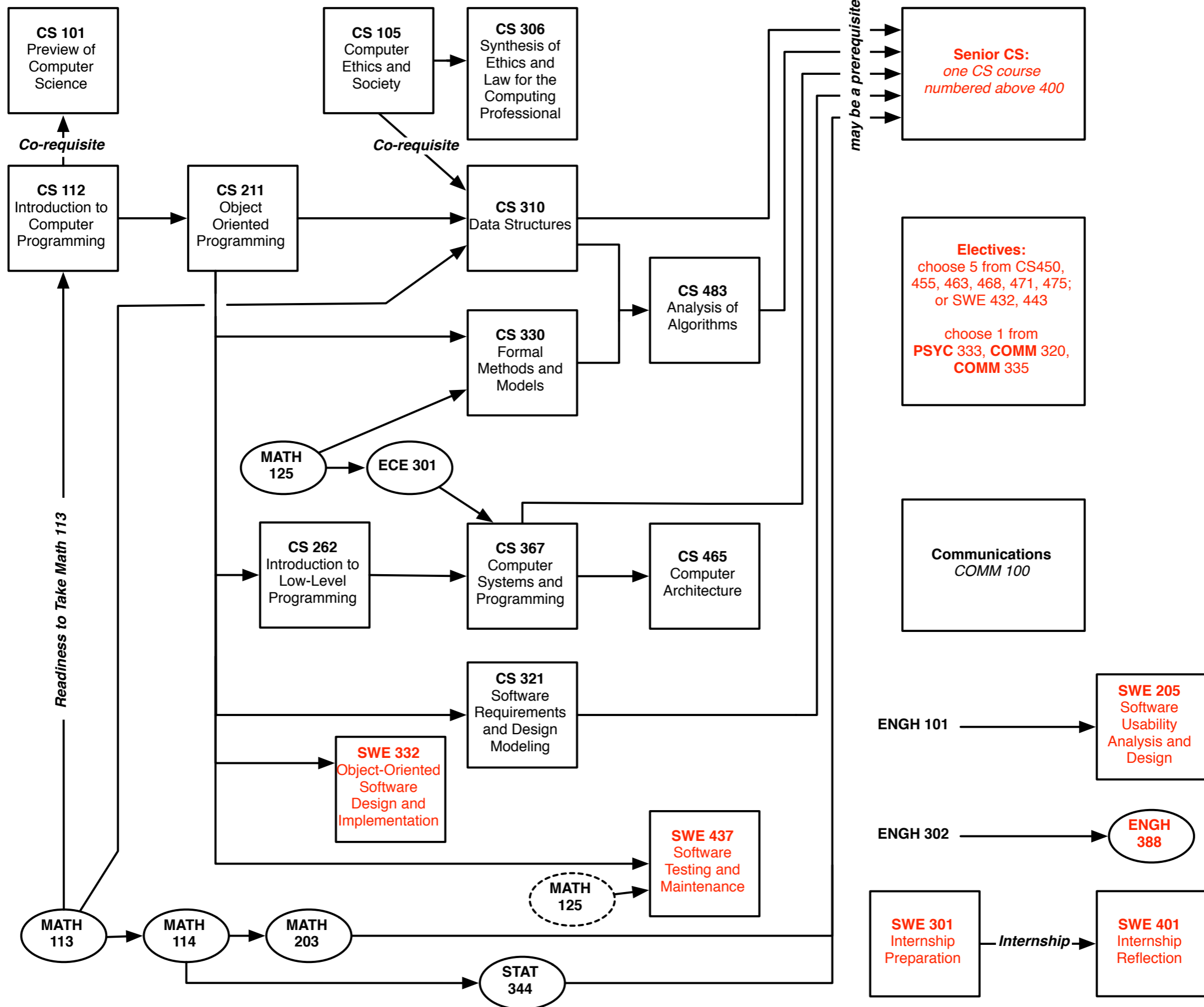


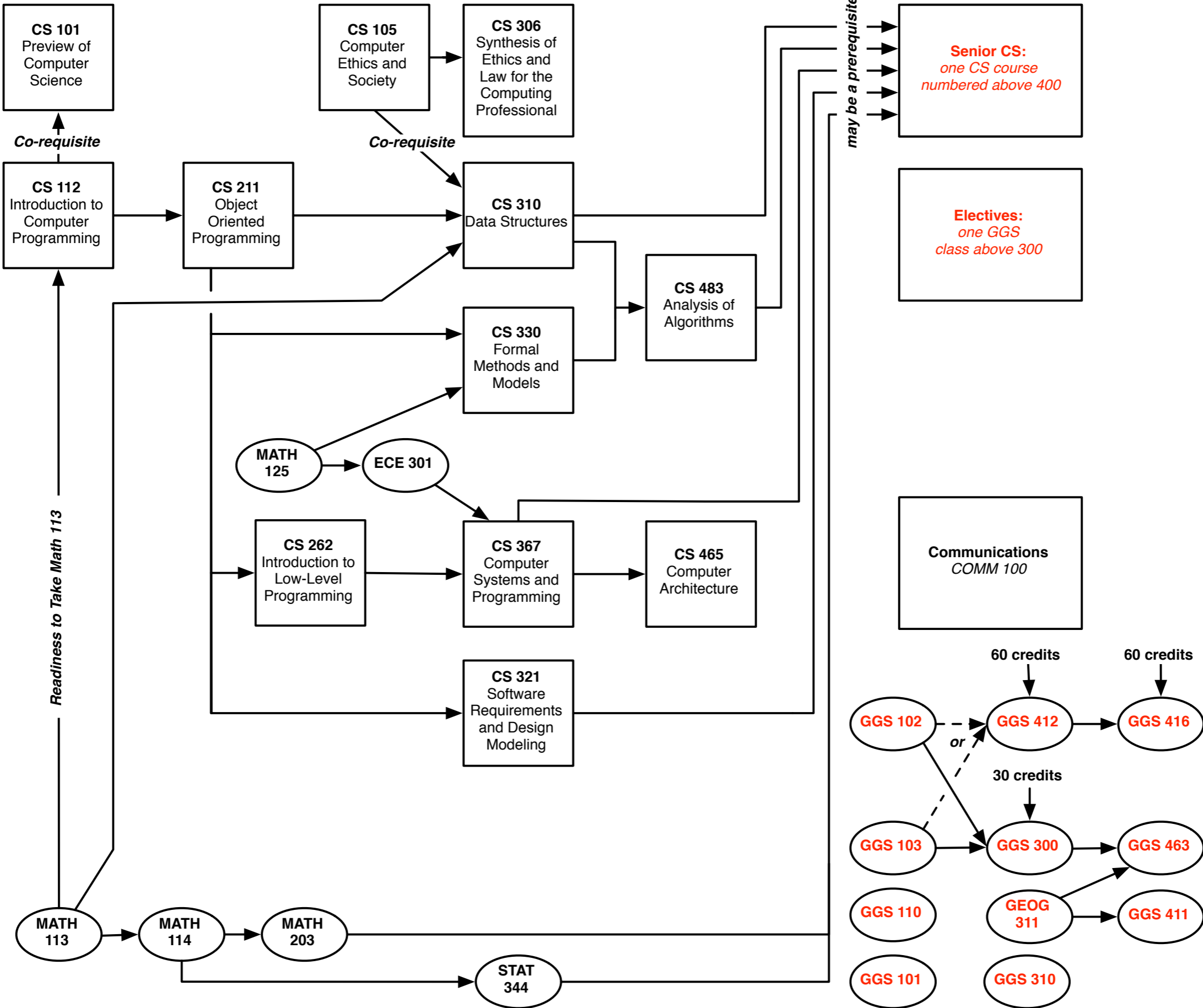
Computer Science



Applied Computer Science in Computer Game Design

Applied Computer Science in Software Engineering





Applied Computer Science in Bioinformatics

