

Office of the President

TO MEMBERS OF THE ACADEMIC AND STUDENT AFFAIRS COMMITTEE:

ACTION ITEM

For Meeting of July 17, 2024

ESTABLISHMENT OF THE SCHOOL OF COMPUTING, INFORMATION, AND DATA SCIENCES AT UC SAN DIEGO

EXECUTIVE SUMMARY

UC San Diego proposes the establishment of a School of Computing, Information, and Data Sciences. The School aims to play an important educational role in training Californians in the areas of computing, information and data sciences that are key to developments across society, particularly with the recent broader advent of artificial intelligence applications in many areas. Through its academic core, the Halicioğlu Data Science Institute would provide an education that is transdisciplinary and grounded in ethical approaches to the use of data. The School plans to be unique by bringing together the Institute with one of the leading computing centers in the nation, the San Diego Supercomputer Center, as an educational and research laboratory for areas of data science, including artificial intelligence, machine learning and informatics, enabled by an accessible experimental computing cyberinfrastructure that has emerged as an essential ingredient for discovery. The School would play a key role in advancing data sciences across all disciplines and advancing the state-of-the-art in computing applications. In concert with existing Schools and academic departments at UC San Diego the School expects to play a key role in the establishment of new fields of inquiry and provide a catalyst for increasing collaboration across all the disciplines at the University.

The School would contribute, therefore, to the public mission of the University of California to advance knowledge in the service of society. Students trained by the School would be prepared to lead future innovations in artificial intelligence, data analytics and data curation. Students and working professionals trained by the School would have a unique opportunity to learn fundamental aspects of data sciences and get hands-on experience with the practical aspects of computing, all grounded by an appreciation of the ethical and public policy dimensions of these advances. As the School achieves its education and research missions, its goal would be to pave the way for advances to in the human, scientific and technical dimensions of problems faced by society in the 21st century, thereby advancing the strategic goals of UC San Diego, the State of California, and the nation.

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.

* * *

7. Academic Schools and Colleges at San Diego

(j) There is established at San Diego the School of Computing, Information, and Data Sciences with curricula leading to the degree of Bachelor of Science and graduate curricula leading to the degrees of Master of Science and Doctor of Philosophy.

BACKGROUND

If approved, the School of Computing, Information, and Data Sciences (SCIDS) would position UC San Diego to support the growing demand for expertise in the data sciences and computing across the research and educational mission of the University. The School of Computing, Information, and Data Sciences would bring together the Halicioğlu Data Science Institute (HDSI) and the San Diego Supercomputer Center (SDSC) and have strong interactions with the existing department of Mathematics (School of Physical Sciences) and two existing departments in the Jacobs School of Engineering: Computer Science and Engineering, and Electrical and Computer Engineering.

The School would initially house four degree programs, administering one undergraduate, two master's, and one doctoral program:

- B.S. in Data Science;
- M.S. in Data Science;
- Online M.S. in Data Science;
- Ph.D. in Data Science.

The proposed School of Computing, Information, and Data Sciences builds upon UC San Diego's establishment of the Halicioğlu Data Science Institute in 2018 and the long-term presence of the San Diego Supercomputer Center since its establishment on campus in 1985. The new School would unite these units, offering the educational and research foundation for these increasingly essential fields, and providing a transdisciplinary environment that would catalyze engagement across the university in the application of computing, information, and data sciences.

Meeting Campus and System Priorities

The School of Computing, Information, and Data Sciences is envisioned to be UC San Diego's next step in addressing some of the most compelling need of modern times—transforming data into actionable knowledge. Every aspect of day-to-day life, from the continuous myriad measurements of wearable sensors to the vast amounts of longitudinal climate information collected across the globe, demands conversion of data into knowledge and models that can be the basis for intellectual advances and strategic change. Addressing the data deluge is, arguably, one of the greatest current intellectual challenges; it will motivate the unprecedented integration of diverse disciplines and the development of unforeseen technologies. UC San Diego is eager to take the initiative in building a trained talent pool to address these issues, thereby fostering economic development of the region, the state, and the nation.

The formal proposal for the School outlined the depth, strengths, and synergies that UC San Diego possesses and the planning framework that would launch a highly competitive school. By drawing on the strengths of the San Diego Supercomputer Center and the Halicioğlu Data Science Institute as foundational units, the School would be uniquely positioned to translate Data Science from the classroom to research and operational scale. Students would learn how to bring research to bear on societal problems ranging from climate change mitigation (wildfires, extreme weather, water management, resilient agriculture, etc.), to social justice issues (food security, housing shortages, mass shootings, equal access to opportunity, etc.), to technical challenges (cybersecurity, next generation technologies from wireless to computer architecture, etc.), to healthcare (personalized medicine, public health, etc.). In the process, the students would engage with industry professionals, emergency responders, City, State, and federal resource management organizations, and non-governmental organizations as partners in operationalizing the results of research.

Projected Student Enrollment

The University of California system is rapidly expanding its undergraduate education to meet the growing demands from qualified applicants and the imminent need for a highly educated next-generation workforce. Indeed, UC San Diego is anticipating a total enrollment (undergraduate plus graduate) of 50,000 students by the year 2030. To achieve these twin goals of growth and workforce preparation, UC must continue to introduce necessary and new disciplines of education and training; nowadays, “computing and data literacy” is recognized worldwide as a necessity.

Both undergraduate and graduate degree programs in Data Science and Computing (DSC) continue to see extraordinary growth in its applicant pools. Figure 1 below shows the size of the applicant pool for Data Science and Computing majors, while Figure 2 shows five-, three- and one-year growth rates for the fastest-rising degree programs at UCSD.

Figure 1: Number of applicants to UCSD Data Science and Computing undergraduate majors

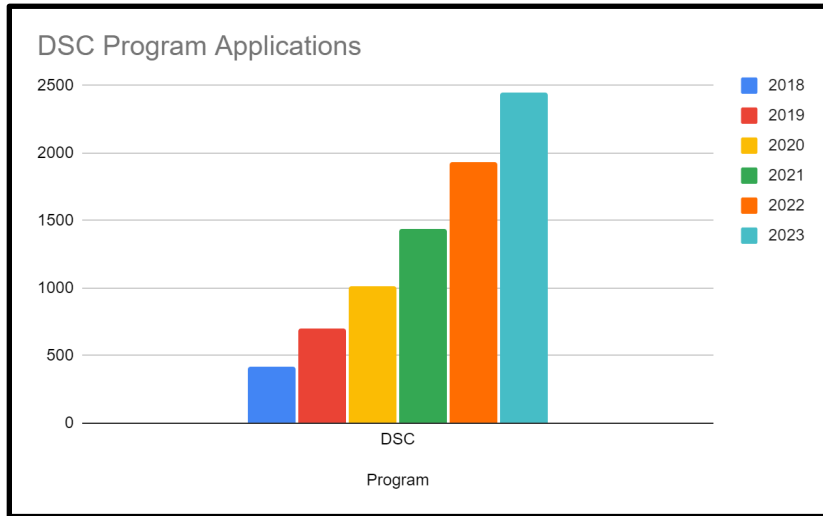
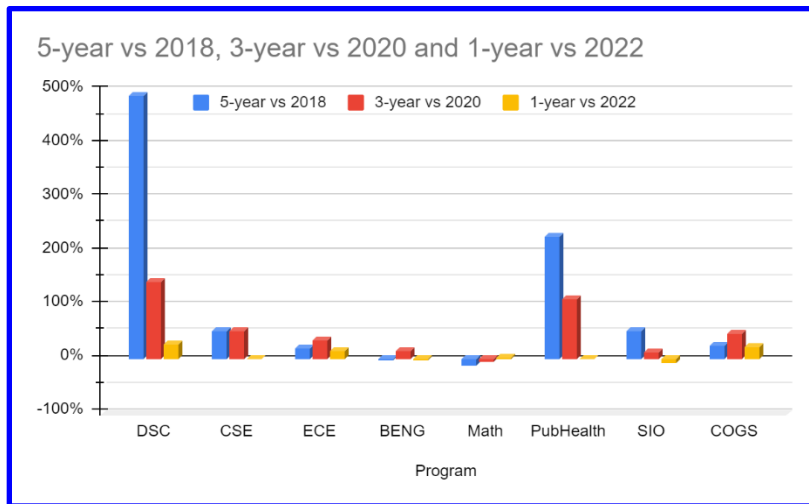


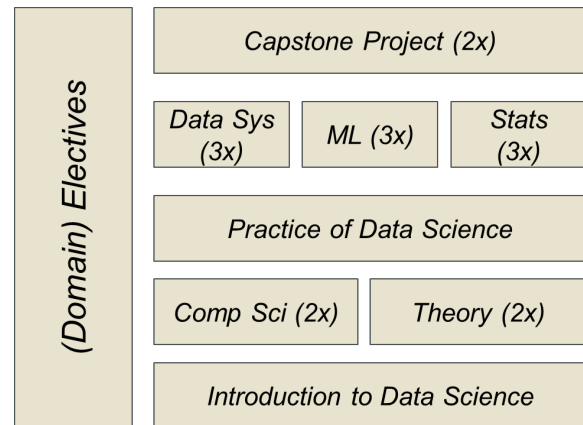
Figure 2: One-, three-, and five-year growth rates for select UCSD degree programs



In the five years since its launch, UC San Diego’s Data Science program is already among the top-15 most sought after majors. The demand from transfer students is even higher. Together Computing and Data Science already constitute the most-in-demand set of undergraduate majors at UC San Diego, ahead of perennially in-demand majors like Biology, Bioengineering, Economics and Psychology, and they can barely accommodate three percent of their applicant pool. At the graduate level, HDSI received 1,285 applications in its inaugural year, with over a thousand vying to enter the M.S. Degree programs. Having anticipated these trends a decade ago, UC San Diego specifically launched the Halicioğlu Data Science Institute with the mandate of excellence and rigor in undergraduate and graduate education, sowing the seeds for the creation of SCIDS.

Academic Rigor

The convergence of disciplines and interdisciplinary engagements within the School of Computing, Information and Data Sciences would provide an excellent opportunity to create degree programs that serve the current and growing need for talent in an information-enabled society. The existing undergraduate and graduate degree programs that would be part of SCIDS feature a rigorous curriculum that encompasses theory and practice of computing, statistics, and domain knowledge essential to understanding the academic and real-world impact of Data Science. For instance, the B.S. in Data Science consists of 112 quarter units in addition to University-required general education courses. As shown in the figure, the B.S. courses create an overall learning experience that builds foundational knowledge to prepare students for upper-division core courses. These classes in probability and statistics, systems, and machine learning emphasize critical reasoning about data generation processes across the Data Science lifecycle. Finally, Data Science majors apply their accumulated knowledge and skills to issues grounded academic disciplines of interest to them in a two-quarter capstone project.



The graduate programs (M.S. and Ph.D. in Data Science) would be curated to ensure that the School can serve students coming from diverse undergraduate backgrounds with varying levels of knowledge and experience in computing, statistics, and applied mathematics. Accordingly, the programs would be structured into three groups of courses: foundational courses (Group A), core courses (Group B), and elective courses (Group C). Among the required core courses for all graduate students are Data Ethics and Fairness, Statistical Models, and Machine Learning. In addition, SCIDS would continue to offer a Master of Data Science program jointly with the Computer Science and Engineering Department. The Master of Data Science program is designed for working professionals; all courses are self-paced and offered online. While offering a different pathway into a master's degree program, the learning goals of the courses in the Master of Data Science program are intentionally the same as for the corresponding courses in the residential M.S. in Data Science programs.

SCIDS also plans to offer educational opportunities that go beyond traditional in-residence degree programs through different presentation formats and modes of delivery. These would include programs that enable individuals to access the benefits of information society in their personal or professional lives, help others make career transition through new training programs, and teach senior executives about the growing role of artificial intelligence in businesses. In other words, the educational mission of SCIDS is expected to span from traditional degree programs to outreach and training for diverse talent.

The full suite of offerings would reflect and leverage the difference in background and training of the talent drawn to SCIDS's programs. SCIDS would both meet prospective students where they are and prepare them to advance as far as their academic ambitions take them. The School would create expanded learning pathways by building upon HDSI's current academic counseling personnel, training boot camps, and gateway courses. SCIDS outreach would include educational discovery opportunities for incoming and potential future degree program students to explore preparatory topics for later success, as well as professional development opportunities for working professionals in industry and civic organizations, an area in which the School anticipates coordination with UC San Diego's Division of Extended Studies. The School expects to be particularly well-positioned to support this outreach mission because of the core capabilities it brings from its academic appointees as faculty and affiliates, as well as practicing computing and data science professionals at SDSC.

The complete academic structure, including undergraduate, graduate, and experiential learning opportunities through SDSC, provides the foundation for the growth of the new School.

Financial Viability

The resources required to establish the School of Computing, Information, and Data Sciences already exist and will migrate to the School; the financial plan thus uses current resources and does not require additional State funds.

The financial viability of SCIDS would be rooted in three elements, each of which is a standard resource generated by other academic units at UC San Diego: instructional activities, research activities, and operational infrastructure activities. For fiscal year 2023–24, the projected revenue from SDSC and HDSI combined includes \$30 million of sponsored research, \$16 million in combined service agreements revenue and recharge income, and \$3.5 million in gifts. The financial starting point for the School would thus be \$50 million, not counting income from instructional activities.

The School's immediate growth areas would lie in its M.S. programs and its Industry Program. Given the large workforce need for experts in data and computing sciences, the School expects robust demand for the M.S. degree programs, as evidenced by HDSI's three years of M.S. enrollment statistics. Given in-state and out-of-state tuition averages of \$40,000 and with a modest enrollment of 100 students each year in the two-year M.S. degree, the School expects circa \$8 million in tuition revenue. The campus will provide a significant portion of the net revenue to the SCIDS Dean and HDSI Director, according to the standard campus models, to support SCIDS programs and faculty recruitment.

At present, SDSC's industry program is focused on service agreements for infrastructure and expertise, while HDSI's is focused on student engagement with industry partners. The two programs are thus complementary, and together provide a more attractive offering to industry than either program alone. UC San Diego therefore expects to be able to rapidly grow revenue to \$20 million from this year's total of \$11.5 million in gifts and service agreements combined.

Adding all these income streams, the annual financial target for the School is \$60 million to \$70 million, compared to \$50 million in the current fiscal year. Fundraising as part of the next capital campaign, as discussed in the next section, should further augment the School’s resources; that includes capital as well as operational resources via, for instance, endowment contributions.

The financial organization and structure of the School would include the Dean’s Office that will subsume several functions from the current business offices of the HDSI and the SDSC, with the essential unit-level functions remaining in support of the delivery of their programs. Both HDSI and SDSC already have extensive collaborations with other units on campus; for HDSI, this includes including joint faculty appointments with existing departments and Schools. For SDSC, this includes a wide range of collaborative projects and faculty fellowships. To set the scale, within the last five years, circa 100 faculty across UC San Diego have submitted extramural research grant proposals together with the research staff at SDSC, in addition to 30 faculty recruitments since 2022 where SDSC has made in-kind contributions to start-up packages. UC San Diego expects collaborative activities across campus to grow in the new School as the two units, HDSI and SDSC, build upon each other’s prior collaborations.

Both HDSI and SDSC are vibrant entities in their own right as they join together in the new School. Regarding the current faculty appointments in HDSI that will form the Senate faculty core of the new School, the data shown in the tables below provides the types and ranks of faculty positions (Annual Year 2024 faculty full-time equivalents). In addition, there are still a number of highly engaged faculty with zero percent appointments, who helped establish HDSI. As shown by the rapid and robust growth of the degree programs in HDSI, this faculty cohort will be a strong foundation for the future growth of the new School. SDSC has a total staffing of circa 250 full-time equivalents, with some 40 serving as Principal Investigators on extramural awards that form the research backbone of the Center.

FTE %	Scripps Institution of Oceanography	Medicine	Philosophy	Bioengineering	Neurobiology	Communication	Computer Science	Electrical Engineering	Mathematics	Political Science	School of Public Health	Physics	Haliçioğlu Data Science Institute
Ladder Rank Faculty													
Assistant	0.50	0.50	-	0.50	0.50	0.50	0.50	0.50	0.33	-	-	0.50	10
Associate	-	-	-	-	-	-	0.25	-	0.25	-	-	-	2
Professor	-	-	0.50	-	-	-	1.33	0.34	0.50	0.25	0.25	-	2
Teaching Professors (Lecturers with or without security of employment)													
Assistant	-	-	-	-	-	-	-	-	-	-	-	-	3
Associate/Full	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0.50	0.50	0.50	0.50	0.50	0.50	2.08	0.84	1.08	0.25	0.25	0.50	17

Table: Faculty FTE in School of Computing, Information and Data Sciences as of June 30, 2024. FTE may be fractional and will be less than total headcount

Headcount	Scripps Institution of Oceanography	Medicine	Philosophy	Bioengineering	Neurobiology	Communication	Computer Science	Electrical Engineering	Mathematics	Political Science	School of Public Health	Physics	Halicioğlu Data Science Institute	Cognitive Science	Pediatrics	Radiology
Ladder Rank Faculty																
Assistant	1	1	0	1	1	1	1	1	1	0	0	1	10	0	0	0
Associate	0	0	0	0	0	0	1	0	1	0	0	0	2	1	0	0
Professor	1	1	1	1	0	0	3	2	5	1	2	1	2	1	1	1
Teaching Professors (Lecturers with or without security of employment)																
Assistant	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0
Associate/Full	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2	2	1	2	1	1	5	3	7	1	2	2	17	3	1	1

Table: Faculty headcount in School of Computing, Information and Data Sciences as of June 30, 2024.

The activities at the school-level would supplement the aforementioned three key elements with a well-designed outreach and philanthropic development initiatives to supplement and expand the size and scope of the envisioned School.

Capital Requirements and Relevance of SCIDS to the next Capital Campaign

The origins of the School lie in the six-year-old Halicioğlu Data Sciences Institute, which serves as the academic pillar of SCIDS, and the decades-old San Diego Supercomputer Center, a national treasure whose pre-existing infrastructure brings uniqueness to SCIDS. HDSI’s founding was enabled by a generous gift of \$75 million during the last capital campaign. The resulting endowment provides \$3 million in annual income which the University has used to make targeted, one-time investments in launching the HDSI as an academic unit, starting online master’s degree programs, and establishing industry liaison, alumni relations, communications, development, career services, and professional training programs. These elements of HDSI would become part of the School of Computing, Information and Data Sciences, which would benefit from synergies with SDSC and interactions across campus.

The San Diego campus’ past ten-year fundraising campaign was completed in 2023 after raising \$3 billion; the design of its next comprehensive fundraising campaign is under way. The establishment of SCIDS will be simultaneous with the initiation of the next major fundraising campaign, and the Chancellor has made clear that funding for graduate support, undergraduate education, and boundary-spanning interdisciplinary research, like that in SCIDS and its dotted-line units, will be among the top priorities. Instructional activities would play a key role in the sustainability of the new School. In this regard, HDSI via its undergraduate major and minor and three graduate degree programs would lead the core instructional activities. The research activities of SCIDS are amongst its biggest highlights and a distinguishing feature of the proposed School compared to its peers across the nation, because, in addition to the faculty and researchers in the academic department of HDSI, SDSC would bring to the School of Computing, Information, and Data Sciences a strong capability for operationalizing and conducting at-scale research activities that explore scientific, societal, environmental, and health challenges that typically require significant investments and multi-disciplinary research teams.

The establishment of a new School would provide an important opportunity for UC San Diego to identify a new state-of-the-art home for SCIDS. Initially SDSC would remain housed in the purpose-built building it has resided in for circa 40 years. HDSI was collocated with SDSC; however, this past summer HDSI relocated to the renovated Data Science Building in the Warren College area. This new home provides relevant space for HDSI, and then, SCIDS to grow the academic program in the near term. In the longer term, the new dean for the School of Computing, Information, and Data Sciences should work with the Executive Vice Chancellor and the Chancellor to identify philanthropic support for a new home for the academic center of the new School. This should be an important priority in the early years of SCIDS.

Conclusion

The School of Computing, Information and Data Sciences would have as a goal to increase access to education, producing a new cohort of graduates that would contribute to the vitality of the State of California and engage in the evolution of society in a rich environment of computing, information and artificial intelligence enabled by the rise of the data sciences. The creation of the School is also expected to resonate and increase engagement with alumni, friends, and other stakeholders. Philanthropic opportunities across the wide range of disciplines this transdisciplinary School should impact new initiatives in biomedicine and health, applications of artificial intelligence, climate and sustainability and the ethical foundations of the use of data in society. The School would provide the catalyst for major philanthropic gifts that will enable future generations of exceptional students from diverse backgrounds, representative of the demographics of the State of California, to become leaders in data-driven areas across the span of human inquiry at the university: from engineering to the arts and humanities, and from the sciences (health, biological, physical, and social) to professional disciplines.

Review and Approvals

The proposal for the School of Computing, Information and Data Sciences has been reviewed and recommended for approval on the San Diego campus and subsequently at the Office of the President and the systemwide Academic Senate, following all required procedures. These rigorous procedures involve engagement by the appropriate committees of both the systemwide Academic Senate and the UCSD Division of the Academic Senates, as well as by the responsible academic leaders at UC San Diego and the Office of the President. They have culminated in the recommendation for approval from the UC San Diego Chancellor, the UC systemwide Academic Council, and the UC President.

Acronyms

DSC	Data Science and Computing
HDSI	Halicioğlu Data Science Institute
SCIDS	School of Computing, Information and Data Sciences
SDSC	San Diego Supercomputer Center