

## NEED AN NSF BPC PLAN?

### INSTRUCTIONS FOR USE (in red text):

All Medium and Large CISE Core Programs, Secure and Trustworthy Cyberspace (SaTC), and Cyber-Physical Systems (CPS) project proposals require an approved BPC plan by the time of award. Even though a BPC Plan is not currently required at proposal submission time, CS@Mines faculty are encouraged to submit a BPC Plan with their proposal (as some reviewers will likely notice if you don't).

CS@Mines faculty are encouraged to copy/paste pieces of our Departmental BPC Plan, which will help you create a strong BPC Plan. Your BPC Plan should be included in the supplementary documents section of the proposal and is limited to 3 pages.

Working with the department in the creation of your Individual BPC Plan will lead to a greater impact on BPC.

- The instructions (this page and other red text) should all be deleted before submission.
- You should also delete the pieces of the next two pages that you do NOT need for your Individual BPC Plan. These two pages are our *Departmental BPC Plan*. It is totally fine that the same wording from the *Departmental BPC Plan* is common across all CS@Mines proposals submitted to CISE. (Contact Tracy if you have any suggestions for improving these two pages.)
- The last page (Opportunities for Faculty Engagement) is where your creativity/thought is needed for YOUR proposal. You should select one (or more) of the BPC activities that fit your interests (OR propose new ideas that align with our department's goals), and then provide details on the description of that activity (e.g., what will you do? how will you track your outcomes/success?).
- To create an impactful BPC plan, your description needs to address all pieces in the NSF Solicitation for BPC Plans: context (including goals), population (i.e., who will you impact), strategy (i.e., your activities), preparation (e.g., prior experience, training), and measurement.
- To get started, check out the Individual BPC Plan Template available on BPCNet.org (both Word and LaTeX formats available). Tracy is happy to read a draft of your BPC Plan (assuming you are not throwing it together last minute to check a box).
- Your BPC Plan should also mention / link to our Departmental BPC Plan on BPCNet.org (showing the reviewers that CS@Mines is serious about BPC).
- A letter of commitment from the department can also be included in the supplementary documents. A letter from the department helps confirm that you have done appropriate work to prepare for making a positive BPC impact. Let Tracy know if you would like to include a letter.

## CS@Mines Departmental BPC Plan

**Effective dates of Departmental BPC Plan:** 2019-2024

**Revision of plan will begin:** January 2021

**Contact:** Tracy Camp <tcamp@mines.edu>, Department Head and Professor of CS@Mines

### CS@Mines Context

Colorado School of Mines (Mines) is a public research university focused on science and engineering (ranked #32 by U.S. News). The Wall Street Journal ranked Mines #2 for combining scholarly research and classroom instruction, which nicely summarizes the mission of Mines. Mines demographics are (Fall 2019):

- 5,102 undergraduate students (31.1% women; ~17% URG<sup>1</sup>)
- 1,420 graduate (M.S. and Ph.D.) students (29.6% women; ~10% URG)

We note that ~88% of the URG students at Mines are Hispanic/Latinx, which is similar to Colorado K-12.

The Department of Computer Science (CS@Mines) was founded in July 2016 (when CS separated from Electrical Engineering). CS@Mines is now the 3<sup>rd</sup> largest department on campus (and continues to be the fastest growing). CS@Mines undergraduate students can choose from six different tracks (CS+X tracks). CS@Mines demographics are (Fall 2019):

- 679 undergraduate students (21.8% women; 21.5% URG)
- 115 graduate (M.S. and Ph.D.) students (23.5% women; 11.3% URG)
- 13 Tenured/Tenure-track faculty (15.3% women; 0% URG)
- 4.5 Teaching Faculty, including Professor of Practice (33.3% women; 0% URG)

Recent analysis of retention data indicated no issues currently exist (i.e., CS@Mines retains women/URG students at similar rates). A recent student survey also showed no culture concerns by any one group. The Fall 2019 CRA Data Buddies survey indicates the only concern is mentoring women to graduate school.

CS@Mines recently received national recognition from the National Center of Women and IT (NCWIT) due to our success in transforming the demographics of our growing undergraduate program:

Undergrads	Fall 2008	Fall 2019	Change
# Majors	157	679	~4.3x
Women	17 (10.8%)	148 (21.8%)	~9x
URG	12 (7.6%)	146 (21.5%)	~12x

Limited focus on recruitment/retention at the graduate level has occurred; thus, significant opportunities exist.

M.S.	Fall 2013	Fall 2019	Change	Ph.D.	Fall 2013	Fall 2019	Change
# Students	14	80	~5.7x	# Students	5	35	~7.0x
Women	3 (21.4%)	16 (20.0%)	~5.3x	Women	2 (40.0%)	11 (31.4%)	~5.5x
URG	2 (14.3%)	13 (16.3%)	~6.5x	URG	0 (0%)	0 (0%)	0x

While CS@Mines has considered diversity more broadly than just women and URG (e.g., we have a scholarship grant for low-income students and the Department Head is involved with 1<sup>st</sup> gen students), we have not considered all possible dimensions (e.g., LGBTQ, people with disabilities, veterans). We have also not put focus on intersectionality, which is needed to fully understand the complexities that exist.

<sup>1</sup> URG = students from under-represented groups in computing: Hispanic/Latinx, African American, American Indian, Native Alaskan, Native Hawaiian/Other Pacific Islanders, and persons with disabilities.

## CS@Mines Departmental BPC Plan

### CS@Mines Goals

1. Increase participation of undergraduate women from 21.8% to 25% by 2024 (Mines 150<sup>th</sup> anniversary) and 30% by 2030 (to achieve gender parity with Mines).
2. Develop/Launch programs to increase the participation of graduate women from 23.5% to 25% by 2024 (Mines 150<sup>th</sup> anniversary) and 30% by 2030 (to achieve gender parity with Mines).
3. Increase participation of undergraduate students from URGs from 21.5% to 25% by 2024 (Mines 150<sup>th</sup> anniversary) and 30% by 2030.
4. Ensure retention data continues to be equivalent for all demographic student groups.

### CS@Mines Activities and Evaluation (faculty member in charge in bold)

- **DECtech** [Goals 1, 4] – <https://tech.mines.edu>: DECtech (Discover, Explore, and Create Technology) is a K-12 outreach program launched in 2012 to recruit females to STEM. This STEM program is run by CS@Mines, so CS is often highlighted, and many CS@Mines female students are involved (helps to retain these women). **Camp**
- **U-CLIMB** [Goals 1, 4] – <http://cs-courses.mines.edu/csci101/U-CLIMB/>: U-CLIMB (Undergraduate Computing Leaders Invested in Mentoring Beginners) is a near-peer mentoring program that trains a diverse team to mentor students currently enrolled in our CS0 course (a course taken by students across campus). **Camp**
- **CS@Mines on Tour** [Goals 1, 3, 4] – <https://csontour.mines.edu>: CS@Mines students travel to K-14 schools with an interactive presentation about CS that encourages interest from diverse students. Students involved in On Tour create a supportive community that helps with retention goals. **Dantam (CC)/Zhang (HS)**
- **RMCWIC** [Goal 4] – <http://www.rmciwic.org>: The Rocky Mountain Celebration of Women in Computing (RMCWIC), which is led by CS@Mines/CU Boulder, occurs every other Fall semester. All CS@Mines female students are strongly encouraged to attend. **Camp**
- **PATHS** [Goals 3, 4] – <https://paths.mines.edu>: CS@Mines received an NSF S-STEM grant in 2016 to launch PATHS (Path Ambassadors to High Success), a scholarship program for academically talented, low-income students from Colorado to study computer science at Mines. **Camp/Williams**
- **Improve student mentoring** [Goal 2] – CS@Mines has required advising meetings (called Interrupt) each semester for our majors. CRA Data Buddies survey results show we need to improve our mentoring of women to graduate school. We plan to develop a new program to improve mentoring in CS@Mines. **Belviranli**
- **Graduate student recruitment program** [Goal 2] – CS@Mines has a graduate recruitment program; the department has started working on new practices/programs to encourage female/URG students to apply. **Hoff**
- **Other activities**: CS@Mines is involved in a number of other BPC activities as well, e.g., diversity and inclusion training for faculty and K-12 teachers, 1<sup>st</sup> gen/transfer/veteran community building, participation at Tapia, Zoom calls for accepted women, and evaluation of courses for inclusive instruction.

CS@Mines closely tracks several data to (1) assess the impact of our activities and (2) launch new activities when problems are discovered. Each year we consider the number of applications, acceptances, and enrollments in CS, all broken down by women and racial/ethnic groups. We also investigate retention/attrition, again broken down by women and racial/ethnic groups. **Yang** (CS@Mines Data Chair) tracks this data annually. We need to further improve our understanding of student outcomes from our recruitment programs (CS@Mines On Tour, DECtech, and U-CLIMB). **Camp** will begin a data collection effort to improve our understanding in 2020.

We periodically deploy pieces of the **NCWIT's Student Experience of the Major** to watch for retention issues (e.g., we deployed the Classroom Climate portion of this survey in 2017-18 and found no difference between women's and men's experiences in CS@Mines). In addition, each year we participate in the Computing Research Association (CRA) **Data Buddies** project, which provides a customized report on how our students responded to a survey compared to students at structurally similar institutions. We are working to improve mentoring of women in the department to address recent issues discovered from this survey. The CS@Mines Diversity Committee (**Camp, Painter-Wakefield, Dantam**) is in charge of deploying these surveys.

## CS@Mines Departmental BPC Plan

### Opportunities for Faculty Engagement

There are many ways a CS@Mines faculty member can be involved in BPC department activities. A few ideas follow; you should feel free to suggest others! You are strongly encouraged to put your Individual BPC Plan in the format suggested in the BPC Template (<https://bpcnet.org/individual-bpc-plan/>).

To create an impactful BPC plan, be sure your Individual BPC Plan addresses all pieces in the NSF solicitation and BPC Plan checklist: context (including goals), population (i.e., who will you impact), strategy (i.e., your activities), preparation (e.g., prior experience, training), and measurement. Tracy is happy to read a draft of your BPC Plan.

BPC Activity Idea #1: Engage with CS@Mines On Tour (Goals 1, 3, and 4). Help the department reach more local K-12 schools that have a large percent of Hispanic/Latinx students. Create a plan to follow-up with students we reach through this program. Expand the program to create other ways to recruit URG students. (Hao/Neil plan to be involved in On Tour for high schools/community colleges, respectively.)

BPC Activity Idea #2: Engage with RMCWiC (Goal 4). Take on a committee role to help organize the conference. Create (and implement) a plan to encourage all women in CS@Mines to attend RMCWiC.

BPC Activity Idea #3: Expand Idea #2 to include sending students to Tapia and/or Grace Hopper (Goal 4). Become the leader for recruiting/encouraging/etc. students to attend these important retention events (e.g., Director of Student Conference Engagement?). Agree to take a team of students to Tapia, Grace Hopper, and/or RMCWiC. (Both Christopher and Tracy have done this.)

BPC Activity Idea #4: Engage with DECtech to improve this program (Goals 1, 4). For example, we do not understand long-term outcomes of DECtech; commit to leading a data collection/analysis of past participants. Expand the program to create other ways to recruit female students.

BPC Activity Idea #5: Engage with PATHS (Goals 3, 4). Develop/Implement activities to encourage PATHS scholars to graduate school (aligned with Goal #2). Work with the Foundation to help solicit funds to sustain this program. Expand the program to create other ways to recruit/retain women/URG students. (Tom is involved in PATHS.)

BPC Activity Idea #6: Provide research opportunities for women/URG students during the academic year and/or summer (Goals 2 and 4). Consider using CRA-WP DREU to recruit students. Consider advertising open positions via DECtech/PATHS/SWE. Talk about ways that you will setup the research experience so women/URG will be encouraged toward graduate school (at Mines or elsewhere).

BPC Activity Idea #7: Help analyze (and improve) our 100/200-level courses to ensure ALL students are engaged/encouraged to become part of CS@Mines (Goals 1, 3). There are best practices available from NCWIT that could be used to do this analysis. EngageCSEdu is also a valuable resource.

BPC Activity Idea #8: Participate in our Interrupt meetings, with goal to either improve student mentoring or recruit graduate students (Goals 2 and 4).

BPC Activity Idea #9: Understanding our data is KEY to understanding where we are and what we should do. Help us understand our data better. (DJ is the "CS@Mines Data Chair".)