

HOW UNIVERSITIES ARE CREATING NEW PATHWAYS TO DIVERSIFY TECH

Valerie Barr, Carla Brodley, Colleen Lewis
Moderator: Andrea Danyluk



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WELCOME

Motivation

The tech industry is booming and pervasive

- Significant impact on individuals and society

It should represent those it affects

- Many groups remain underrepresented
- An issue of social and economic equity

These three panelists are changing the way CS is taught and providing new pathways to CS



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INTRODUCTIONS AND MODELS FOR CHANGE

Valerie Barr in One Slide

Intro #1: The Technical Me

- MHC BA in Applied Math, NYU MS in CS, Rutgers PhD
- Hofstra University, 1995 - 2004
- Union College, 2004 - 2017
- Mount Holyoke College, 2017-now
- Research: CS Education, software testing, interdisciplinary applications
- Dept. chair (2X), Chair and Past Chair of ACM-W

Intro #2: Non-Technical Me

- Partnered (34 years, why marry now?)
- One daughter, 26 (library science!)
- Other fun: it's all about the bike
- And travel, cooking & baking, reading mysteries.....



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Interdisciplinary combination of CS & other fields

Themed Introductory CS

- 14% women in intro → 38% women
- Students came from 7 majors → students came from 30 majors!
- 58% indicated interest in taking more CS
- 59% wanted to see computing courses in their own major
- Fed into intermediate courses in CS that are not on major track, e.g.
 - Modeling & simulation
 - Data visualization

Incorporating computing into non-CS courses

- Added computing in discipline specific ways (chiefly through OTS software)
- “Infused” courses in 15 disciplines
- 74% said that the computational component helped them understand the disciplinary material!



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What's next? Core computing concepts across the curriculum!

Students outside of CS are more diverse!

- Develop set of core computing concepts.
- Work with faculty outside of CS to incorporate core computing concepts into their courses.
- Run modified courses, evaluate student understanding of computing concepts.
- Stealth approach to achieving computing across the curriculum without requiring it!
- Reach a much broader and more diverse student population!



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Carla Brodley

Professional and Personal Milestones

- BA in Mathematics, McGill University 1985
- Various dead-end programming jobs 1985-1988
- Started graduate school, UMASS 1998
- [Marriage](#) 1990
- Ph.D. awarded 1994
- [Benjamin born](#) 1994
- Started as assistant professor, Purdue 1994
- [Matthew born](#) 1998
- Tenure awarded 2000
- [Divorce](#) 2000
- Moved to Tufts as a full professor 2004
- Chair 2010
- [Marriage to George \(and son Chris\)](#) 2014
- Moved to Northeastern to be Dean 2014
- Exec Dir., Center for Inclusive Computing 2019



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What makes me happiest



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REPROGRAM YOUR CAREER. REWRITE YOUR FUTURE.



[READ THE STORY](#)

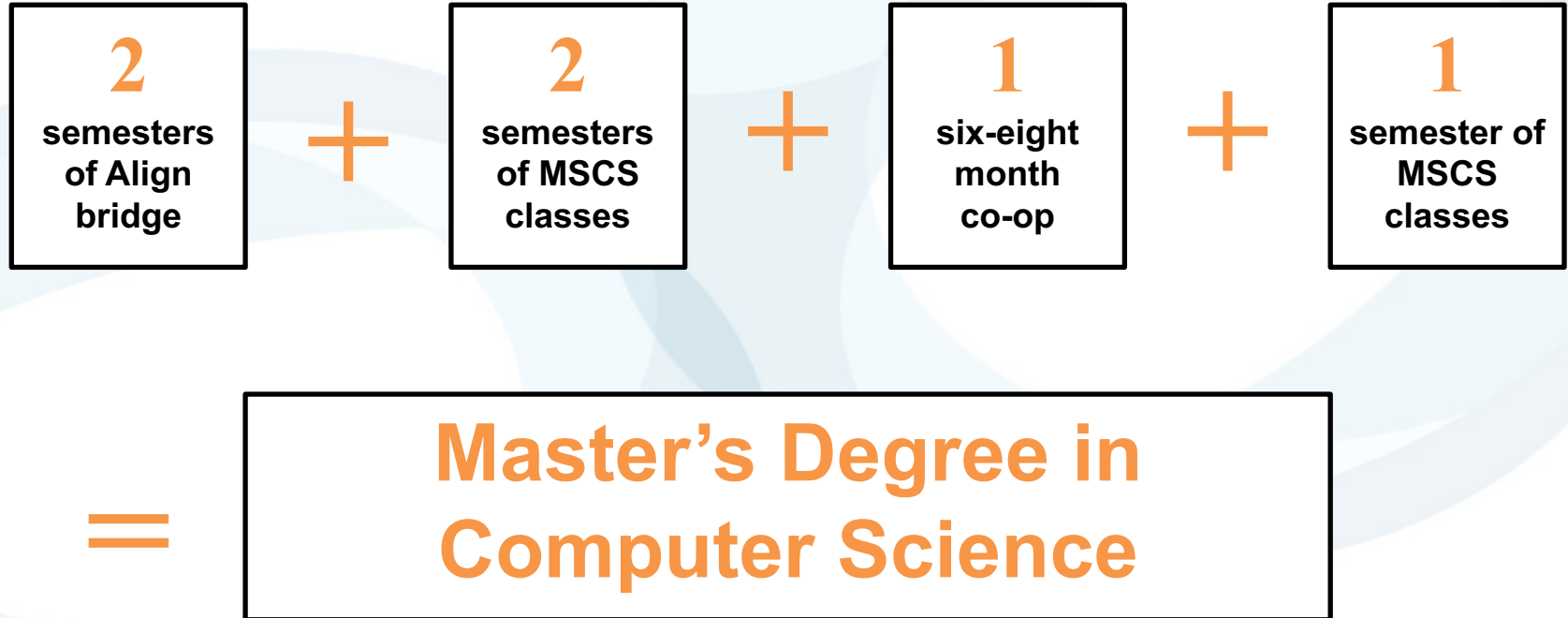
JOHANNA
**BA POLITICAL
SCIENCE AND
INTERNATIONAL
AFFAIRS**
ALIGN MSCS '19

[READ THE STORY](#)

WILLA
**BS SOCIAL
SCIENCES**
ALIGN MSCS '18

[READ THE STORY](#)

Northeastern's Align MS in CS for non-majors



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Located in Tech Hubs across North America



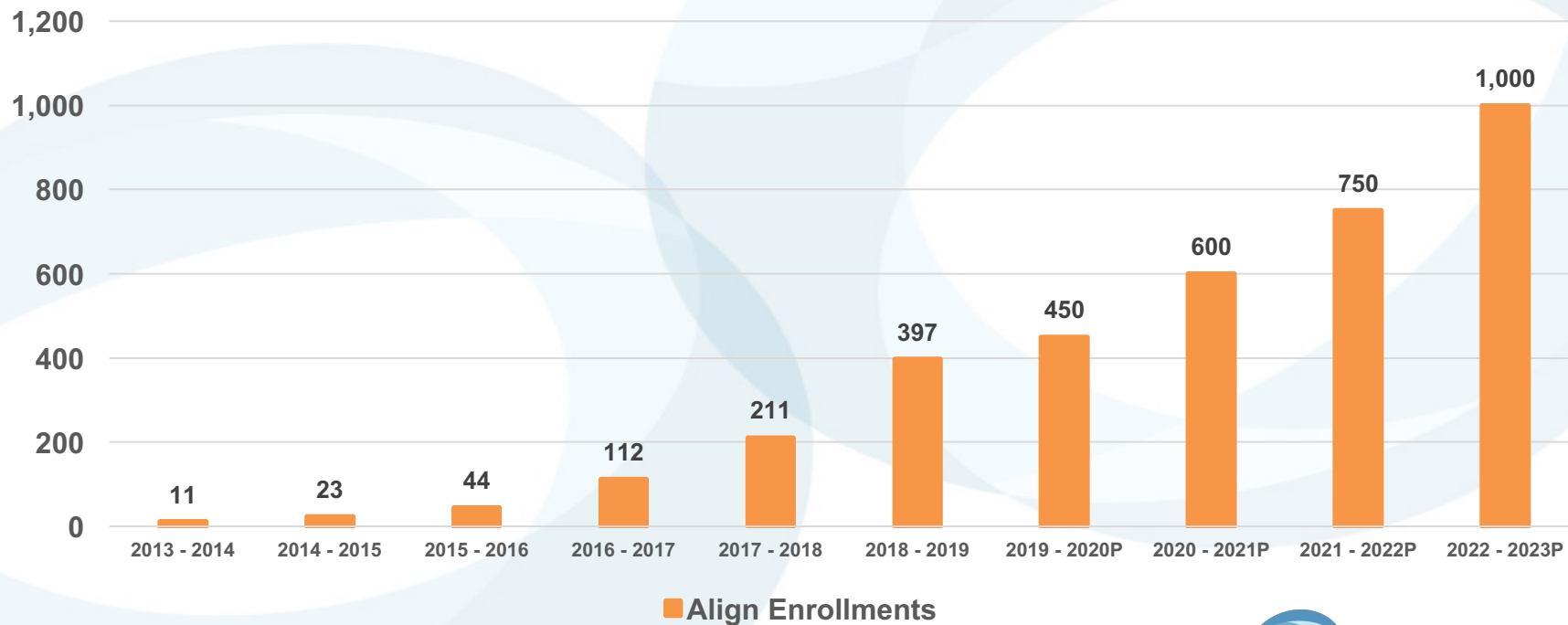
**Offered at these four locations
with more to come**



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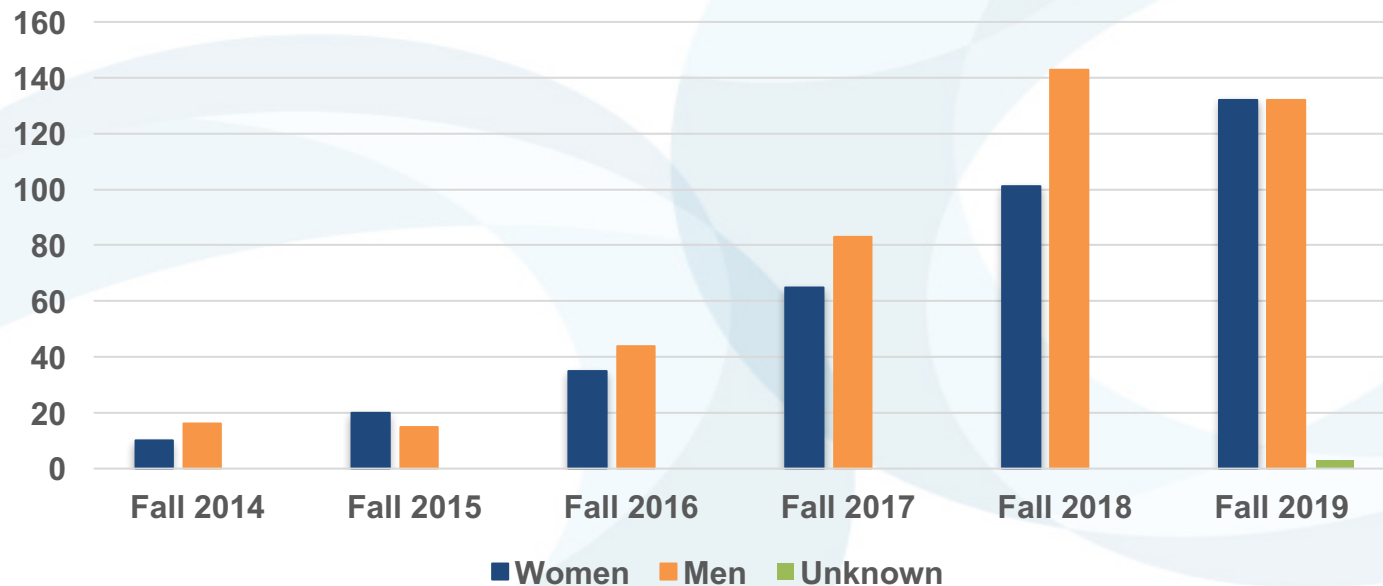
Strong demand for breaking into tech



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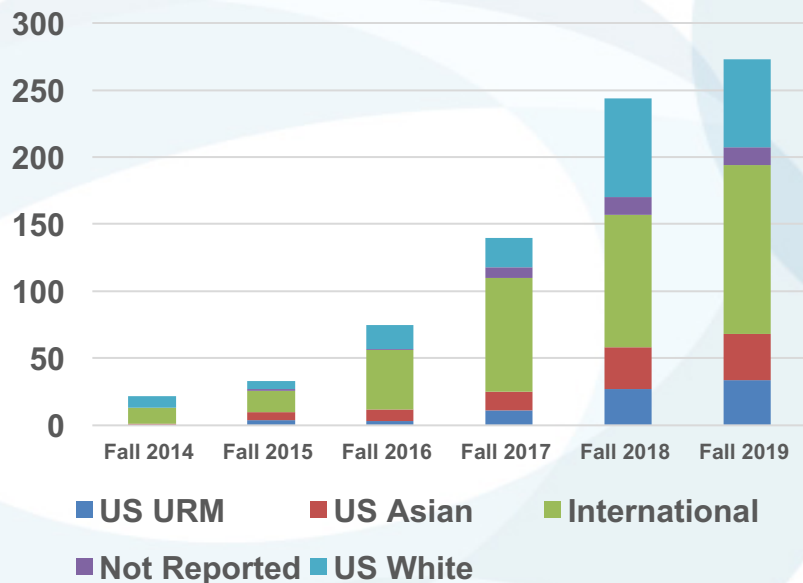
46% of all Align students are women



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Align demographics



- With the Fall 2019 cohort of 273 students, we will have 778 current Align students
- Our incoming class reflects similar demographics to the US population

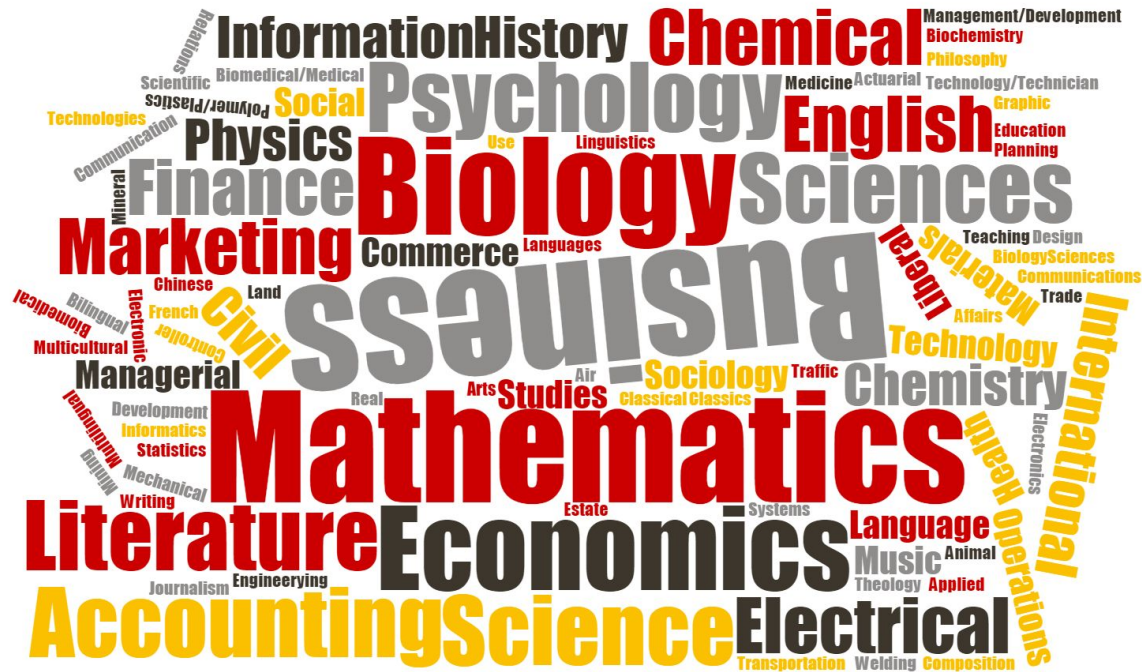
	National % BS/BA Degrees	National % CS Degrees	Khoury % Fall 2019 Align Class
Women	56%	19.5%	50%
URMs	25%	10%	26%



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Students come from 80+ disciplines



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Khoury industry partners

150+ co-op/internship placements and **137** alumni in tech roles at leading firms



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Align Consortium: A national movement



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The Center for Inclusive Computing

Northeastern
Khoury College of
Computer Sciences

HOME INITIATIVES GRANTS ABOUT

CENTER FOR INCLUSIVE COMPUTING

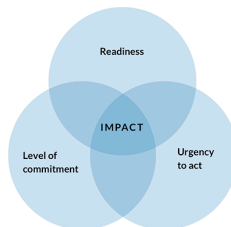
We envision a world in which women are fully represented—and thriving—as technological contributors, leaders, and innovators.

Closing the Demographic Gaps

The center's mission is to substantially increase the representation of all people majoring in computing across the United States. We do this by partnering with nonprofit colleges and universities with large computing programs (200 graduates or more per year) to implement [evidence-based practices](#) that support the recruitment, enrollment, and graduation of historically underrepresented groups majoring in computing.

To succeed, we seek partners that demonstrate a combination of three factors:

- **Readiness.** The unique characteristics of the institution will enable the ambitious increase of women and underrepresented groups in computing.
- **Level of commitment.** Key institutional leaders are supportive and will



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Colleen M. Lewis @CSTeachingTips Lewis@hmc.edu

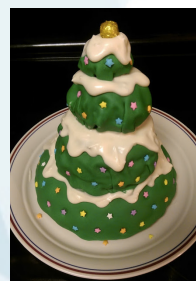
Berkeley EECS
ELECTRICAL ENGINEERING & COMPUTER SCIENCES



Berkeley
UNIVERSITY OF CALIFORNIA

Graduate
School of
Education

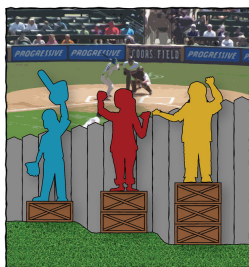
HARVEY
MUDD
COLLEGE



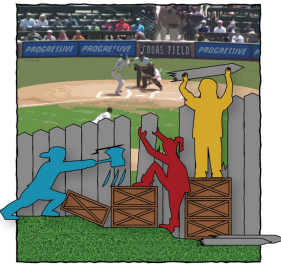
culturalorganizing.org/the-problem-with-that-equity-vs-equality-graphic/



EQUALITY



EQUITY



JUSTICE



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Tips for Department Inclusivity



CS Teaching Tips.org/Tips-for-Department-Inclusivity

☒ **1 Survey students regularly**
to identify institution-specific growth opportunities.

We want to improve our department based upon your feedback!

☒ **2 Optimize the intro course**
to be welcoming regardless of CS exposure.

You don't need prior CS experience to succeed!

☒ **3 Monitor performance patterns**
to identify structures or culture with differential impact.

We should investigate why some groups have higher rates of attrition!

☒ **4 Support new pedagogies**
to improve students' learning and experience.

Teachers are encouraged to adopt effective teaching practices!

☒ **5 Train faculty to respond to bias**
to address toxic culture in and out of the classroom.

We are all responsible for creating a positive dept. culture!

☒ **6 Foster student community**
to create effective peer mentoring programs.

Funding for snacks can be helpful for building community!

☒ **7 Show students the breadth of CS**
to engage beginning students with varied interests.

CS is a broad field with connections to many other disciplines!

csteachingtips

HARVEY
MUDD
COLLEGE

QUESTIONS AND DISCUSSION

What is CRA-WP?

Individual & Group Research Mentoring

Undergrads: Undergraduate Research Experiences (CREU & DREU), Research-Focused Scholarship opportunities at GHC (GHC Research Scholars)

Grad Cohort: Group Mentoring of Graduate Students (Grad Cohort for URMD & Grad Cohort for Women)

Grad Students & Academics/PhD Researchers: Mentoring Tracks @ GHC, Returning Scholars @ GHC, Group Mentoring for Early & Mid Career @ CMW



*Stay in touch: cra.org/cra-wp, Twitter: @CRA_WP,
Facebook: CRA-WP, Linked-in: CRA-Widening
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CRA-WP Events at GHC

- Visit the CRA-WP Booth in the EXPO to learn more
- Attend another CRA-WP Session
Building Your Professional Persona Session, 4 – 5 pm, OCCC W308D



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