What is Computer Science?

It’s **NOT** just using computers or the web
It’s **NOT** just writing programs
It’s **NOT** just today’s technology (Java, Python, Swift, ...)

CS encompasses full range of activities related to computers:

• theory & algorithm development,
• software engineering: software requirements, design, maintenance
• devising computing solutions for cutting edge problems
A Fast Changing Field

11 years ago there were no iPhones, no Androids
Today there are about 12 million people writing smart-phone apps

But there are basic principles that don't change, e.g.,

– Don't think about everything at once
– Certain questions can never be fully answered
– Sorting a large list of names can take a hour or centuries, depending on how you do it
– …
Our goal:
- Preparing students to be life-long learners,
- Starting from fundamental, enduring principles.
What do computer scientists do?

• Design & build software, hardware, networks, and robots
  – In every industry
  – In every size business
  – In every size team
Why become a Computer Scientist?

That is up to you
What is the CS Department like?

Big

– About 50 full time faculty members
– 1260 declared undergrad majors (4/30/2018)
– 445 u.g. majors graduated (A.Y. 2017/2018)
What is the CS Department like?

And growing

Enrollment in the class "Intro to CS"
Size is a problem

- Competing with lots of other students for seats in a course and for attention from the faculty
Size is an advantage for Computer Science.

- Recently active student groups/clubs:
  - USACS: CS students' club
  - WCS: Women in CS
  - Fizzbuzz: Interview Prep/Problem solving club
  - RUMAD: Mobile app development club
  - COGS: Creation Of Games Society
Size is

An advantage

• Resources and Activities
  – The CAVE
  – Hack-R-Space
  – HackRU
  – HackHers
  – Code Red
  . . .
Warning – CS is not for everyone

Computer Science takes a particular way of thinking
- For some people it is natural
- Many people can learn it, with hard work
- For some people it is very, very hard

Be prepared to bail out

(e.g. ~1200 freshman, graduated 450 majors → ~36%)
Our Curriculum
## Introductory CS course offerings:

<table>
<thead>
<tr>
<th>If you are interested in</th>
<th>Consider taking</th>
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</thead>
<tbody>
<tr>
<td>Using computers in everyday life</td>
<td>CS 110</td>
</tr>
<tr>
<td>Using computers in business</td>
<td>CS 170</td>
</tr>
<tr>
<td>Programming computers as a mathematician or a scientist</td>
<td>CS 107</td>
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<tr>
<td>Being a CS minor or major</td>
<td>CS 111</td>
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Two Undergraduate Degrees

Bachelor of Arts (B.A.)

  3 Required math courses
    Calc 1&2 (640:151 and 640:152)
    Linear Algebra

  6 Required CS courses

  5 Elective CS courses
Two Undergraduate Degrees

Bachelor of Science (B.S.)

3 Required math courses
   Calc 1&2 (640:151 and 640:152)
   Linear Algebra

6 Required CS courses

7 Elective CS courses

2 Science courses (+ Labs)

BS = BA + 2 science courses + 2 more CS electives

About 80% of CS majors do BS degree
Electives

More Electives

• Topics Courses (topics vary)
  – Cryptography
  – Data mining
  – Probabilistic Algorithms
• Independent Study
• Selected Courses offered by Mathematics or Electrical and Computer Engineering
• Access to graduate courses for good students (at professor’s discretion) -- a dozen students each term
Elective *Tracks*: Electives that go well together

- Computer Security
- Software Engineering and Information Management
- Computer and Software Systems
- Graphics and Vision
- Artificial Intelligence and Cognitive Science
- Computing Concepts and Themes (Theory of Computing)
CS 395: Internship in CS

CS majors have done internships at Johnson & Johnson, Merck, SEI, AT&T, Citicorp, Google, others
Admission to CS Undergrad Major

• To be admitted to the CS major you must
  – Get C or better in
    • CS 111 Intro to CS
    • CS 112 Data Structures
    • CS 205 Discrete Structures 1
    • Calc 1 and 2
  – With at most 1 retake per course
BS/MS Program

https://www.cs.rutgers.edu/undergraduate/the-honors-bs-ms-degree-program-in-computer-science

Benefits
- no GRE required for grad admission
- it is an honor
  (very few do it, requires CS GPA > 3.75)
(But if you take the GRE and are admitted, you can follow exactly the same plan on your own.)

Apply at the end of your Junior year
- but plan your courses earlier
First-year courses of special interest to CS majors

- **Byrne Seminar**: Computing a Metaphor (Kulikowski and McGrew)

- **FIGS**: Exploring Computer Science (Yang, Andrei, Gudipati, Patel)
Example First Semester Classes for a CS major

- CS 111: Intro to Computer Science
- Math 151: Calculus 1
- General Elective
- Byrne Seminar: Computing a Metaphor