

Department of Computer Science
School of Arts and Sciences
www.cs.rutgers.edu

Presented by
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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, ...)

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

10 years ago there were no iPhones

Today there are about 200,000 people writing iPhone 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 most computer scientists do?

- Design build software, hardware, networks, and robots
 - In every industry
 - In every size business
 - In every size team

Why choose a career in CS?

MONEY Magazine and Salary.com researched hundreds of jobs, considering their *growth, pay, stress-levels and other factors*. These careers ranked highest.

1. Software Engineer
2. College professor
3. Financial adviser
4. Human Resources Manager
5. Physician assistant
6. Market research analyst
7. Computer IT analyst
8. Real Estate Appraiser
9. Pharmacist
10. Psychologist

Will there be jobs?

| Job | growth 2012 - 2022 | % growth 2012 - 2022 |
|-----------------------------|-----------------------|-------------------------|
| Computer Systems Analysts | 127,700 | 25% |
| Computer Network Architects | 20,000 | 15% |
| Software Developer | 222,600 | 22% |

* source: US Department of Labor

What is the CS Department like?

Big

- About 45 full time faculty members
- 713 declared undergrad majors (A.Y. 2015/2016)
- 241 u.g. majors graduated (A.Y. 2015/2016)

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

- Active student groups / clubs
 - USACS: CS students' club
 - WCS: Women in CS
 - Just Euler: 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

Our Curriculum

Computer Science

Two Undergraduate Degrees

- BA
 - Three required math courses (Calc 1&2, Linear Algebra)
 - Six required CS courses
 - Five Elective CS courses

Two Undergraduate Degrees

- **BS**
 - Three required math courses (Calc 1&2, Linear Algebra)
 - Six required CS courses
 - Two semester science course with labs
 - Seven elective CS courses

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; Graphics
- Information and Data Management; Implementation
- Internet Technology
- Computer Architecture II
- Operating Systems Design
- Distributed Systems: Concepts and Design
- Computer Security
- Formal Languages and Automata

More Electives

- Topics Courses (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)

CS 395: Internship in CS

Counts toward CS major requirements

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

www.cs.rutgers.edu/undergraduate/bsms.whtml

Benefits

- no GRE required for grad admission
shorter time (5 yrs) possible ??
- 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: The Internet of Things: Promises and Perils (Kulikowski and McGrew)
- FIGS - Exploring Computer Science (Jalal/Kotadia)

Example First Semester Classes for a CS major

- CS 111: Intro to Computer Science
- Math 151: Calculus 1
- General Elective
- Byrne Seminar: The Internet of Things: Promises and Perils

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 scientist | CS 107 |
| Being a CS minor or major | CS 111 |