

## BPC Plan

### Computer Science Department, Duke University

**Effective dates of Plan:** 04/04/2024 - 04/04/2026

**Contact Person:** Jian Pei, Chair, Computer Science Department.

**Context:** The Computer Science Department at Duke is committed to improving the participation of women in its student and faculty community, and various steps we have taken—e.g., revamping courses, introducing team-based experiential learning, and the DTech program—have resulted in significant progress. As a highlight, the number of women graduating with a CS major at Duke increased from about 20% in 2015 (the national average) to over 36% in 2023. The rates of participation by women in computer science at Duke are listed below. However, participation in the major still can be improved: in 2023, roughly 55% of Duke undergraduates were women; in comparison, women made up 60.6% of students in CompSci 101 (our pre-major introductory course) but only 36% of majors.



Population	Total Number	Women
Duke CS Graduate Enrollment (Ph.D.) in 2023-24	96	23.9%
Duke CS Graduate Enrollment (Masters) in 2023-24	81	24.7%
Undergraduate Duke CS Class Graduated in 2023	428	36.2%

The picture is quite different for racial and ethnic groups underrepresented in computing. For instance, around 11% of Duke undergraduates during 2022-23 were African American, while those graduating with a CS major was around 5.8%. Though the latter number is larger than the national average of 3.5% (2022), there is significant room for improvement. At the graduate level, there is an even greater need to improve participation: less than 4% of our current graduate students are African American or Hispanic.

#### Goals:

Goal 1 (G1) We aim to increase, each year, the percentage of women, African American, and Hispanic students in the undergraduate CS major program until it matches the percentage of these students in Duke's overall undergraduate population.

Goal 2 (G2): We aim to increase the retention rates of students from the groups underrepresented in computing at both the undergraduate and graduate level each year until they match those among the overall CS undergraduate and graduate populations.

Goal 3 (G3): By 2027, we aim to engage more than 75% of the faculty to participate in activities that encourage students from the groups underrepresented in computing to pursue research, such as enrolling in independent study courses, taking advanced courses, writing theses, etc. To reach this aim, we expect senior faculty to devote more effort and lead by example.

**Activities.** To reach these goals, we take a holistic approach that includes curricular efforts, co-curricular programs, and mentoring. These activities build on the impactful programs we have already implemented.

**A1: Participation in Research & Teaching** (G1, G2, G3). [Contact: K. Munagala, X. Yang, N. Washington]

A1a. Building on our successful Spring Undergraduate Research and Project Showcase, each semester faculty can create opportunities to showcase students' course projects and independent studies. Faculty can use this activity to broaden participation by ensuring that a diverse range of students are recognized for their accomplishments and made aware of future project and research opportunities, and by highlighting projects that illustrate a broad variety of applications of computing.

A1b. We will run a per-semester Town Hall style meeting where faculty can engage with students to both learn about barriers to engagement with and inclusiveness in our program and to ensure that all students are well-informed about research opportunities.

A1c. Faculty can recruit promising women and students from underrepresented groups for the undergrad TA pool and can assist with developing a centralized and coordinated system for hiring TAs.

A1d. Faculty with interdisciplinary research interests can recruit from more diverse student pools from related fields; this means highlighting interdisciplinary research and broadening our reach in the events above.

**Measurement:** We will design pre- and post-surveys for students attending the research showcase meetings, Town Hall meetings, and serving as UTAs to measure their satisfaction with the activities by race and gender. We will also track how many faculty and students participate in these activities.

**A2: Professional Development and Support.** (G1, G2, G3) [Contact: S. Rodger]

A2a. The department will continue to support student research and professional development by encouraging and financially supporting our students to attend major national and international

workshops, CRA-W workshops, the Grace Hopper Celebration of Women in Computing, and the TAPIA conference. Faculty can attend the conferences with the students.

A2b. We will create a cohort of students from diverse backgrounds when they declare their major. Faculty can organize social activities and have gatherings where either faculty give talks or we invite external speakers who can serve as role models.

*Measurement:* We will design pre- and post-surveys for students attending the conferences and staying in a cohort to measure their participation and satisfaction with the activities by race and gender. We will also track how many faculty and students participate in these activities.

**A3: Summer undergraduate experiences.** (Goals G1, G2, G3)

A3a. Faculty can participate in various 10-week summer programs for undergraduates, including Data+, Code+, and CS+. These programs serve over 100 students every summer, about half of whom are female. Students join small project teams collaborating with other teams in a communal environment led by faculty and graduate student mentors. These programs are part of a concerted effort to engage students in co-curricular projects early in their undergraduate careers and offer vital opportunities to recruit and mentor students from underrepresented groups. [Contact: B. Fain]

A3b. In the Duke Technology Scholars (DTech) Program, groups of scholars live together through the summer, sharing experiences, learning together, and participating in summer programming with technology industry leaders. Over 100 women participated in DTech this year. Faculty will work with the DTech Program Director to recruit students from underrepresented groups who are interested in research experiences, for the summer programs and for mentored research. [Contact: S. Daly]

*Measurement:* We will design pre- and post-surveys for students in the summer programs to measure their participation and satisfaction with the programs by race and gender. We will also measure the retention rate of those students to evaluate whether those programs help retain the students.

**A4: Pedagogical Efforts.** (Goals G1, G2, G3) We will continue efforts to make the CS curriculum more inclusive, improve departmental climate, and improve retention of students from underrepresented groups.

A4a. To increase access to the major, we created several entry points via interdisciplinary introductory courses, interdepartmental majors, and new project and elective courses. Faculty can teach these existing courses, implementing pedagogical practices intended to attract a more diverse range of student to computing, or build on this success to introduce additional entry-points and pathways through our major. [Contact: O. Astrachan]

A4b. We provide faculty, staff and students access to training about cultural competence, social identity groups, and the challenges impacting them (intersectionality, racism, bias, discrimination) by adding modules to existing training programs and the orientation course for graduate students, and via a departmental seminar series about culture and bias. Faculty can participate in existing efforts or work to expand and improve our offerings. [Contact: N. Washington]

*Measurement:* We will continue to track via DataBuddies and in-house surveys the percentages of women and students from underrepresented groups enrolling in and completing the CS major, via both traditional and new entry points to the major, and how many continue on to graduate school. We will also track the number of faculty/courses that meaningfully incorporate cultural computing and/or that have been trained in cultural computing.

**A5: Outreach.** (Goal G2) We will continue several activities to improve the pipeline of students from underrepresented groups in the undergraduate and graduate pool. [Contact: N. Washington, B. Fain]

A5a. Faculty can work on proposals to secure funding for activities to broaden participation, such as grants that support undergraduate research or mentoring of graduate students who are women or from underrepresented groups in computing.

A5b. Faculty can partner with HBCUs, e.g., North Carolina Central University, as well as engage with Durham public schools (45% African American) via offering short courses and faculty seminars.

A5c. Faculty can expand our summer programs to recruit students from HBCU/HSIs, as well as partner with the DREU program, with the goal of attracting these students to our graduate program.

A5d. Faculty can engage with the Duke University Center of Exemplary Mentoring (UCEM), whose Sloan Program provides financial support and mentoring for Ph.D. students from underrepresented groups.

*Measurement:* We will track faculty participation in activities, students reached by the activities, and enrollments of students from underrepresented groups.