Department of Computer Science

School of Arts and Sciences

www.cs.rutgers.edu

Presented by

Prof. Louis Steinberg

www.cs.rutgers.edu/~lou

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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

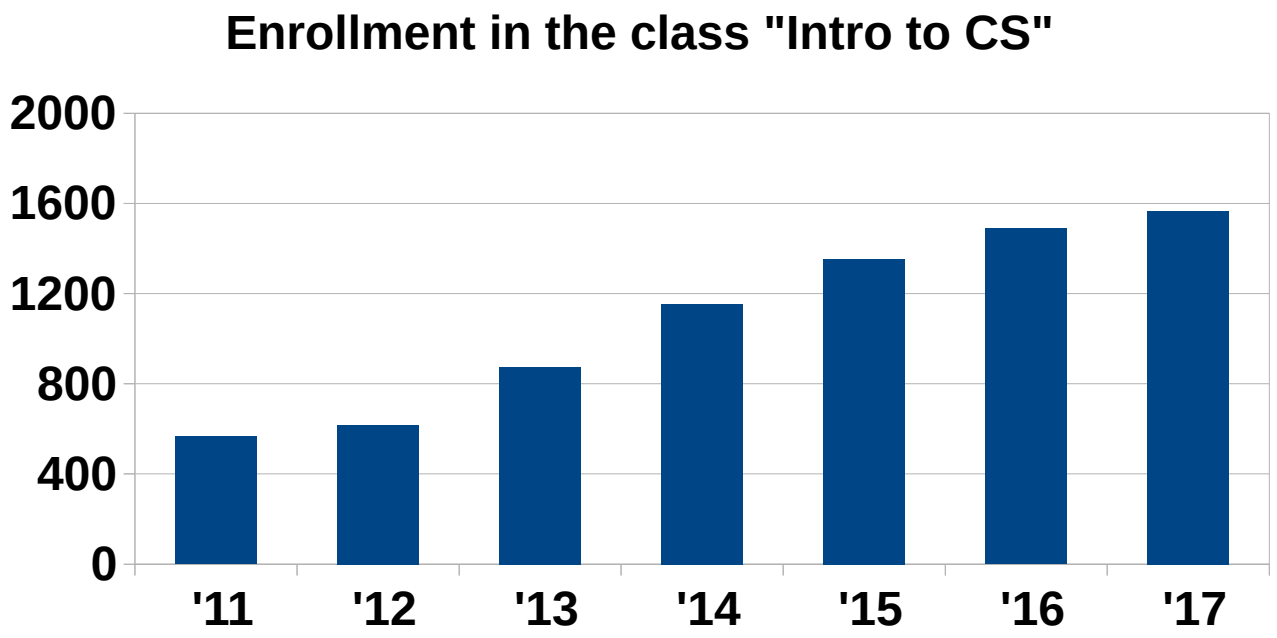
What is the CS Department like?

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



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

- 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:

If you are interested in	Consider taking
Using computers in everyday life	CS 110
Using computers in business	CS 170
Programming computers as a mathematician or a scientist	CS 107
Being a CS minor or major	CS 111

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

Software Methodology, Software Engineering,
Systems Programming,
Programming Languages, Compilers,
Numerical Analysis and Computing,
Intro to Imaging and Multimedia,
Information and Data Management,
Internet Technology,
Computer Architecture II,
Operating Systems Design,
Distributed Systems: Concepts and Design,
Computer Security,
Formal Languages and Automata

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