Broadening Participation in Computing (BPC) Plan v1.0
Department of Computer Science (CS), School of Arts and Sciences (SAS)
Rutgers University–New Brunswick (RU-NB)

BPC plan effective date: January 1, 2021 through August 31, 2023
BPC Plan v2.0 start date: September 1, 2023 (revision of v1.0 to start January 2, 2023)
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Context: While our overall goal is to promote diversity, equity and inclusion (DEI) in all aspects of CS education and research at RU-NB, the initial focus is on our undergraduate education programs. Thus, contextual information and goals in this plan are undergraduate-centric. RU-NB's undergraduate student body is approximately 50% women and 50% men, and is among the most ethnically diverse in the country. The CS undergraduate student body, however, does not yet reflect RU-NB's diversity. We start with ∼25% women in the Introduction to CS course, decreasing to ∼15% women earning a bachelor degree in CS. We start with ∼4% and ∼8% Black and Latinx students, respectively, compared with ∼13% and ∼20% taking college classes in NJ in Fall 2018. ∼2.5% and ∼6.4% of students earning CS bachelor degrees are Black and Latinx, respectively. We are seeing a slow but statistically significant increase in the percentage of women taking the introductory course, rising from 21.6% in 2013 to 28.3% in 2017. Recognizing the significant DEI gaps, RU-NB's CS faculty have already been engaged in promoting DEI through large-scale curricular reforms (Diaz et al., SIGCSE 2017) and innovative co-curricular programming (Wright et al., SIGCSE 2019), guided by data-driven reflection on student experiences and outcomes (Babes-Vroman et al., SIGCSE 2017). Our DEI efforts involve collaborations with partners throughout RU-NB and a range of statewide and nationwide partners (e.g., BRAID at AnitaB.org).

Goals: We plan to continue building *a supportive educational environment that empowers undergraduate students to explore and succeed in CS, regardless of gender, ethnicity and socio-economic background.* Specific goals include:
  G1. Creating and nurturing a welcoming environment at RU-NB CS that promotes all students' intent to pursue and persist in a CS degree.
  G2. Fostering interest and capacity in CS education across New Jersey, with emphasis on engaging middle and high school students and preparing students transferring from 2-year colleges.
  G3. Revising RU-NB CS introductory classes to have a consistent look and feel, including clear learning goals, modules that better connect to real-life issues, and a presumption of student success.
  G4. Engaging diverse stakeholders to coordinate and integrate broadening participation activities.

Activities:
A1. Continue to monitor undergraduate students pursuing the CS major and minor [G1]
  Contacts: T. D. Nguyen; A. Centeno, M. Cozzens.
a) Collect data. We have collected extensive enrollment data in CS courses to quantitatively understand our education environment since 2016. We are contextualizing this quantitative data with surveys and interviews of students and instructors, and drawing lessons for current and future efforts in DEI.
b) Continue our efforts to track how the education environment is changing with our DEI efforts. We will also expand our data gathering to include math, physics and chemistry classes required for the major.
A2. Extend curricular revision [G3]
  Contacts: A. Centeno; A. Gunawardena, K. Michmizos, F. Trees, S. Venugopal.
a) Update our introductory sequence for the CS major. It includes four courses covering programming (111), data structures (112), and discrete math (205 and 206). Major updates to promote DEI roll out in 111 for Fall 2020, in 112 for Spring 2021, in 205 for Fall 2021, in 206 for Spring 2022.

b) Grow data science. Starting Spring 2021 we are introducing a new introductory course on data management for data science (210), with minimal prerequisites and leading to a new data science certificate, to integrate meaningful computing experience in a range of majors across SAS, especially in STEM.

c) Develop software tools to bolster student learning, with a particular focus on at-risk students, offering real-time predictions for personalized instruction, feedback and intervention.

A3. Refine and expand co-curricular programs [G1, G2]

Contacts: S. Nagarakatte; A. Centeno, J. Hong, L. Sorensen

a) Boost and expand the Douglass-SAS-DIMACS CS Living Learning Community (LLC), which provides an immersive educational experience to create a supportive cohort for first-year undergraduate women.

b) Pair students in introductory classes with peer mentors to reinforce students' feeling of belonging and perceptions of access and equity; starting Spring 2021, mentoring will include assistance with course material to make stronger and more valuable connections with students.

c) Continue to provide infrastructure to foster a supportive and engaged student community, combining tutoring and technical assistance, project equipment and studios, and space for meeting and socializing.

d) Continue to provide opportunities for socially-impactful undergraduate research experiences to foster a sense of belonging and self-efficacy for CS students, including through initiatives like Project Super at Rutgers designed around DEI.

A4. Outreach to middle schools, high schools and community colleges [G2]

Contacts: F. Trees; A. Gunawardena, S. Kramer, T. D. Nguyen, L. Sorensen, S. Varma

a) Support undergraduates to connect with younger students and promote broader participation in CS through programs led by student organizations.

b) Support the RU-NB Provost's Office to run RiseUp4CS, an initiative which encourages women students in high schools to take the CS AP exam and provides mentoring by Rutgers CS students.

c) Career conversations with students of Greater Brunswick Charter School and the 4H Youth programs.

d) Partnering with middle and high schools to provide professional development in CS to administrator and teachers, and to increase CS teaching capacities with emphasis on DEI.

e) Increase communication and curriculum synchronization with community colleges.

A5. Foster partnerships within Rutgers [G4]

Contacts: M. Stone; T. D. Nguyen, S. Varma,

a) Connect and partner with Rutgers leadership (e.g., Office of the SVP for Equity, Office of the EVP for Academic Affairs, and Offices of the RU-NB Chancellor and Provost) and other stakeholders so that departmental goals and activities align with and leverage Rutgers's strategic vision and activities.

A6. Foster connections and partnerships beyond Rutgers [G4]

Contacts: M. Stone; T. D. Nguyen, F. Trees, S. Varma,

a) Continue to work and foster new partnerships with peer institutions (e.g., Big Ten) and organizations such as BRAID, NCWIT, CSTA-NJ and AWIS-CJC to research, share and implement best practices.

b) Continue to organize the Annual NJ Summit for Diversity and Scalability in CS Education to bring together academic, government and industry stakeholders.

Evaluation: Several teams are working to track concrete progress in these activities as well as to evaluate the effectiveness of our interventions. These teams work both to test specific research hypotheses relating our activities to our goals, framed in collaboration with social scientists and educators, as well as to implement logic models that track actions, participation and outcomes, developed in collaboration with external evaluators engaged by ourselves and by our partners and funders. Key inputs to these tests and models include documentation of the participation and products resulting from each of our activities, quantitative trends in institutional data at Rutgers and at our partner sites (particularly enrollment, graduation and other measures of student participation and success), and interviews and surveys of diverse stakeholders covering both immediate and long-term impacts of our work.