

# Center for Inclusive Computing

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Level-Up, Washington DC  
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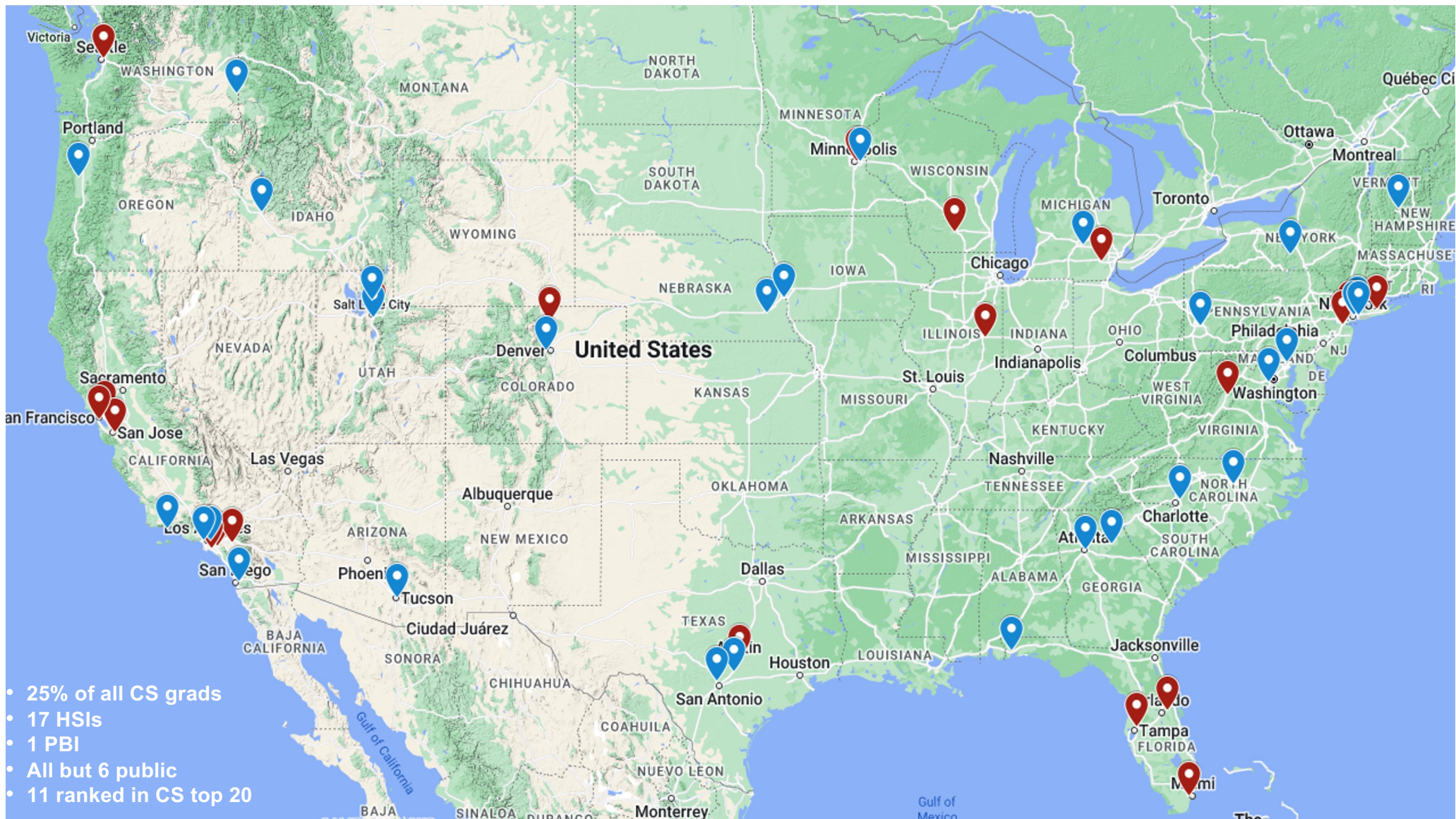


Northeastern  
University




# Goals:

1. Share learnings from work with **23** universities on retention
2. Share learnings from work with **58** universities on intersectional data collection and analysis
3. Share Northeastern's experience creating **43** interdisciplinary computing degrees (CS+X)



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# Learnings on Retention

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- 1. Fix the institution, not the student.**
  - 2. The department has room to act.**
  - 3. Start with retention, then work on attraction.**





## **We have found 10 systemic interventions that work: 6 focused on not losing the students who show up**

1. Address distribution of prior experience
2. Centralize TA recruiting, training and evaluation
3. Sync sections
4. Create computing "in context" intro courses
5. Eliminate monster degrees and impossible semesters
6. Support students via advising and other co-curricular means





## ...and 4 focused on inviting more students to come


1. Create a CS0
2. Make CS0/CS1 satisfy gen-ed requirement
3. Don't cap enrollments based on GPA in CS1/2, Calc 1, etc.
4. Create interdisciplinary computing majors





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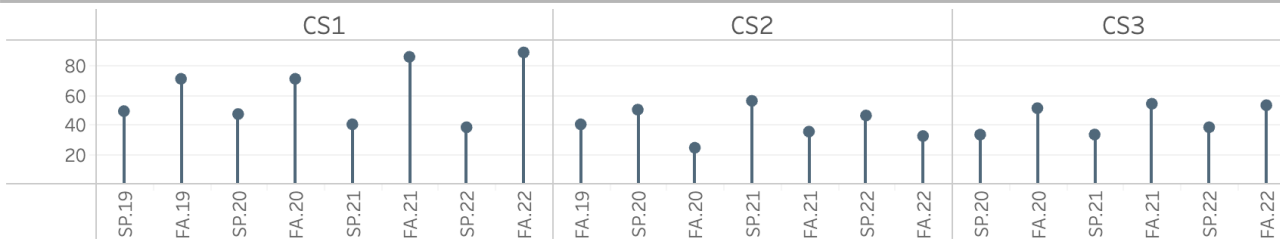
# Learnings on Intersectional Data

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- 58 universities currently participate in the CIC's data program
  - This demonstrates that universities *can* unlock demographic data held centrally (but incentives may be required)

## CS1-3 Enrollment

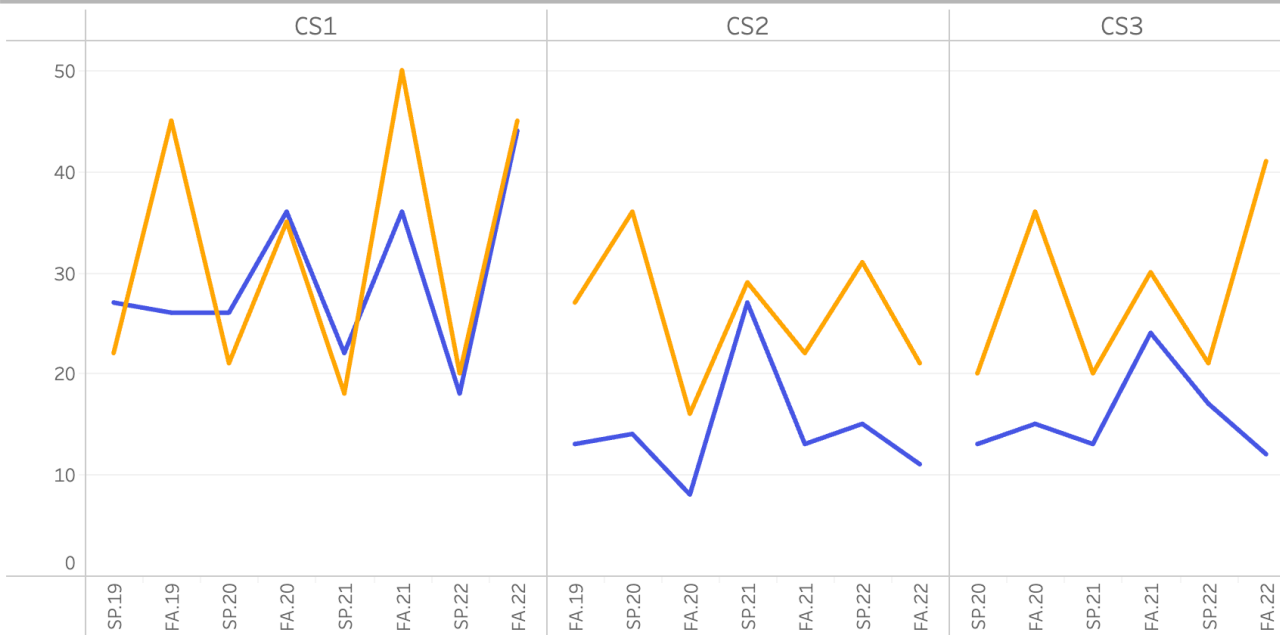
### Total Women

Enrollment by Term, Course



### Enrollment by BLN Women | ANTUW Women, Course

ANTUW Women BLN Women



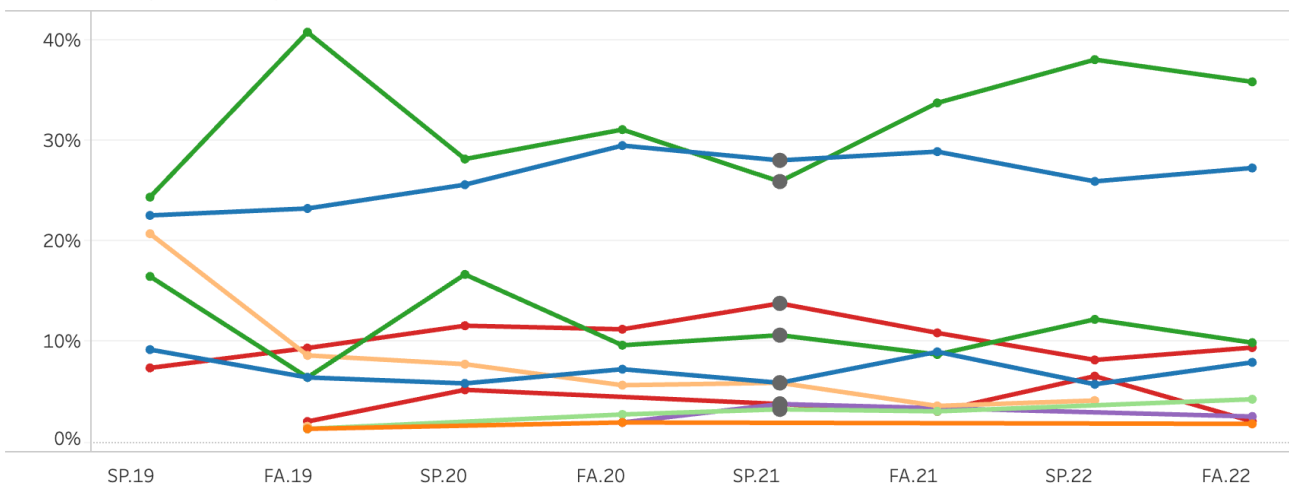


## CS1 - 3 Enrollment | Advanced

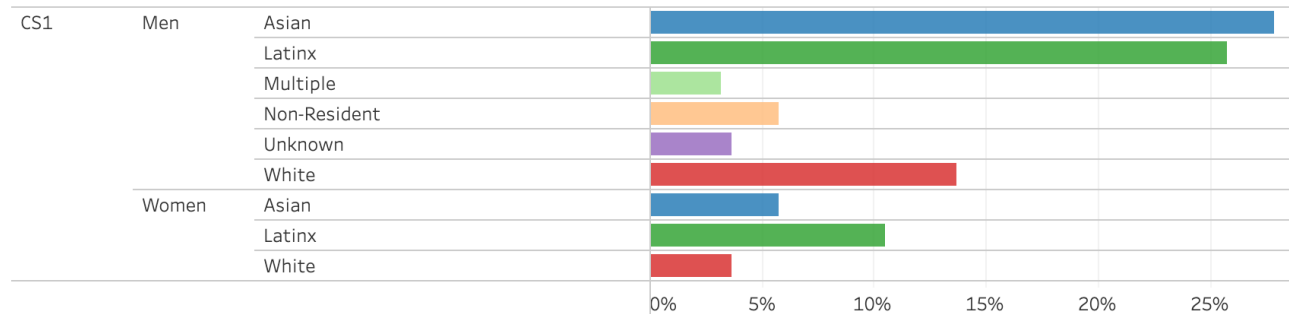
### Percent Students Enrolled by: Term Course Gender Race



Click on a data point to change the **Enrollment Breakout** below



### Enrollment Breakout: Term SP.21

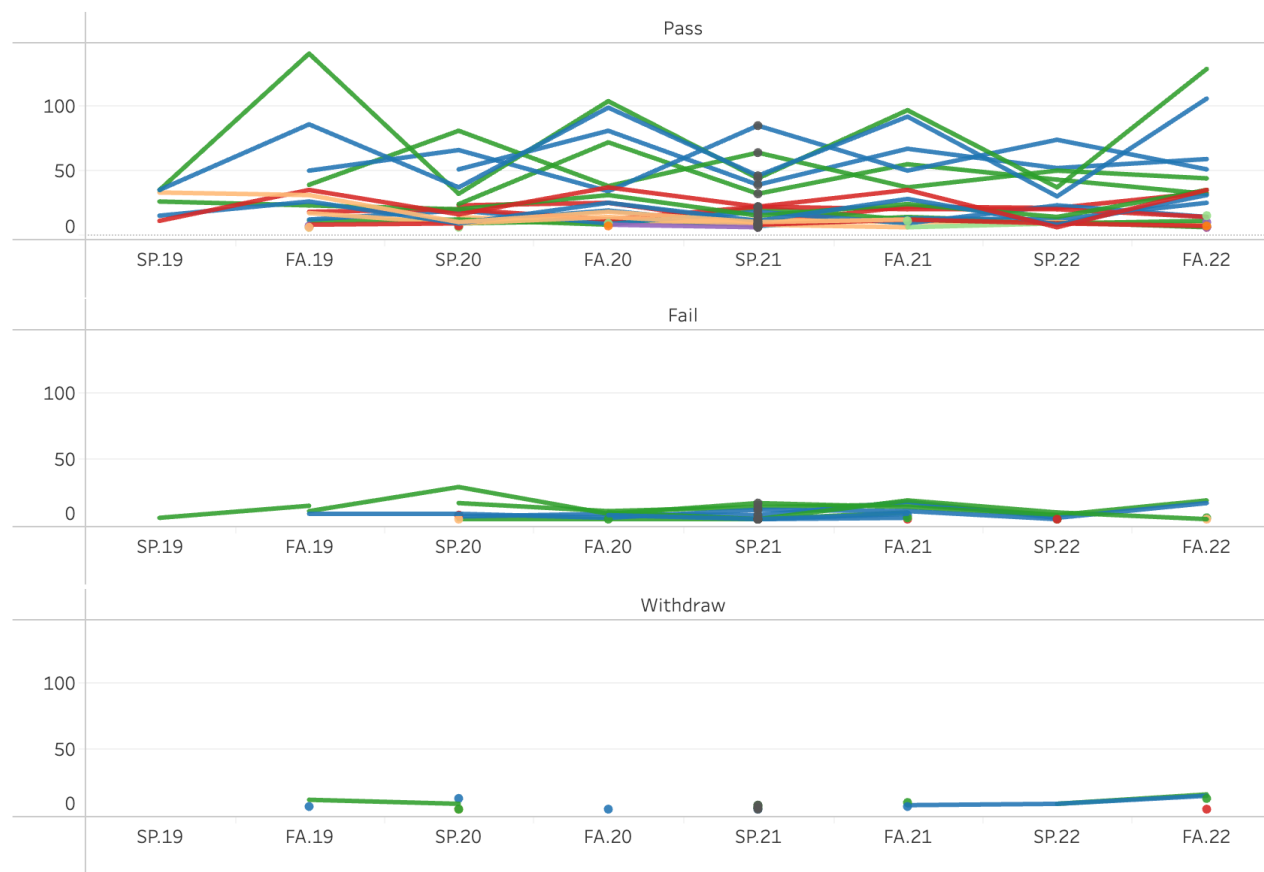


## Number of Students who Passed, Failed, Withdrew by: Term Course Gender Race

AIAN Black Latinx Non-Resident White  
 Asian Hawaiian Multiple Unknown

Choose Outcomes

All



V2 of CIC's visualization and collection system is up and running and we are integrating short surveys created by CERP from Data Buddies





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# Learnings from 43 “CS+X” majors at Northeastern

## What is a combined major at Northeastern?



## Example: BS in Computer Science and Design

6 core CS  
+  
3 CS electives

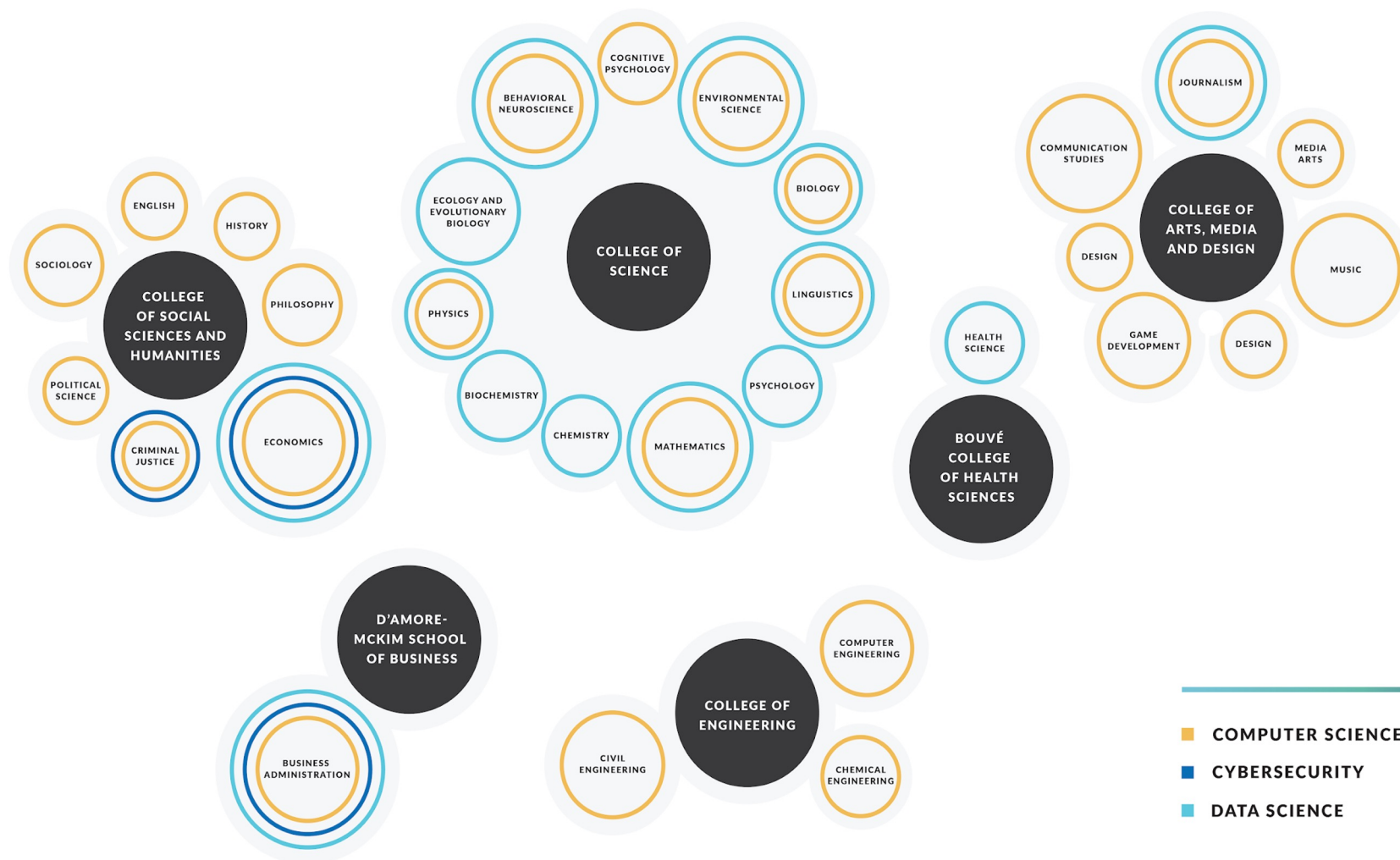


5 core design  
+  
2 design  
specialization  
courses  
+  
3 design  
electives



Human Computer  
Interaction  
+  
Psychology  
Course  
+  
Capstone







**2001 Mathematics**

**2001 Physics**

**2001 Cognitive Psychology**

**2005 Biology**

**2006 Music Comp. and Tech.**

**2006 Business Admin.**

**2008 Media Arts**

**2009 Environmental Science**

**2010 Game Development**

**2011 Journalism**

**2014 Computer Engineering**

**2014 Communication Studies**

**During 2014-2021 we added 30 additional computing combined majors.**

# At **Northeastern**, combined majors drove the increase in representation of women in computing

**2014**

404/811 majors are combined

Of combined, 21% are women  
(vs. 17% for within-discipline majors)



**2022**

2042/3528 majors are combined

Of combined, 40% are women  
(vs. 28% for within-discipline majors)

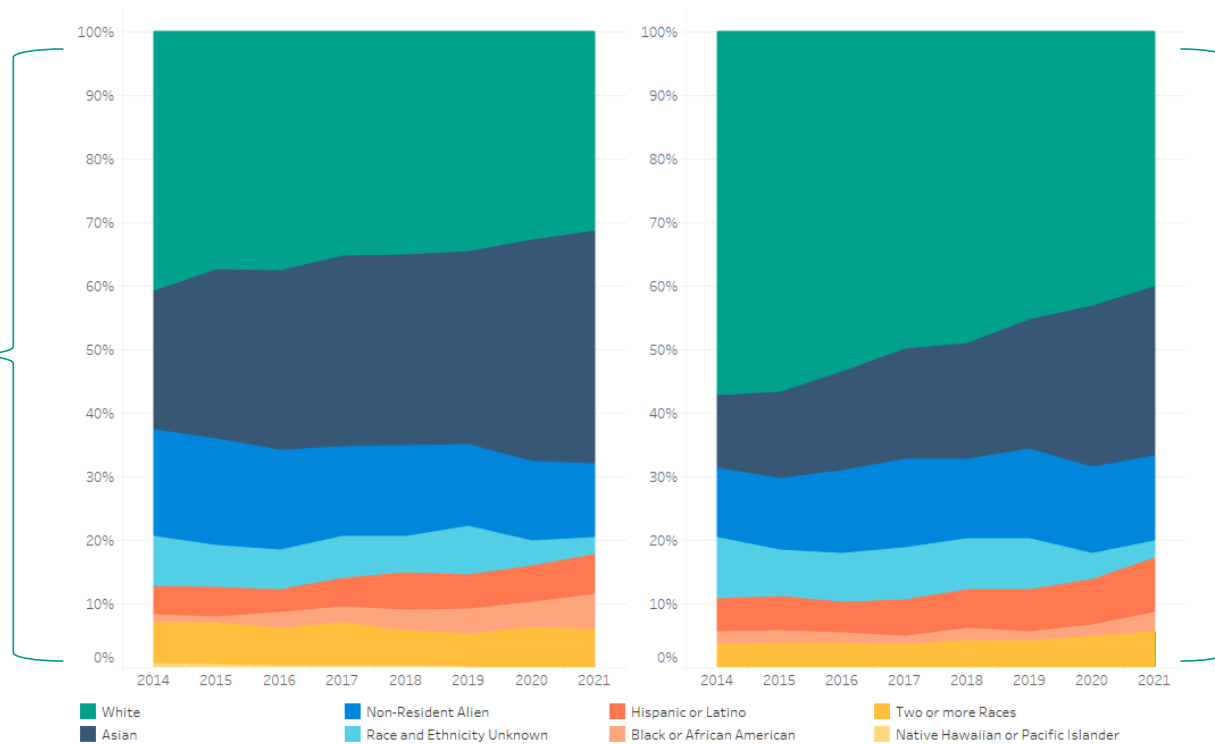
**2022 incoming 1st yrs**

349/557 majors are combined

Of combined, 53% are women  
(vs. 32% for within-discipline majors )

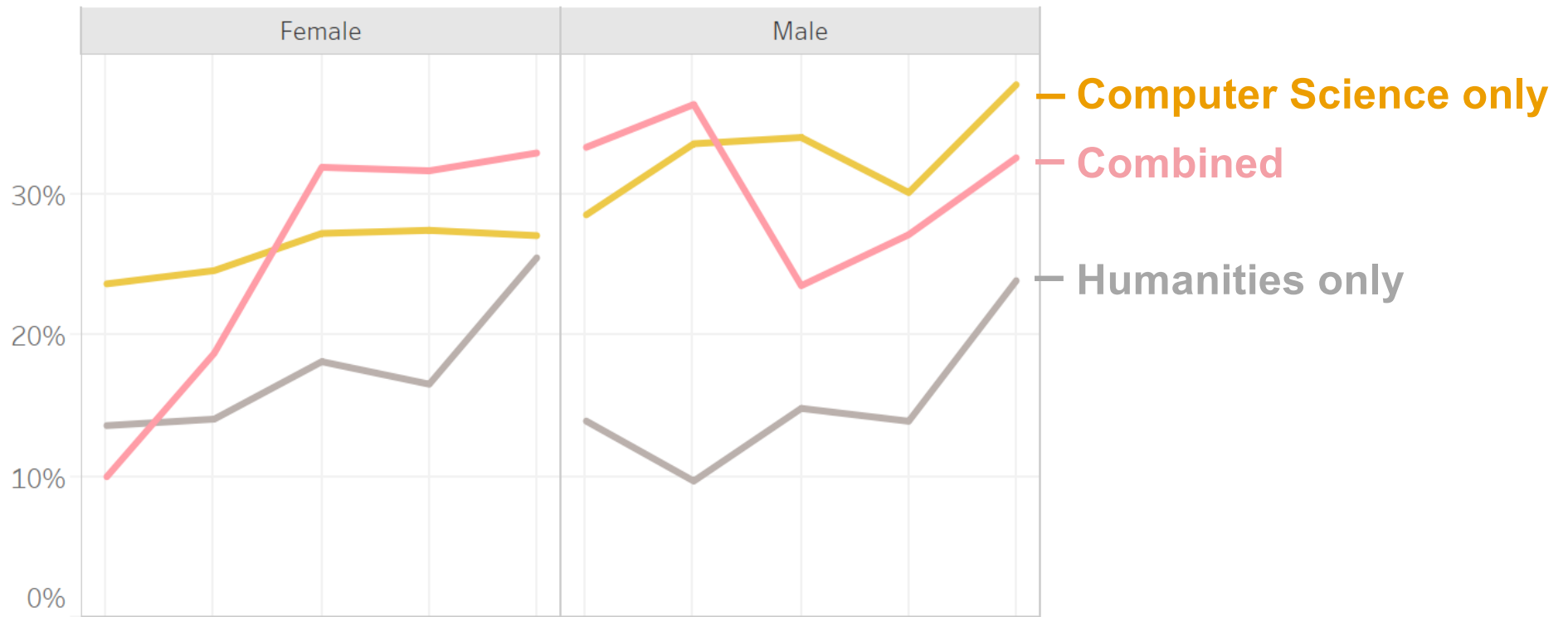
# Intersectional Data

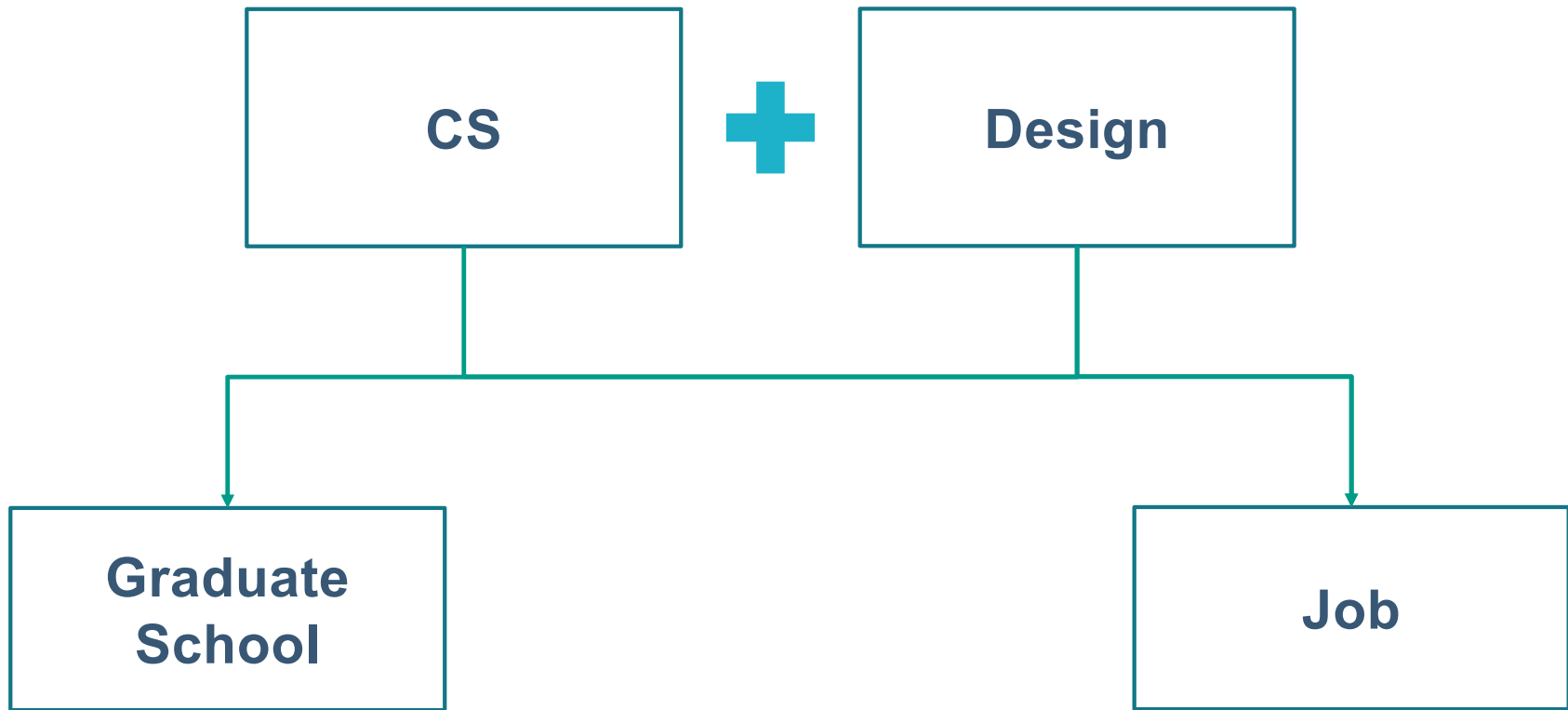
**Women**  
**2014: 19%**  
**2022: 35%**




**Men**  
**2014: 81%**  
**2021: 65%**

# Yield Rates: 2018-2022









We looked at LinkedIn data for grads and observe **no difference in jobs/salaries** for computing-only versus combined:

- Many combined majors are hired at “pure” tech companies such as MS, Google, Amazon, etc.
- But, combined majors have the additional opportunity to work at the juncture of their two disciplines (e.g., biotech and fintech)

# Before you invite students from other disciplines to combine with CS, ensure beginners are truly welcome.

1:

All NU students take CS1 (in Racket) and CS2 (in Java).

In 2014, CS1 DFW rate in = 25%, not uniformly distributed by gender, race/ethnicity.



2:

Create 2 sections of CS1 & CS2 ("accelerated" and "standard"). Improve TA training

Students self-select based on prior experience and comfort level.



3:

DFW rate decreased from 25% to <5%

Now uniformly distributed across populations.

We see no difference in performance in CS3

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# Final Thoughts



# Current Efforts:

1. Grant funding for 9 more schools, focused on retention
2. Grant funding for CS transfer pathways (community college + 4-year universities)
3. NSF Alliance DAPPIC (CIC + CRA CERP)
4. Expanding the MS Pathways Consortium (23 schools today)
5. NSF-funded “Bridge to Cyber” program for SFS CyberCorps Schools (7 schools)
6. Launching national demonstration project to implement multiple interdisciplinary computing degrees at 8 large public universities

**Thank you!**

