Yeshiva College Computer Science

Judah Diament
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Goal: Careers at the Top of the Industry

- **We are <u>not</u> focused on students getting their first job** – that's relatively easy for any competent "programmer"…
- …but if someone is just a simple "programmer", he will generally switch careers or be unemployed by the time he is ~15 years into his career
- Our goal is to **prepare our students to compete for the best C.S. jobs and for lifelong success at the highest levels of the industry**
- This requires a **rigorous mastery of C.S. fundamentals**, along with **expertise in a C.S. specialty which is always in demand**

Faculty Statistics

- **139+ years of full-time corporate experience** across Amazon, Citi, Goldman Sachs, Google, IBM, Intel, and others
- **69 issued U.S. patents**
- **200+ publications**

Y.C. C.S. Results

Yeshiva College Computer Science Post Graduation Job Placements 2019-2021

Google

NOAM ANNENBERG '20
AVERY ENNIS '20
NATHANIEL ESRAEILIAN '20

amazon

JUDAH BRICK '20
MICAH HYMAN '20
ARYEH KLEIN '20
JONATHAN SCHECHTER '20
ISAAC SCHEINMAN '20
MOSHE WEINREB '20
JACOB MENDELSON '21

BLACKROCK

JACOB B. SAKS '19
TONY ARRIAZA-GONZALEZ '21

Goldman Sachs

AVI KATZ '19

IBM

YEHUDAH MELTZER '20

Disney INTERACTIVE

MORDECHAI SCHMUTTER '19

Bloomberg

JOSEPH SKLAR '20

YESHIVA COLLEGE COMPUTER SCIENCE

Class of 2019

Avi Katz
Goldman Sachs

David Mandelbaum
Citibank

Noah Potash
Katz Cybersecurity

Jacob B. Saks
Blackrock

Mordechai Schmutter
Disney Interactive

Class of 2020

Noam Annenberg
Google

Judah Brick
Amazon

Lior Brik
QuadPay

Saul Cohen
BNY Mellon

Avery Ennis
Google

Nathaniel Esraeilian
Google

Daniel Feldan
NYU, M.S. in C.S

Eliezer Goldberg
RIETS

Judah Goldfeder
Columbia University, M.S. in C.S

Jonathan Greenberg
TD Securities

Avi Hirsch
Prudential Financial

Micah Hyman
RIETS & Amazon

Yehuda Inslicht
Citibank

Aryeh Klein
Amazon

Yehudah Meltzer
IBM

Jacob Naiman
BNY Mellon

Moshe Rosensweig
RIETS

Jonathan Schechter
Amazon

Isaac Scheinman
Amazon

Aaron Schwartz-Messing
RIETS

Aaron Shakibpanah
HubSpot

Joseph Sklar
Bloomberg

Yair Wasserman
PTC–Onshape

Moshe Weinreb
Amazon

Class of 2021

Yaakov Diament
NYU, M.S. in C.S

Daniel Ginsgerg
Broadridge

Tony Arriaza-Gonzalez
Blackrock

Eitan Kaszovitz
RIETS

David Levy
Databricks

Jacob Mendelson
Amazon

Edan Pinchot
RIETS

Ari Roffe
Morningstar

Daniel Schaffel
Learn Ventures

Ezra Splaver
Columbia University, M.S. in C.S, and RIETS

Myles Tyberg
Chewy

Class of 2022 Job Offers

- Amazon **x2**
- **Amazon + RIETS**
- BNY Mellon
- Charles Schwab
- Goldman Sachs **x2**
- Google
- **Google + RIETS**
- Landis
- Nomura
- PennyMac
- SoftworksAI
- Vista Equity Partners
- ZoomRPM

The 15 students in the class of 2022 received offers to be software engineers, primarily in **two financial clusters, one cluster around $100k-$110k and one cluster around $140k**, with a few outliers (1 well above, 2 or 3 below.)

Y.C. C.S. Class of 2023

Company	Number of Students Placed
Amazon	8
Amazon + RIETS	2 (+1)
Bloomberg	1
BNY Mellon	1
BNY Mellon + RIETS	1 (+2)
CVS Health/Aetna	1
Goldman Sachs	1
Google	1
JPMC	2
Morgan Stanley	1
Nomura	1
P&G	1
PTC	2
RIETS	2
Scholastic	1

(+x) indicates the number of students who pushed off graduation until next year in order to return to the given employer as an intern so they can be RIETS students next year

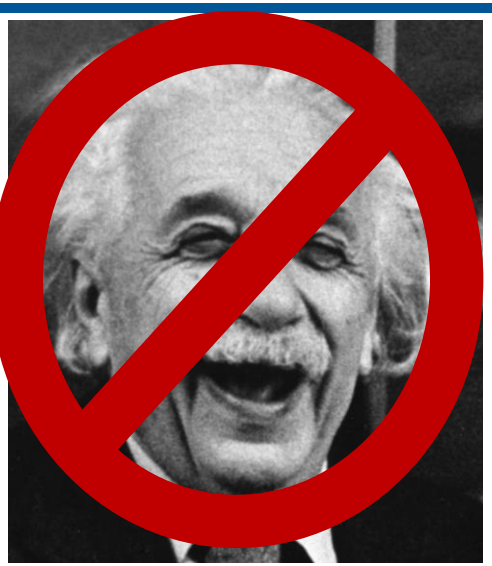
Placement Numbers
On Graduation Day

Year	Number of Graduates	Number of Graduates with Job or Graduate School Acceptance By Graduation Day
2019	7	6
2020	25	23
2021	13	11
2022	15	14
2023	27	26

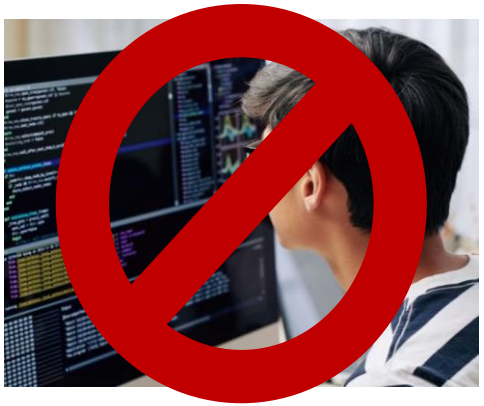
About C.S.

Common Questions / Mistakes

- **Q:** Is C.S. only for math geniuses?
- **A: NO! Most Software Engineers use little or no advanced math**



- **Q:** Do I have to have coding experience to major in C.S.?
- **A: NO! We assume you know NOTHING coming in**

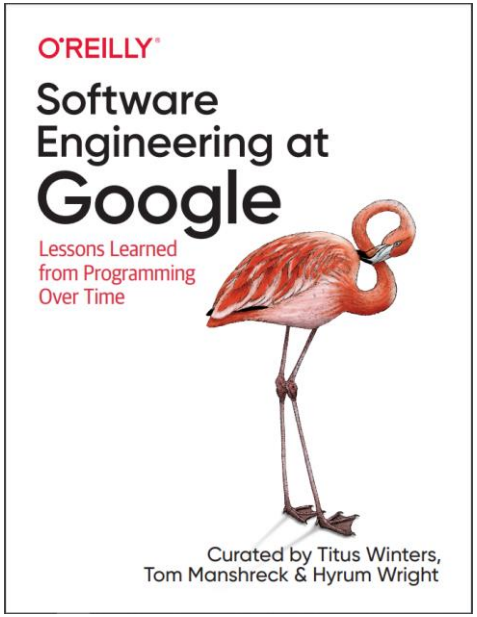


Common Questions / Mistakes

Q: Does being a software engineer involve sitting alone at my computer all day?

A: NO! 99.9% of significant software is not built by individuals. Software development is a team activity.

Just as an example, the SE@Google book spends chapters 2-7 talking all about teams!



The Real Factors for Success

1. **Problem Analysis & Decomposition:** the ability to break a large problem down into a set of smaller problems that you can solve piece by piece.

2. **Creativity:** you must be creative to come up with the various parts of a program.

3. **Logical, systematic thinking and attention to detail:** code is a series of steps to achieve some goal. You must think logically and systematically to author the right set of steps.

4. **Problem-solving:** it is very rare for code to be written without any bugs. Eve without bugs per se, programs may not yield the results intended (e.g. scaling challenges, etc.) Discovering what is wrong and fixing it, a.k.a. debugging, is one example of problem solving needed to be a good software engineer.

5. **Work Ethic:** anything of real value in this world is only achieved through hard work. Good Software Engineers are highly paid and in high demand because becoming one requires hard work.

Programmer vs. C.S.
A Trivial Banking Example

- **The Challenge:** 10,000,000 items need to be compared to each other (some balance each other out in terms of risk, etc.) in order to produce a bank's daily balance sheet.
- **Novice programmer's solution:** compares each item to each other item. Runs for **1.16 days** on a modern computer (and results in a very angry boss!)
- **A Computer Scientist's Solution:** uses, for example, functions and hash tables. Runs in **0.01 seconds** on a modern computer.
- **Applies across industries:** internet-scale services in Big Tech, fleet management in logistics, marketing ad exchanges / auctions, etc.

Tracks in the Major: 2 B.Sc., 1 B.A.

- **B.Sc. tracks:**
  - designed to prepare students to **directly enter the job market.**
  - have **more C.S. requirements, fewer non-C.S. requirements**.
- **Distributed Systems** (B.Sc., 4 years)
  - Focus: general software engineering and building large-scale systems that run large top companies today (creating the cloud)
- **Artificial Intelligence** (B.Sc., 4 years)
  - Focus: Artificial Intelligence, Machine Learning, Natural Language Processing, etc.
- **B.A.** (3 years)
  - Focus: general software engineering
  - **Grad school strongly recommended**

Does Industry Care?

The two B.S. in Computer Science programs at Yeshiva provide what most colleges can't, *which is experience with subject matter that prospective employers are increasingly working in. Students who choose the 3-year BA track are at a disadvantage [compared to those in any 4 year program] when it comes to internship eligibility, since those students would have to interview during the fall of their 2nd year before completing coursework (such as algorithms) that are more or less mandatory for success in software engineering internship interviews. Internship experience is also a fantastic qualification to have on a resume as well. Having that 4th year of study with computer science can provide students the time to deepen their expertise and give them a greater chance at success both in the short-term and in the long -term.*

-Brendan Collins, Lead, University Programs, Google

B.S. in C.S - Distributed Systems Track

(20 Courses, 68 Credits, 4 Years)

Semester-By-Semester Schedule

Year on Campus	Fall Semester	Spring Semester
1st	Intro to C.S. (COM 1300)	Data Structures (COM 1320)
	Calculus I (MAT 1412)	*Linear Algebra (MAT 2105)*
	YC Core #1 - 1st YEAR WRITING	Mathematics for Computer Science (COM 1310)
		YC Core #2
2nd	Intro to Algorithms (COM 2545)	Design & Analysis of Algorithms (COM 2546)
	Computer Organization (COM 2113)	Operating Systems (COM 3610)
	YC Core #3	YC Core #4
3rd	Introduction to Distributed Systems (COM 3800)	Advanced Distributed Systems (COM 3810)
	Parallel Programming (COM 3820)	CyberSecurity (COM 4580)
	Networking (COM 2512)	Modern Data Management (COM 3580)
	YC Core #5	YC Core #6
4th	Programming Languages (COM 3640)	Compilers & Tools (COM 3645)
	Database Implementation (COM 3563)	Capstone Project (COM 4020)
	Artificial Intelligence (COM 3760)	YC Core #8 - ELECTIVE
	YC Core #7 - ELECTIVE	

B.S. in C.S - Artificial Intelligence Track

(22 Courses, 76 Credits, 4 Years)

Semester-By-Semester Schedule

Year on Campus	Fall Semester	Spring Semester
1st	Intro to C.S. (COM 1300)	Data Structures (COM 1320)
	Calculus I (MAT 1412)	***Calculus II (MAT 1413)***
	YC Core #1 - 1st YEAR WRITING	Mathematics for Computer Science (COM 1310)
		YC Core #2
2nd	Introduction to Algorithms (COM 2545)	Design & Analysis of Algorithms (COM 2546)
	Linear Algebra (MAT 2105)	***Multivariable Calculus (MAT 1510)***
	Computer Organization (COM 2113)	***Probability Theory (MAT 2461)***
	YC Core #3	**YC Core #4**
3rd	Artificial Intelligence (COM 3760)	Machine Learning (COM 3920)
	Mathematical Statistics (MAT 2462)	Modern Data Mgmt (COM 3580)
	Programming Languages (COM 3640)	Operating Systems (COM 3610)
	YC Core #5	**YC Core #6**
4th	Introduction to Distributed Systems (COM 3800)	Natural Language Processing (COM 3930)
	Machine Learning Applied (COM 4010)	Capstone Project (4020)
	Parallel Algorithms & Programming (COM 3820)	**YC Core #8 - ELECTIVE**
	YC Core #7 - ELECTIVE	

B.A. in Computer Science Track

(13 Courses, 46 Credits, 3 Years)

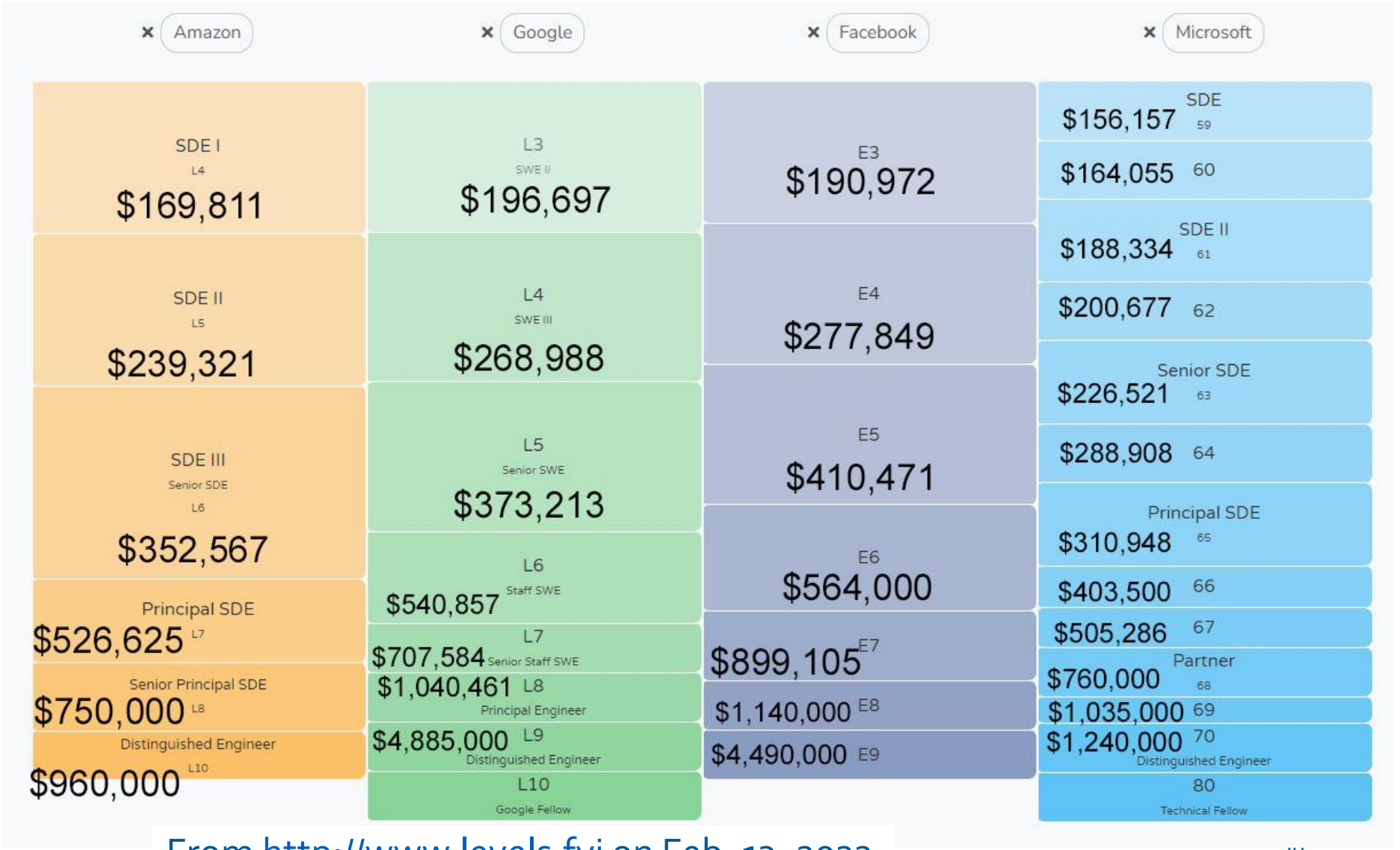
Semester-By-Semester Schedule

Year on Campus	Fall Semester	Spring Semester
1st	Intro to C.S. (COM 1300)	Data Structures (COM 1320)
	Calculus I (MAT 1412)	***Linear Algebra (MAT 2105)***
	YC Core #1 - 1st YEAR WRITING	Mathematics for Computer Science (COM 1310)
	YC Core #2	**YC Core #3**
		YC Core #4
2nd	Introduction to Algorithms (COM 2545)	Design & Analysis of Algorithms (COM 2546)
	Computer Organization (COM 2113)	Operating Systems (COM 3610)
	YC Core #5	**YC Core #7**
	YC Core #6	**YC Core #8**
3rd	((Intro to Distributed COM 3800 & Advanced Distributed COM 3810) **OR** (Parallel (COM 3820) & Modern Data Mgmt (COM 3580))	
	Programming Languages (COM 3640)	**YC Core #11**
	Artificial Intelligence (COM 3760)	**YC Core #12**
	YC Core #9	
	YC Core #10	

Recommended: Networking (COM 2512), Cybersecurity (COM 4580)

STEM Job Market

Tech Total Compensation (Base + Stock + Bonus)



From http://www.levels.fyi on Feb. 13, 2022

May 2017 Wall Street Journal Series, Even More True Today:

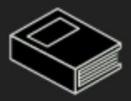
Quants are the New Kings of Wall Street

THE QUANTS

5.21.17
Meet the New Kings of Wall Street

5.21.17
The Quants Run Wall Street Now

5.21.17
The Rise of Quants in 5 Charts



5.21.17
The Layman's Quant Glossary

5.21.17
Video: What's an Algorithm?

5.22.17
Only Robots Can Tally the Fees

5.22.17
Build Your Own Trading Bot

5.22.17
Inside A Trading Algorithm

5.23.17
Insurance: Where Humans Rule

5.23.17
Tech Disrupts Financial Advisory

5.24.17
Old School Fund Goes Quant

5.24.17
Hedge Funds vs. Silicon Valley

5.24.17
A History of Trading

5.25.17
An Algo Made You Buy the ETF

5.25.17
Wall Street's Endangered Species

5.26.17
How to Be Your Own Quant

5.26.17
The Debate: Scientific Method Is Better

5.26.17
The Debate: Why Brains Are More Reliable

Faculty

Judah Diament

Professor, Department Chair

- **IBM T.J. Watson Research Center: 2000-2014**
  - **Patents:** 14 U.S. patents issued
  - **Publications:** 5 conference papers, 1 journal article
  - Impacted multiple IBM software products, including shipping code
- **Goldman Sachs: 2014-2016**
  - Vice President, Finance Engineering
- **Alumnus of Y.U., N.Y.U. (M.S. in C.S.), R.I.E.T.S.**
- Judah's LinkedIn page
- diament@yu.edu

Dave Feltenberger

Adjunct Professor

- **Prof. Feltenberger currently teaches: Machine Learning, Machine Learning Applied, and AI Capstone Project**
- Prof. Feltenberger's professional background:
- **Google, 2012-Present: Principal Engineer**, Technical lead for Semantic Location. Previously - Senior Staff Software Engineer, Quality & ML in Google Maps; founder of Corp Eng ML team
- **Goldman Sachs: 2010-2012** Senior Software Engineer, post-execution trading platform

Avraham Leff

Professor

- **PhD, Computer Science, Columbia University: 1992**
- **IBM T.J. Watson Research Center: 1991-2017**
  - **Patents**: 21 U.S. patents issued
  - **Publications**: 45 conference papers & journal article
  - Impacted multiple IBM software products, including shipping code
- Avraham's LinkedIn Page

Ramesh Natarajan

Adjunct Research Professor

- **PhD, University of Texas at Austin**
- **Google, 2020-2023:** Google Cloud, Software Engineer and Tech Lead
- **Amazon, 2014-2020 :** Research Scientist
- **IBM, 1988-2014:** Research Staff Member
- **Patents:** 25 granted (at IBM, Amazon and Google). IBM High-Value Patent Award.
- **Ramesh's LinkedIn Page**

Avi Rosenfeld

Adjunct Professor

- **PhD, Computer Science / Artificial Intelligence, Bar Ilan: 2007**
- **Associate Professor, Machon Lev, Jerusalem**
  - Head of Data Science Program
  - Publications: 80+
  - Patents: 3
- **One of four member of Israel's Education Counsel responsible for judging all academic degrees in Data Science**
- **Alumnus of MTA, YC, RIETS,Azrieli**
- **Avi's LinkedIn Page**

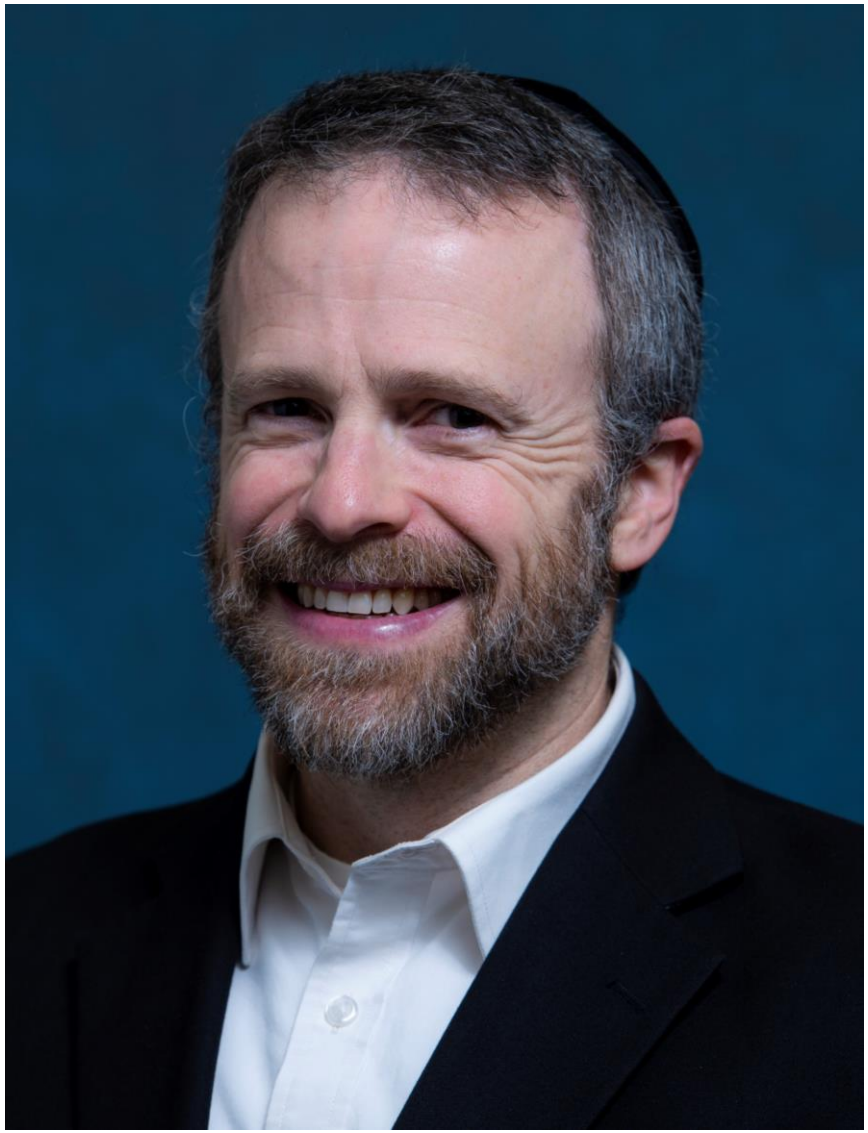
Akiva Sacknovitz

Clinical Professor

- **Citigroup: 2010-2022**
  SVP, Global Spread Products, Securitized Markets IT
  Led the design and implementation of a fault-tolerant messaging and service API framework and a distributed queueing system to support front-office desk pricing and end-of-day risk calculations.
- **Credit Suisse: 2004-2010**
  Credit Derivatives, pricing and risk applications
- **Shopping.com (eBay): 2003-2004**
  Research engineer, deal discovery and classification
- **Network Analysis Center: 1996-2003**
  Wide-area network analysis software development
- **Alumnus of Y.U., N.Y.U. (M.S. in C.S.), R.I.E.T.S.**
- **Akiva's** LinkedIn page

Ben Wymore

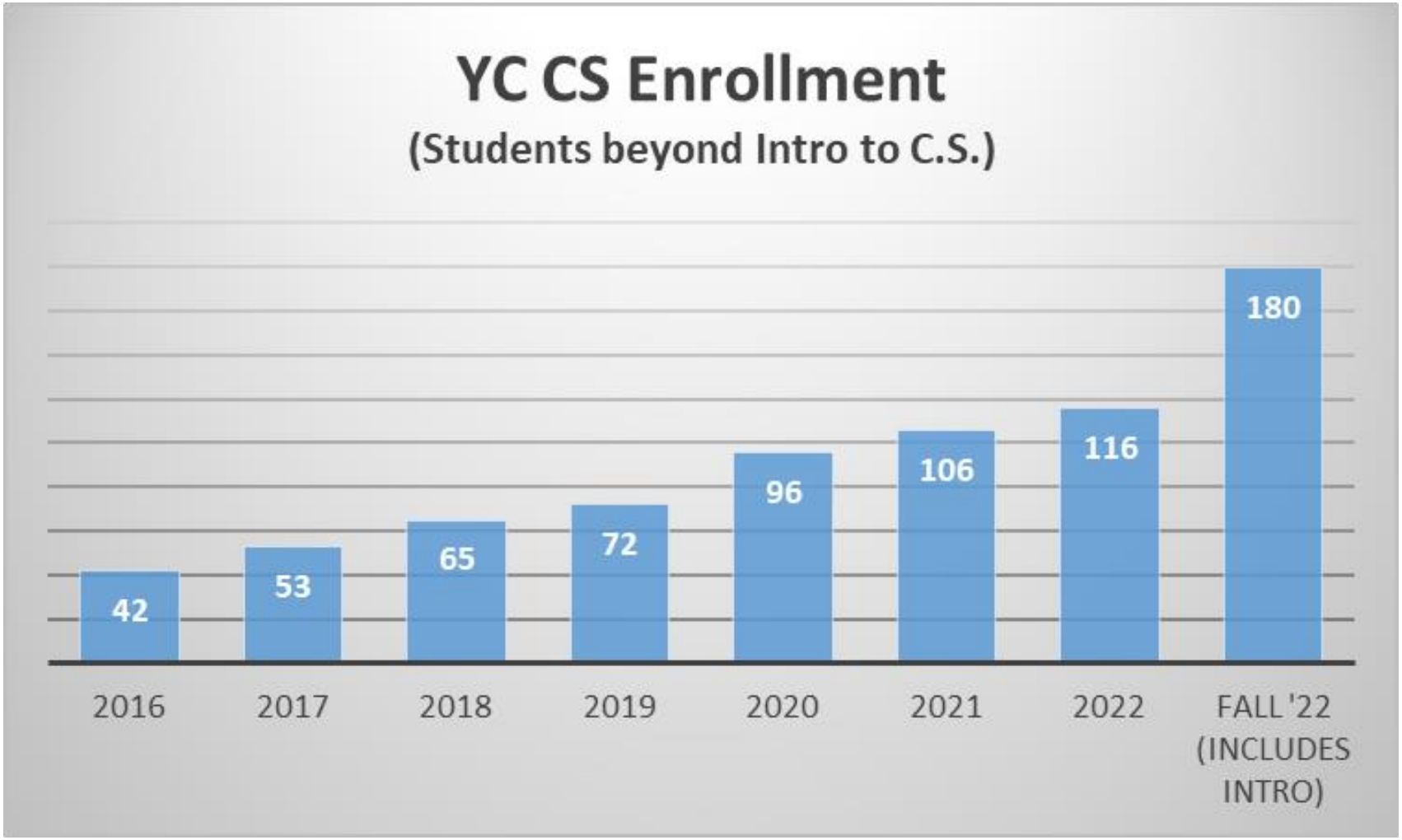
Clinical Professor



- **M.S. in C.S., University of Minnesota: 1997**
- **Intel Research: Software Engineer**
- **Crestron Electronics: Senior Software Engineer & Team lead**
- **Patents**: 9 U.S. patents issued

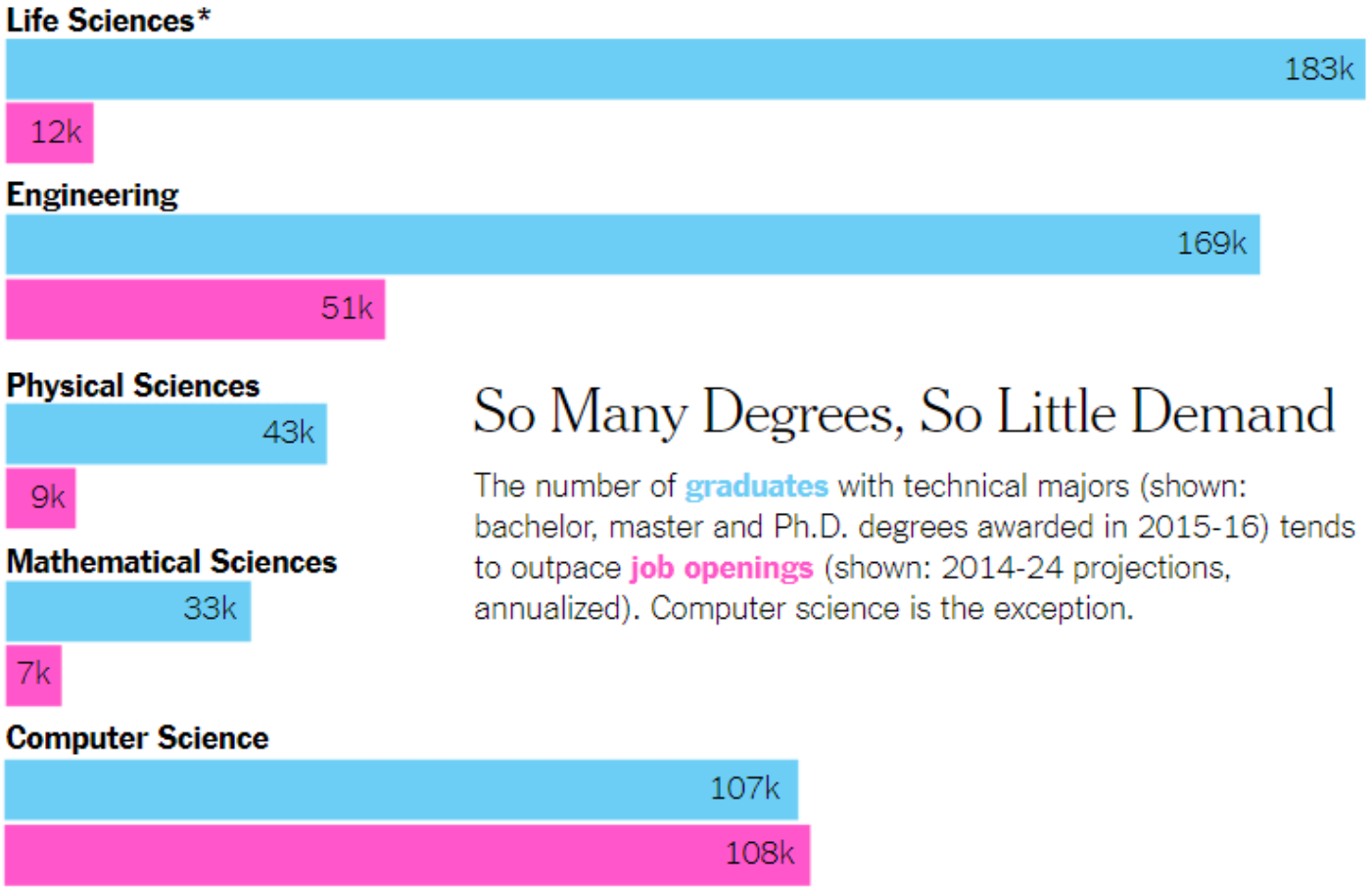
Additional Information

Results: Enrollment Numbers



Where the STEM Jobs Are (and Where They Aren't)

NY Times, Nov. 1, 2017, based on data from Bureau of Labor Statistics & National Center for Education Statistics



*Does not include health care occupations.

Bureau of Labor Statistics, National Center for Education Statistics

Example Base Salaries: Accepted '19- '20 Salaries

Salary Range	Number of Students
$80,000 - $89,000	1
$90,000 - $99,000	1
$100,000 - $109,000	4
$110,000 - $119,000	6
$120,000 - $129,000	3
$140,000 - $149,000	1

- This does not include signing bonuses or stock options
  - Signing bonuses: $0 - $48,000. Stock options: $0 - $80,000
- Many/most surveys radically understate salaries because they lump help desk, network support, etc. together with software engineers
- Long Term Upper bound: "Island money"