From Vision to Evaluation: The Evolution of BPC Success

Tracy Camp

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Tracy Camp

Emeritus Professor
Colorado School of Mines

CS@Mines

Co-Chair

Board

CRA-WP
Computing Research Association
Widening Participation

Generation CS:
Computer Science Undergraduate Enrollments Surge Since 2006

Executive Director and CEO
Computing Research Association

CS@Mines

Tracy Camp
Founding Department Head
Department of Computer Science
Colorado School of Mines

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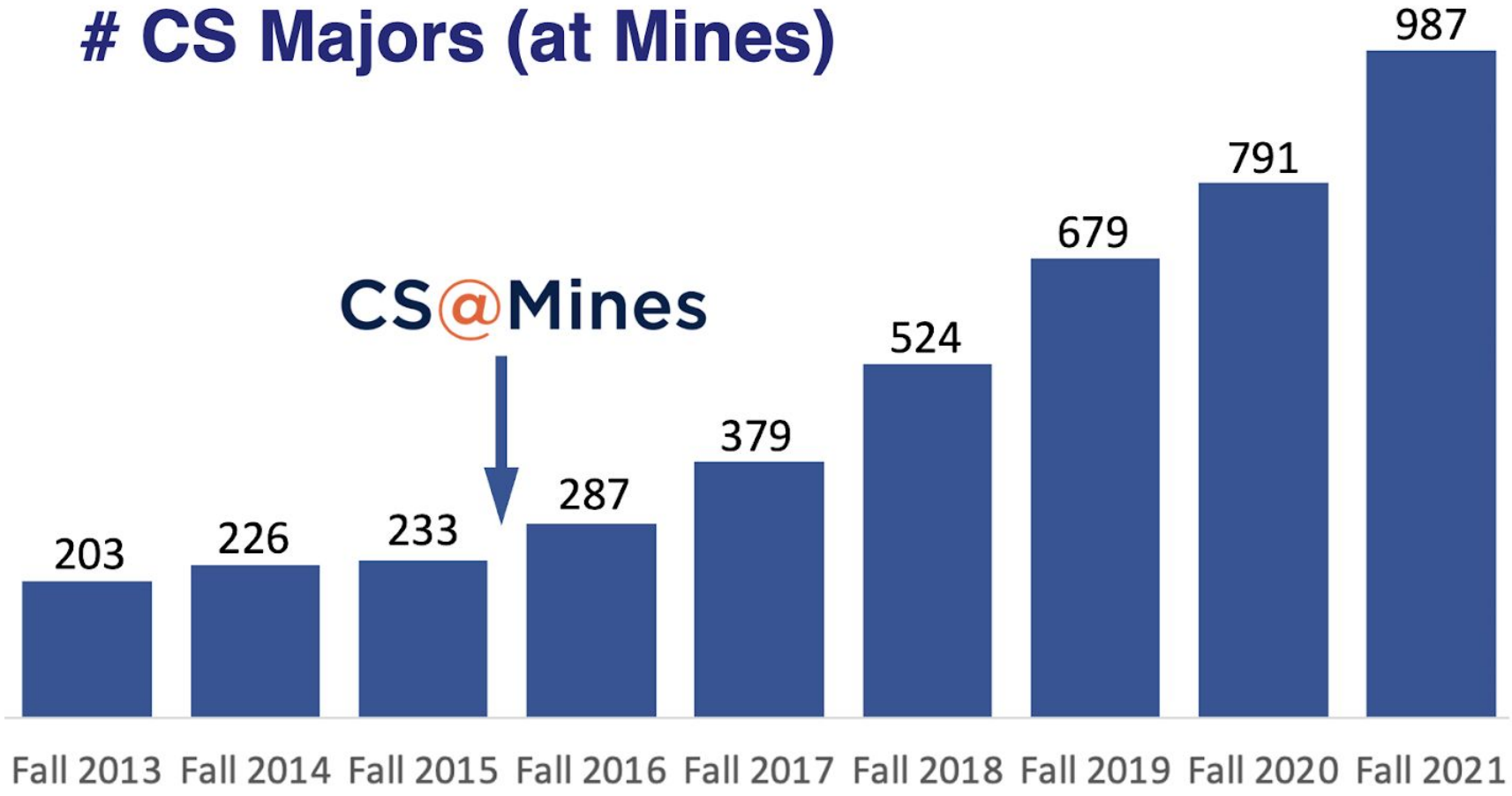
CS Majors (at Mines)



	Fall 2008	Fall 2021	Change
UG Majors	157	987	~6.3x
Women (#)	17	226	~13.3x
AHN (#)	12	180	~15x

	Fall 2008	Fall 2021	Change
UG Majors	157	987	~6.3x
Women (%)	10.8%	**22.9%**	~2.1x
AHN (%)	7.6%	**18.8%**	~2.5x

	Fall 2008	Fall 2021	Change
UG Majors	157	987	~6.3x
Women (%)	10.8%	**22.9%**	~2.1x
AHN (%)	7.6%	**18.8%**	~2.5x

Women at Mines: ~31.7%
URG at Mines: ~18%

What did CS@Mines do?

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Several Impactful BPC Activities

Recruitment activities

Retention activities

Welcoming culture (space/activities)

Transfer efforts

Visible signs that diversity is important

etc.

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List of BPC Activities: https://tinyurl.com/BPC-NCWIT-Activities

Extension Services for Undergraduate Programs
Activity Reference Sheet

Increase Enrollment
• Participate in events held by admissions or other campus offices (e.g., give presentations at orientation) • Develop and deliver messaging that will inform potential majors about career opportunities and the nature of computing and engineering work • Have students or faculty act as ambassadors for the major at admissions events (e.g., orientation) • "Market" your major to undeclared majors • Create a strategic recruiting plan that targets qualified and readily available potential students • Offer a minor • "Market" your minor to students with other majors • Provide relevant and accurate information (e.g., "Talking Points") to the admissions, advising, and other offices that might speak on your behalf • Have faculty inform and personally recruit capable students in non-major introductory courses • Develop an appealing web site and brochures for diverse prospective students • Print and distribute posters about your program • Provide information to K12 teachers, guidance counselors, etc. • Have students conduct "roadshows" in high schools (and have local current undergrads recruit from their high schools)

Measurement: KEY for Success

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Overall Process

1. Determine Context and Set Goals
2. Implement Activities Strategically
3. Evaluate/Measure
4. Feedback loop

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Overall Process

1. Determine Context and Set Goals
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3. Evaluate/Measure (Tracy)
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Public Data:

U.S. postsecondary data (IPEDS)

use bpcnet.org/statistics site

U.S. K-12 Students (CCD)

NCWIT Scorecard

CRA Taulbee

ACM NDC

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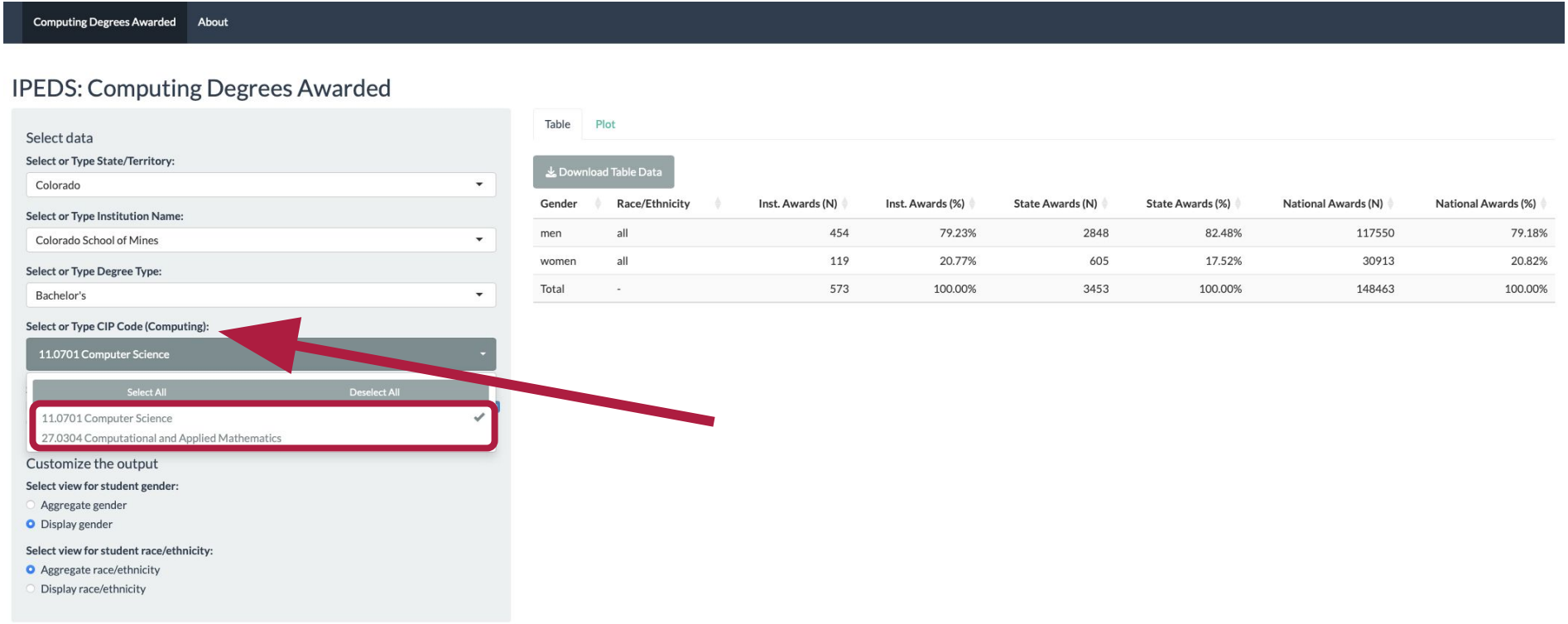
GOTO: bpcnet.org/statistics
SCROLL down to tools
CLICK Postsecondary Computing Degrees Awarded (IPEDS)



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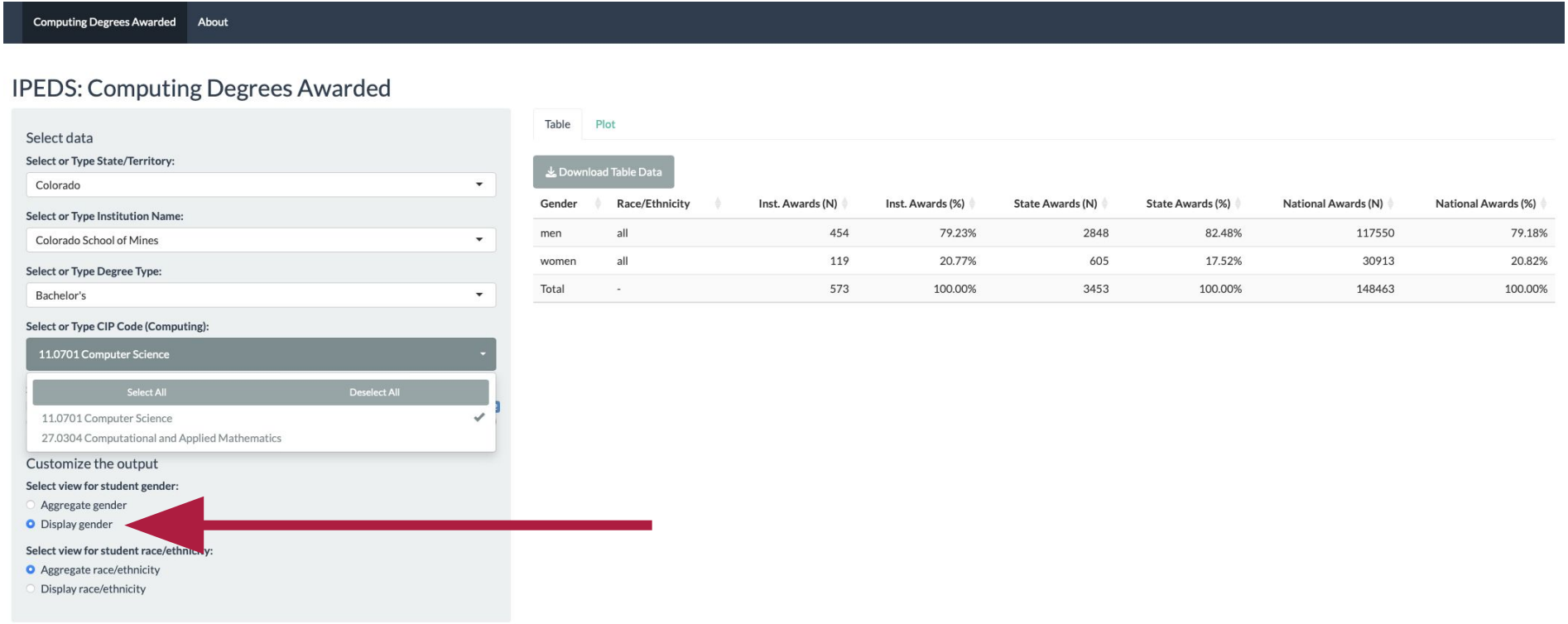

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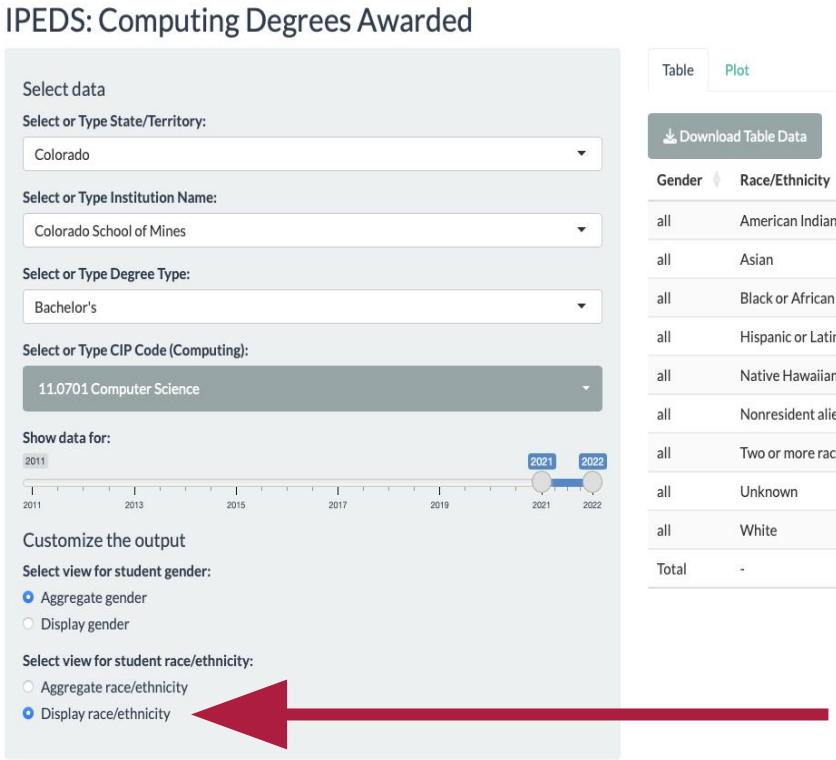

Table | Plot

Download Table Data

Gender	Race/Ethnicity	Inst. Awards (N)	Inst. Awards (%)	State Awards (N)	State Awards (%)	National Awards (N)	National Awards (%)
all	American Indian or Alaska Native	3	0.87%	4	0.21%	147	0.18%
all	Asian	22	6.36%	234	12.32%	18434	22.79%
all	Black or African American	2	0.58%	47	2.47%	3825	4.73%
all	Hispanic or Latino	36	10.40%	178	9.37%	8658	10.71%
all	Native Hawaiian or Other Pacific Islander	0	0.00%	0	0.00%	102	0.13%
all	Nonresident alien	6	1.73%	126	6.64%	10516	13.00%
all	Two or more races	18	5.20%	103	5.42%	3396	4.20%
all	Unknown	7	2.02%	35	1.84%	2729	3.37%
all	White	252	72.83%	1172	61.72%	33063	40.88%
Total	-	346	99.99%	1899	99.99%	80870	99.99%

GOTO: bpcnet.org/statistics
SCROLL down to tools
CLICK Postsecondary Computing Degrees Awarded (IPEDS)

IPEDS: Computing Degrees Awarded

Select data

Select or Type State/Territory:

Colorado

Select or Type Institution Name:

Colorado School of Mines

Select or Type Degree Type:

Bachelor's

Select or Type CIP Code (Computing):

11.0701 Computer Science

Show data for:

Customize the output

Select view for student gender:

- Aggregate gender
- Display gender

Select view for student race/ethnicity:

- Aggregate race/ethnicity
- Display race/ethnicity

Table | Plot

Download Table Data

Gender	Race/Ethnicity	Inst. Awards (N)	Inst. Awards (%)	State Awards (N)	State Awards (%)	National Awards (N)	National Awards (%)
men	American Indian or Alaska Native	3	0.87%	4	0.21%	128	0.16%
men	Asian	14	4.05%	169	8.90%	13257	16.39%
men	Black or African American	0	0.00%	38	2.00%	2803	3.47%
men	Hispanic or Latino	31	8.96%	148	7.79%	7061	8.73%
men	Native Hawaiian or Other Pacific Islander	0	0.00%	0	0.00%	87	0.11%
men	Nonresident alien	4	1.16%	100	5.27%	7745	9.58%
men	Two or more races	13	3.76%	76	4.00%	2605	3.22%
men	Unknown	6	1.73%	32	1.69%	2124	2.63%
men	White	207	59.83%	1003	52.82%	27821	34.40%
women	American Indian or Alaska Native	0	0.00%	0	0.00%	19	0.02%
women	Asian	8	2.31%	65	3.42%	5177	6.40%
women	Black or African American	2	0.58%	9	0.47%	1022	1.26%
women	Hispanic or Latino	5	1.45%	30	1.58%	1597	1.97%
women	Native Hawaiian or Other Pacific Islander	0	0.00%	0	0.00%	15	0.02%
women	Nonresident alien	2	0.58%	26	1.37%	2771	3.43%
women	Two or more races	5	1.45%	27	1.42%	791	0.98%
women	Unknown	1	0.29%	3	0.16%	605	0.75%
women	White	45	13.01%	169	8.90%	5242	6.48%
Total	-	346	100.03%	1899	100.00%	80870	100.00%

Monitor your local data:

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Institutional Data:

Applications, Acceptances, Enrollments

Retention/Attrition

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Institutional Data:

Applications, Acceptances, Enrollments
Retention/Attrition

e.g., 21.2% accept vs. 16.7% enrolled (females)

⇒ 24% enrolled (females)

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Institutional Data:

Applications, Acceptances, Enrollments

Retention/Attrition

DFW rates (esp for early courses)

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Institutional Data:

Applications, Acceptances, Enrollments
Retention/Attrition

DFW rates (esp for early courses)

CS@Mines Data Chair

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Understand your STUDENTS

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Understand your STUDENTS

CERP

Computing Research Association

Evaluation

CRA Data Buddies Survey

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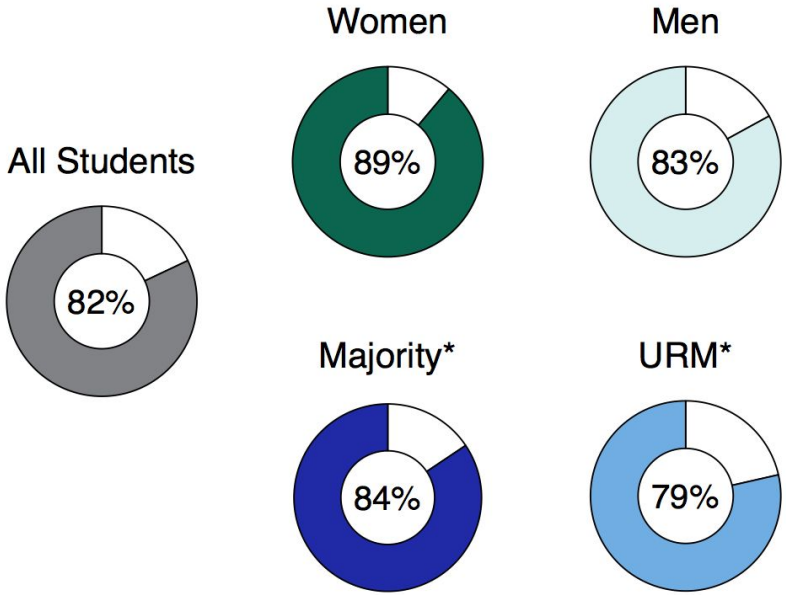
Satisfaction with the computing program

At your institution, the following are satisfied with the computing program**:



Thought about leaving computing major

At your institution, the following thought about leaving their computing major**:

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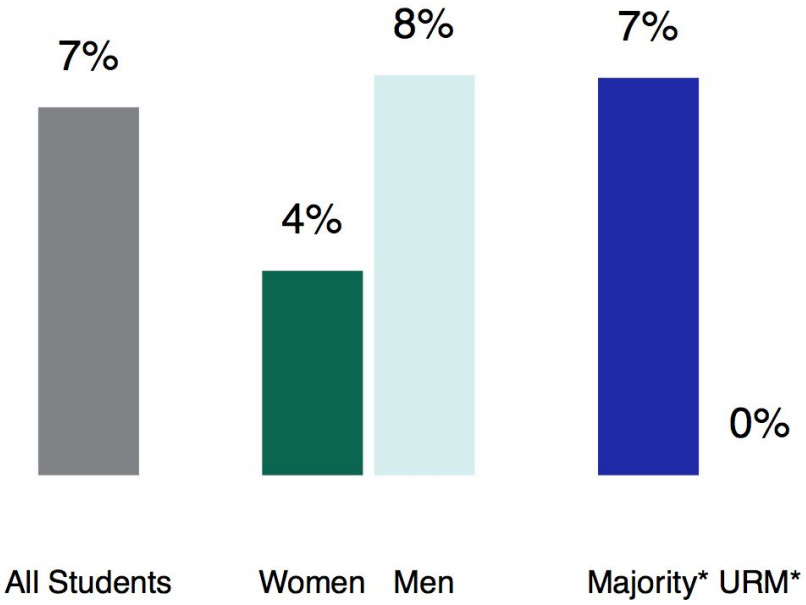

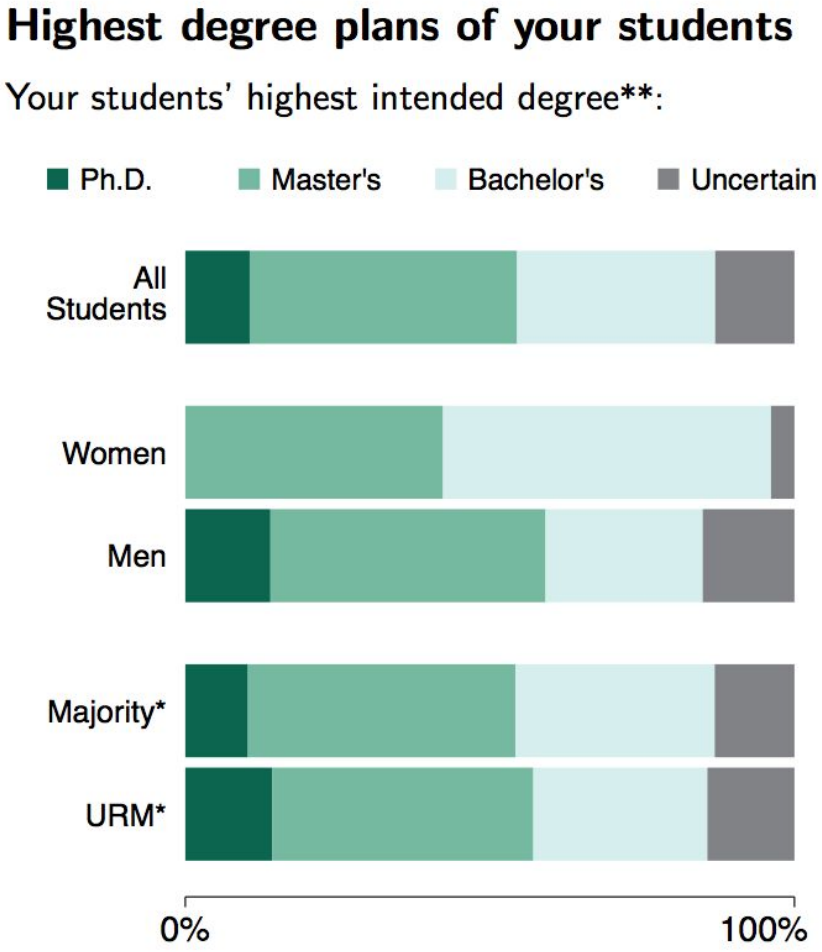

Plans ☹

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What is the highest degree you plan to attain?	**Women**	**Men**
Bachelor's degree (**significant**)	52%	26%

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Shared with Dean (significant)

Question	Mines	Comparison group
I am confident that I can complete my undergraduate degree in computing	4.89 (0.32)	4.51 (0.85)
Overall, I am satisfied with the computing program at my institution	4.33 (0.85)	3.90 (1.07)
The department is NOT very supportive of its students	1.81 (0.93)	2.43 (1.10)
My department cares about its students	4.37 (0.71)	3.73 (1.00)
Who do you consider to be a mentor? (prof within my department)	61%	40%

Understand your STUDENTS

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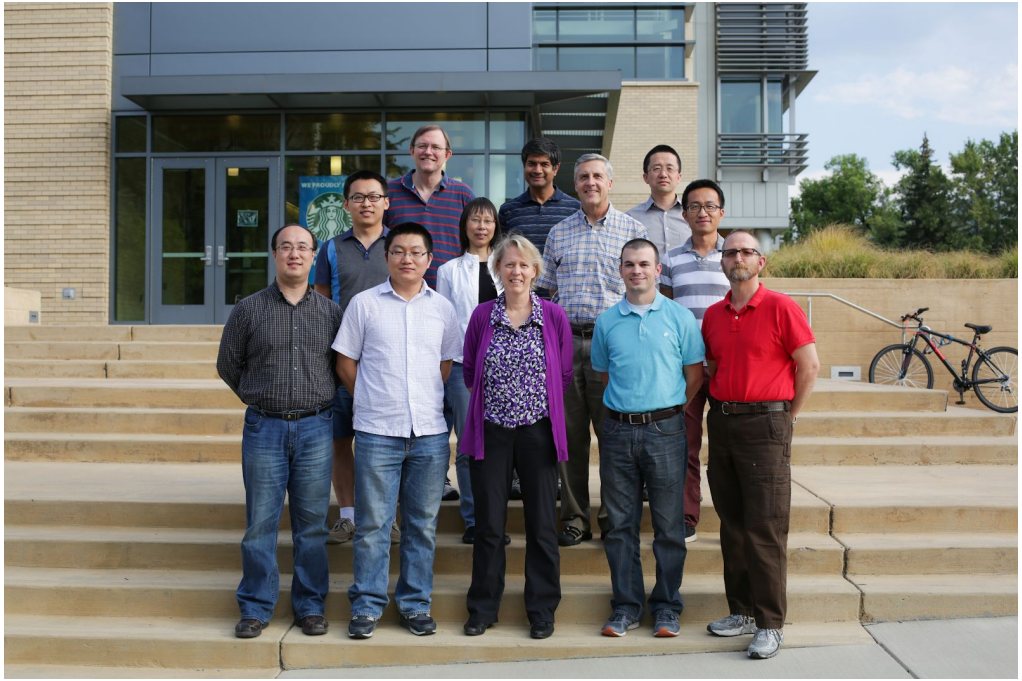
Understand your DEPARTMENT



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Example BPC Activity

Implicit bias training

Metrics:

- % of faculty/staff who attend training
- % of students who attend training

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Data and Measurement

DO:

Collect data to iteratively improve activities

DON'T:

Assume each activity will work as intended

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Other Tips

Diagnose / Fix retention problems FIRST

Consider needed systemic CHANGES

Center for Inclusive Computing

LEVEL UP

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An NSF-funded project to build consensus around a united vision of inclusive undergraduate computing education

6 Regional workshops

400 Community participants

4 Initial high-priority, evidence-based strategies

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2024-25 Focus

Four evidence-based strategies:

- Tracking/reviewing intersectional data on recruitment and retention
- Training TAs in inclusive practices
- Investing in student affinity groups
- Appointing faculty leader(s) for BPC efforts

Coming soon: One-page summaries for each strategy:

- Goals, rationale, implementation ideas, and risk mitigation

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Overall Process

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What questions do you have?

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