Increasing Women’s Participation in Computing
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Three Decades of DIMACS
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Women in Computer Science

- Undergraduate computer science enrollments have risen substantially in the last decade nationally, but the percentage of women remains stubbornly low (19% in 2017) [ZB18].
- This is bad for women, bad for the CS field, and bad for innovation.
- At the undergraduate level, living-learning communities have been shown to help increase engagement and promote success [GGMS90, Ink11].
Living-Learning Community for Women in Computer Science at Rutgers
DIMACS, Douglass Residential College, and Rutgers Computer Science, with additional support from the Rutgers School of Arts and Sciences and the National Science Foundation developed a living-learning community for women in computing at Rutgers.

The Douglass-DIMACS-SAS Computer Science Living-Learning Community started in 2016 and is now in its fourth year.

Relies heavily on experience, infrastructure, and staff at Douglass Residential College (DRC) at Rutgers.

Students apply once they are accepted at Rutgers, before they start their first year.
Computer Science Living-Learning Community

- Multi-layered mentoring including a staff director, graduate mentor, an undergraduate peer academic leader, and a faculty advisor.
- Students live in a common dorm on the Rutgers Busch campus where the CS department is.

- A first-year seminar course on “Great Ideas and Applications in Computer Science.”
- Community-building programs and events to promote student engagement.
**Goals and Activities**

- Support first-year women planning to study CS by:
  - building community
  - providing academic enrichment and support
  - providing a rich structure of role models and mentors, including peer and near-peer
  - connect to the wide range of opportunities in CS, including internships, research, and social good

- Among these students, increase engagement and confidence to promote success and retention in the major and the field.
Outcomes: Majors (as of July 2019)

71% have declared a computing major or minor vs. 65% in comparison group 1.

71% have declared a computing major or minor vs. 50% in comparison group 2.
Additional Outcomes

- Quasi-Experimental Repeated Measures Study carried out by CRA’s CERP to compare LLC students to a comparison group of similar students.

- LLC participants report:
  - participation in the CS LLC helped them to continue in the CS major
  - strong support from all of the faculty, staff, and mentors associated with the program, which contributed to participants’ sense of belonging

- However, analysis of surveys also revealed some results of concern:
  - both CS LLC and comparison women show a decrease during their first year of college in their computing abilities and show a decrease in the extent to which feel welcomed and supported within the broader computing department.

- We made adjustments to the program over time and are continuing to monitor the program’s effectiveness. The CS department is also working more broadly to address these issues.
Many Reports of Strong Positive Impact

“I feel more confident in my computer science skills and ability to learn. I was intimidated at first... The LLC has definitely provided resources that helped with my confidence, like mentors and professors.”

“It was really interesting to see how what we were learning in the classrooms applied outside of school. It has encouraged me to want to learn and continue learning computer science.”

“I can’t imagine how my first year would be without the LLC. In such a big campus, making close friends is hard. With the LLC’s impact, I am more confident about my academic goal.”

“A year full of amazing support and new friendships that will last a lifetime.”

“This community has helped me especially make it through to study CS... I think it was the fact that I was able to work with a group of women going through the same struggles as me, understanding what I was feeling.”
Computer Science at Barnard
Barnard College

- Founded in 1889
- A selective women’s liberal arts college
- Affiliated with Columbia University
- No Computer Science program of its own until 2019.
Barnard created its own Computer Science program/department in January 2019. Currently one faculty member and one faculty fellow. Planning to hire one more of each this year.

Will continue to partner very closely with Columbia for the CS major.

**Rebecca Wright: joined Barnard in January 2019**
- Barnard’s first Computer Science faculty
- Previously on the faculty at Rutgers
- Druckenmiller Professor of Computer Science and Director of the Diana T. and P. Roy Vagelos Computational Science Center
- Research area: security and privacy

**Sarah Morrison-Smith: joined Barnard in July 2019**
- Ph.D., University of Florida, 2019
- The inaugural Roman Family Teaching and Research Fellow in Computer Science, a two- to three-year position.
- Research area: human-computer interaction.

**Focus on enhancing the Barnard experience:**
- build CS community
- increase academic support
- bring advising for CS majors to Barnard
- continued hiring of Barnard CS faculty
- develop curriculum and new programs with a focus on computing across the disciplines
Barnard already has CS majors, with substantial recent growth.

Coursework for the major is still primarily completed at Columbia, but now with additional CS elective options at Barnard.

Graduates do very well in the job market.

No counterpart program/department at Barnard until 2019.
Barnard CS Vision and Goals

▪ Build a program in CS at Barnard to:

▪ better serve CS majors as Barnard students
▪ connect CS to other disciplines and departments at Barnard
▪ teach CS and engage all students in meaningful computing experiences as part of a rigorous liberal arts education
▪ focus on areas beyond a traditional CS major, including the connection of technology to its impact on society and ability to solve problems and improve lives.
Barnard CS Courses So Far

- Privacy in a Networked World
- Contextual Design for Technology
- Developing Accessible User Interfaces
Curriculum development and program development efforts will focus on computing across the curriculum.

Develop new course offerings and new majors or minors via hiring in CS and in collaboration with other departments.

Through the Vagelos Computational Science Center, support non-curricular programs and inclusion of computational projects and activities in non-CS courses:

- workshops, seminars, hackathons for students to develop skills and interest
- recitation sections, labs, and open hours in the CSC classroom
- workshops for faculty to develop their skills
- student computing fellows to work with faculty and students
- support for student and faculty research projects
Workshops & Events

CSC hosts workshops most Fridays to introduce students to computational topics and skills. Current and planned topics include:

- Data Engineering with SQL
- Pandas: Python’s Data Analysis Library
- ReactJS for Building User Interfaces
- Data Visualization with D3
- Neural Networks with PyTorch
- Machine Learning
- Augmented Reality (AR)