

Office of the President

TO MEMBERS OF THE ACADEMIC AND STUDENT AFFAIRS COMMITTEE:

ACTION ITEM

For Meeting of May 17, 2023

ESTABLISHMENT OF A COLLEGE OF COMPUTING, DATA SCIENCE, AND SOCIETY AT UC BERKELEY

EXECUTIVE SUMMARY

UC Berkeley proposes the establishment of a College of Computing, Data Science, and Society. The College goals include educating a large student body representative of California's population to approach data ethically and skillfully and partnering with California's higher education sector to develop accessible and excellent data science, statistics, and computing programs. The College would advance the state-of-the-art in computing, data science, and statistics and their applications and implications, establish new fields, and enhance existing programs by bringing these disciplines into collaboration with other disciplines.

By fulfilling its research and education missions, the College would inform and enable solutions to human, scientific, technical, and societal challenges, impacting areas of strategic importance to UC Berkeley, the State of California, the nation, and the world. Students trained by the College would be better equipped to create innovative tools that respond to societal problems with consideration of ethical consequences, consistent with the University of California's public mission to further a more just and ethical world.

RECOMMENDATION

The President of the University recommends that the Academic and Student Affairs Committee recommend to the Regents that Section 15 (a) of the Academic Units and Functions, Affiliated Institutions, and Related Activities of the University, as provided for in Standing Order 110.1, be amended as follows:

Additions shown by underscoring; deletions shown by strikethrough

* * *

1. Academic Colleges at Berkeley

(a) Academic Colleges.

There are established at Berkeley ~~three (3)~~ four (4) academic colleges in each of which there is an undergraduate curriculum as follows:

- College of Computing, Data Science, and Society leading to the degrees of Bachelor of Arts, Master of Arts, Master of Science, Master of Engineering, and Doctor of Philosophy.

BACKGROUND

The proposed College of Computing, Data Science, and Society will enable UC Berkeley to respond to a growing demand for data science expertise across its research and education mission. The College of Computing, Data Science, and Society would bring together the following departments, schools, programs, and institutes:

- Department of Statistics;
- Department of Electrical Engineering and Computer Sciences (jointly with the College of Engineering);
- Data Science Undergraduate Studies;
- Center for Computational Biology;
- Computational Precision Health program (jointly with UC San Francisco);
- Bakar Institute of Digital Materials for the Planet; and
- Berkeley Institute for Data Science.

The College would house ten degree programs. It would administer three undergraduate and two doctoral programs:

- B.A. in Data Science;
- B.A. in Computer Science;
- B.A. in Statistics;
- Ph.D. in Computational Biology (administered by the Center for Computational Biology); and
- Ph.D. in Computational Precision Health.

In addition to the above B.A. in Statistics, the Department of Statistics would administer:

- M.A. in Statistics; and
- Ph.D. in Statistics.

In addition to the above B.A. in Computer Science, the Department of Electrical Engineering and Computer Sciences would administer:

- M.Eng. in Electrical Engineering and Computer Science;
- 5th-Year M.S. in Electrical Engineering and Computer Sciences; and
- M.S. and Ph.D. in Electrical Engineering and Computer Science.

The College of Computing, Data Science, and Society would have an affiliation with UC Berkeley's School of Information, including the School of Information's Dean having a dotted-line reporting relation to the Dean of the College of Computing, Data Science, and Society.

The proposed College of Computing, Data Science, and Society builds upon UC Berkeley's establishment of a Division of Computing, Data Science, and Society. In 2018, UC Berkeley announced the provisionally named Division of Data Science and Information, with an interim dean having begun in 2017. In 2019, Dr. Jennifer Chayes was named the Division's Associate Provost and Dean, and in 2022 the official name of the division was announced as the Division of Computing, Data Science, and Society.

In sum, after having functioned as a unit for five years, the College of Computing, Data Science, and Society would provide an education and research home for several existing departments and programs and facilitate the development of new initiatives and cross-campus synergies in computing and data science by engaging with other disciplines across the University to ensure deep engagement with other fields.

Meeting Campus and System Priorities

Information, computing, data science, artificial intelligence, and machine learning have become dominant lenses through which we view, interpret, engage with, and alter the world. Academic institutions across the UC system and beyond are considering how to best organize computing and data science initiatives at their campuses. Building a new college creates the institutional focus needed to support the extraordinary scholars who will change how we think about and develop the discipline of data science.

In the last decade, UC Berkeley has seen an almost insatiable demand for computing and data science training and degrees from both students and employers. Whether students decide to explore a data-driven field, every undergraduate in any area of study will increasingly need exposure to data science during their time on campus. As communities are challenged by misleading information, a solid education enabling one to think critically and confidently about data is essential, as is having the skills to identify and defend oneself from misinformation. Berkeley's programs in data science and related fields provide a framework for thinking through the social and political implications of data and algorithms, including the incentives of those producing the data and the biases inherent in their use. These programs prepare students to be members of a civil democratic society by equipping them with the technical and critical thinking skills necessary to thrive. Required courses in human contexts and ethics in data science education underline this broad commitment, differentiating Berkeley programs from programs at other institutions.

UC Berkeley is ideally suited to be the first university to create a college of computing and data science united with a social mission. Universities across the country and around the world have experienced rapid growth in computer science and emerging data science programs. Given its highly respected undergraduate data science and computer science programs, in addition to a

host of other highly respected programs across the campus, UC Berkeley has the responsibility and opportunity to create the next generation of data-driven leaders in industries such as new technologies, finance, the arts, education, health, government service, social welfare, journalism, and criminal justice. Scholars in academic disciplines across campus are working hand-in-hand with scholars in computing and statistics to create multidisciplinary fields and curricula. The proposed college will nurture the development of these fields and produce the next generation of leaders, well equipped to enter a broad range of professional pursuits.

Projected Student Enrollment

Data and computer scientists are in high demand across the technology sector, as well as in healthcare, finance, insurance, and other industries. Increasingly, there is demand for data and computer scientists in the media and entertainment industries, government, national security, and education. In academic year 2022-23, more than 900 undergraduate students are expected to graduate with a Data Science degree at Berkeley, the fifth graduating class for this new major. The three undergraduate majors that will be brought together in the new college – Computer Science, Data Science, and Statistics – will have over 1,250 graduating seniors annually. These students will benefit from proximity to each other and relevant disciplines across campus. The college will produce diverse leaders for a broad set of industries and professions who are equipped with both technical virtuosity and a deep knowledge of the ethical implications of data and algorithms. A college structure will provide necessary resources in career advising and internship placement, in partnership with industry, educational institutions, and government agencies, to facilitate student transition to the workplace.

Data science, computer science, and statistics courses also serve students from across the campus. In 2022-23, more than 4,000 students enrolled in introductory computational courses, more than 4,200 enrolled in introductory data science, and more than 3,300 enrolled in introductory statistics courses. Since 2010, enrollment growth in computer science, data science, statistics, and probability courses – particularly courses that are gateways not only to those majors but to many other areas of campus – has been enormous and reflects a commitment to keep access open to students across campus, especially in the lower division.

In response to tremendous demand for professionals with data science expertise in almost every industry, the College of Computing, Data Science, and Society plans to establish new master's degree programs and certificates in Data Science paired with an area of specialization or concentration. The degree curricula would be based on a common core of computing, statistics, and data science, including human contexts and ethics, with specializations in biomedicine, environmental and climate science, business, law, public policy, urban planning, public interest technology, and many other fields. These education programs will serve both the citizens and businesses of California.

Academic Rigor

The academic mission of the College of Computing, Data Science, and Society would be to enrich instruction and research in computing, data science, and statistics within the founding

units of the division and in collaboration with colleagues across the UC Berkeley campus. The College would focus on serving the current and future needs of its founding units while also encouraging new graduate groups, augmented graduate groups, and research units to support evolving intellectual agendas and respond to the needs of business, industry, and society at large.

UC Berkeley's data science, computer science, and statistics programs are among the best in the country, and its graduate programs in these fields are also growing and vital to the proposed college's academic rigor. Berkeley's graduate program in computer science is ranked first in the nation and its statistics program is ranked second. At the graduate level, over 650 students are enrolled in Ph.D. programs and approximately 150 students are enrolled in M.S./M.A. programs.

The College's graduate programs would cover a wide spectrum of specializations, research opportunities, and curricular offerings. They would educate cohorts of students who are interested in pursuing academic careers, as well as those who are interested in pursuing careers in nonprofits, industry, and government. The graduate curriculum includes many foci at the cutting edge of research and practice, including algorithm development, artificial intelligence, programming languages, cybersecurity, information theory, robotics, human-computer interaction, visualization, privacy, statistical machine learning, large data set manipulation, high-dimensional data analytics, computer-aided verification, causal inference, graphical models, statistical physics, probability, computational biology, computational precision health, the theoretical foundations of computer science, the interaction of humans, technology, and information, and the applications and implications of computing and data science across a wide range of domains.

The formation of a College of Computing, Data Science, and Society would enable transparent, equitable partnerships with other colleges and divisions at Berkeley; provide a known framework for the development of new disciplines and departments in rapidly changing fields; enable the adoption of financial and administrative models for supporting instruction and research that are used in other units across campus; and help to foster identity and community among graduate students and alumni.

Central to the growth and evolution at the College of Computing, Data Science, and Society would be the breadth and depth of partnerships across campus in combination with UC Berkeley's comprehensive excellence in the Divisions of Arts and Humanities, Biological Sciences, Mathematical and Physical Sciences, and Social Sciences in the College of Letters and Science; the Colleges of Chemistry, Engineering, Environmental Design, and Natural Resources; and the Schools of Business, Education, Journalism, Information, Law, Optometry, Public Health, Public Policy, and Social Welfare. To name just two examples: collaborations between Materials Science and Engineering, Chemistry, and Computing, Data Science, and Society faculty led to the launch of the Bakar Institute of Digital Materials for the Planet in Fall 2022; and collaborations between Computing, Data Science, and Society and faculty across Berkeley and UC San Francisco led to the development of the UCSF-UC Berkeley Computational Precision Health program in Fall 2021.

Financial Viability

The resources needed for establishment of the College of Computing, Data Science, and Society are existing resources that would migrate to the College; the financial plan uses current resources and does not require additional State funds. The financial organization and structure of the College includes the Dean’s Office, Data Science Undergraduate Studies, Department of Statistics, Center for Computational Biology, and the Berkeley Institute for Data Science. The College would share, in partnership with the College of Engineering, responsibility for the financial management and oversight of the Department of Electrical Engineering and Computer Sciences. The College would also share, in partnership with UC San Francisco, responsibility for the joint-campus Computational Precision Health program. The numerous joint appointments among the faculty-holding units and between these units and other units across campus reflect the interdisciplinary and collaborative nature of computing, statistics, and data science as disciplines.

The data shown in the table below display the types and ranks of faculty positions (Annual Year 2023 FTE). The faculty lines in Computing, Data Science, and Society are within existing (and in some cases, relatively new) areas; no new faculty lines are being requested as part of the College’s formation. These academic programs provide a stable foundation for normal academic operations. All Electrical Engineering and Computer Sciences faculty, shared with the College of Engineering, are included.

	Computational Biology	Electrical Engineering and Computer Sciences	Statistics	Computational Precision Health	Computing, Data Science, and Society
Ladder Faculty					
Assistant	2	16	5	3	26
Associate	0	15	7	0	22
Professor	0	58.8	9	0	67.8
Teaching Professors (Lecturers with or potential for security of employment)					
Assistant	0	3	0	0	3
Associate / Full	0	4	2	0	6
Total	2	96.8	23	3	124.8

Table: Faculty FTE in Computing, Data Science, and Society as of April 2023. FTE may be fractional and will be less than total headcount.

Computing, Data Science, and Society has been successful in raising funds for philanthropically supported faculty positions in collaboration with partners on campus. Since 2020, funds have been raised for 14 new faculty positions: four positions for Bakar Institute of Digital Materials for the Planet (not reflected in the table above, as the positions will be recruited during the 2023-24 academic year); four positions in Computational Precision Health, with one of these positions not reflected in the table above because a recruitment is in progress; two positions in Computer Science; one position focused on artificial intelligence (AI) and cancer research shared between Electrical Engineering and Computer Sciences and Berkeley's Department of Molecular and Cell Biology; and three lecturer with security of employment or potential for security of employment (LSOE/LPSOE) positions with an emphasis on the Computer Science and Data Science majors. Computing, Data Science, and Society has also obtained challenge gifts for three ladder-rank faculty and one Lecturer with Security of Employment in Data Science; when these challenge gifts are matched, they will add another four FTEs and bring the total to 18 positions. These philanthropically funded positions benefit the campus at large, given their focus on interdisciplinary research, the Data Science major, and courses that are increasingly taken by students across campus regardless of their major.

The creation of a college will afford opportunities to incubate new fields of inquiry at the intersection of computing and data science with other fields; these interdisciplinary areas are often the most active areas of research, leading to some of the most exciting scientific breakthroughs. The new college will also provide new philanthropic opportunities that support faculty lines in Electrical Engineering and Computer Sciences, Statistics, and other departments, thus supporting popular undergraduate majors and graduate programs at UC Berkeley.

Capital Requirements and Sources of Revenue

The faculty, staff, and students of Computing, Data Science, and Society are currently housed in several buildings on campus. The Electrical Engineering and Computer Sciences Department is housed in Cory, Soda, and Sutardja Dai Halls, in addition to Berkeley Way West. The Department of Statistics is housed on the third and fourth floors of Evans Hall. Data Science Undergraduate Studies staff are located in Warren Hall and Evans Hall; Computational Precision Health staff are located in Warren Hall; division staff are located in Warren Hall and McLaughlin Hall. Berkeley Institute for Data Science is located in Sutardja Dai Hall.

Construction for the Gateway, a new home for the College of Computing, Data Science, and Society, would be at the intersection of Hearst Avenue and Arch Street. Construction began in September 2022 and the building is scheduled to open during the 2025-26 academic year. The Gateway building will convene and connect faculty and students in Computing, Data Science, and Society disciplines and others across campus. With a shared purpose to improve human health, environmental sustainability, and social justice, this inclusive community is expected to catalyze interdisciplinary collaboration to investigate and help solve the most pressing problems of our time. In 2020, Computing, Data Science, and Society received a foundational \$252 million gift to seed construction of the Gateway. Since that time, the campus and Computing, Data Science, and Society have secured an additional \$76 million in philanthropic pledges for this campaign priority. University leaders including the Chancellor are actively working to raising

additional funds to ensure the completion of the building. The creation of a new college presents a unique opportunity that could include a substantial capital gift component and potentially, a naming gift.

In addition to existing resources that currently support the units that are part of Computing, Data Science, and Society, the Division has coordinated closely with University Development and Alumni Relations and other partners across campus on UC Berkeley's \$6 billion Light the Way Campaign, which has already surpassed its fundraising target. Computing, Data Science, and Society has secured substantial gifts and pledges totaling \$516.7 million. Since 2020, \$194.6 million has been raised in non-capital gifts for new research initiatives, endowed faculty and faculty start-up packages, and endowed graduate fellowships. Partnerships with alumni and friends are likely to lead to more such gifts from individuals who want to work with the College to create new fields and provide greater educational opportunities. Estimating conservatively, incoming non-capital gifts will continue at least at this rate in the future.

Once the College has reached a stable state, the roles and responsibilities of its administration will be driven by student need, size of the faculty, nature of the organization, development priorities, and scope of activities, in line with practice at UC Berkeley.

Computing, Data Science, and Society would increase access to education and degrees, enabling social mobility for a cross-section of the students of California, and the creation of the College would inspire engagement with alumni, friends, and other stakeholders. Philanthropic opportunities can enable new approaches to urgent problems in biomedicine and health, climate and sustainability, and human welfare and social justice. Major gifts are expected to enable generations of exceptional students from diverse backgrounds to become the data-driven leaders of the future in areas from technology to the biological and physical sciences, engineering, and mathematics, social sciences, arts and humanities, and professional disciplines.

Review and Approvals

The proposal for the College of Computing, Data Science, and Society has been reviewed and recommended for approval on the UC Berkeley campus and subsequently at the Office of the President and the systemwide Academic Senate, following all required procedures. These rigorous procedures involve committees of the Academic Senate on the campus and systemwide, as well as the responsible academic leaders at UC Berkeley and UC Office of the President, culminating with the recommendation for approval from the UC Berkeley Chancellor, UC systemwide Academic Council, and the UC President.