Opportunity and Challenge Profile

Search for the Dean, School of Physical Sciences
University of California, Irvine
Irvine, California

The University of California, Irvine (UCI), among the nation’s top public research universities and one of the fastest growing campuses in the world-renowned University of California system, seeks an inspiring, visionary, and strategic scholar-administrator to serve as Dean of the School of Physical Sciences (SPS). The University was founded to advance a goal of improving society through globally preeminent research, life-enhancing discoveries, and a world-class education for the most talented people regardless of background or economic circumstances. The School of Physical Sciences has been delivering on that goal for over 50 years, and has played a pivotal role in elevating the institution’s intellectual rigor and contributing to its national prominence. With faculty members who are innately collaborative, coupled with a robust array of independently and collectively productive departments, SPS will continue to promote and support the research that will shape society for decades to come. The next Dean will guide the School to further distinction by inspiring excellence in teaching and research, and continuing to strengthen existing infrastructure that supports interdisciplinary thought and creative partnerships locally, nationally, and globally.

UCI serves approximately 35,000 undergraduate and graduate students, more than 1,240 ladder rank faculty, and over 10,300 staff members. Founded as an interdisciplinary campus, it boasts excellence across its arts and sciences core and in its professional schools. In U.S. News & World Report’s 2019 “Best Colleges” survey, UCI climbed to seventh among all public universities and 33rd out of the 1,600 universities evaluated nationwide. As the youngest member of the prestigious Association of American Universities (AAU), UCI combines the strengths of a major research institution with the dynamism and nimbleness of an emergent campus. In addition, its mission as a public and land grant institution plays a significant role in contributing to the advancement of the state, the nation, and the world.

Currently home to over 2,300 undergraduates, 512 graduate students, and 160 faculty members, the School educates 96.5 percent of UCI undergraduates who take at least one course in SPS to help them achieve the basic skills for their various majors. The School is composed of four departments: Chemistry, Mathematics, Physics & Astronomy, and Earth System Science, all ranked in the top five among UCs and top 20 among AAUs, according to Academic Analytics. To date, 12 faculty members have been elected to the National Academy of Sciences and 10 have been elected to the American Academy of Arts and Sciences. Further, the School is a leader in science education more broadly, with initiatives in modern instructional methods and interdisciplinary education.

The next Dean will play a key role in designing and implementing a framework to ensure the economic and intellectual vitality of the School and further highlight and promote the contributions and visibility of physical sciences at UCI. The School is uniquely positioned on a relatively young campus, with robust STEM programs, that sits within the very established UC system. The University and School have distinction and influence coupled with the flexibility to further define their identity, and the Dean must provide the leadership to shape the School’s future success for years to come.

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To achieve these goals, the Dean will address several opportunities and challenges:

- Execute the vision of the strategic plan while maintaining a culture of collegiality and respect;
- Facilitate collaboration within the School and across campus;
- Acquire and allocate resources;
- Continue to foster a culture of inclusivity and a commitment to diversity;
- Recruit and retain excellent faculty; and
- Increase the visibility of the School locally, nationally, and internationally.

A list of the desired qualifications and characteristics of the Dean can be found at the conclusion of this document, which was prepared by the Search Advisory Committee with the assistance of Isaacson, Miller, a national executive search firm, to provide background information and detail the key opportunities and challenges related to the position. All confidential applications, inquiries, and nominations should be directed to the parties listed at the conclusion of this document.

About UCI

UCI traces its roots to the late 1950s, when the University of California began planning for a new campus to meet the needs of Southern California's growing population. Orange County still contained vast open spaces that provided a variety of options for locating a campus. Out of 23 possible sites, the Irvine Ranch site was chosen, and the University opened for classes on October 4, 1965, as 119 faculty and 1,589 students joined a campus that was still very actively under construction. On May 20, 1966, Daniel G. Aldrich Jr. was officially inaugurated as chancellor of UCI, a position he held for 22 years – and whose legacy is commemorated to this day with Aldrich Park, a 19-acre botanical garden in the center of the campus. At its founding, UCI comprised the College of Arts, Letters, and Science and two professional schools: the Graduate School of Administration (now the Paul Merage School of Business) and the School of Engineering (now the Henry Samueli School of Engineering). The five original divisions of the College of Arts, Letters, and Science remain intact to this day as independent schools: Biological Sciences, Fine Arts (now the Claire Trevor School of the Arts), Humanities, Physical Sciences, and Social Sciences. In ensuing years, UCI has also added the Donald Bren School of Information and Computer Sciences; the School of Education; the School of Law; the School of Medicine; the Sue & Bill Gross School of Nursing; and the School of Social Ecology.

Throughout its first five decades, UCI has enjoyed an unparalleled combination of rapid growth in enrollment and an equally impressive increase in the size, quality, and influence of its research programs, performing arts, and professional schools. The UCI faculty has included three Nobel laureates, Pulitzer Prize winners, recipients of the National Medal of Science, and many members of the most important scholarly, scientific, and professional organizations. The Center for World University Rankings places UCI 55th in the U.S. and 88th in the world in its 2017 ranking of the top 100 degree-granting institutions of higher education. Many of its programs, across the disciplines, rank in the top 20 or higher.

UCI is among the most diverse and dynamic campuses in the University of California system. In May of 2017 the U.S. Department of Education named UCI a Hispanic-serving institution for 2017-18 year. The designation builds on UCI’s recognition in early 2016 as an Asian American and Native American Pacific Islander-serving institution, demonstrating the University’s dedication to providing a world-class education to every qualified student. The HSI and AANAPISI designations increase UCI’s eligibility for funding and grants from the Departments of Education, Agriculture, and Housing & Urban Development. These designations recognize the institution-wide commitment to promoting the value of diversity not just as a goal in and of itself, but as an essential component to improving the student experience.
Having celebrated its 50 year anniversary in 2015 and looking ahead to the next century, UCI is entering an exciting and challenging new era. With ambitious plans to strengthen contributions in research, education, and service; accelerate the University’s ascendency among globally preeminent research universities; and marshal passions, skills, and ingenuity to further improve people’s lives, there is great momentum and ambition across the campus. The University has experienced significant growth over the past ten years; launched 20 new graduate programs in fields such as public health, pharmaceutical sciences, and nursing science; established a school of education and a school of nursing; and opened the first new public law school in California in more than 40 years.

Looking forward, the campus, under the leadership of Chancellor Howard Gillman and Provost & Executive Vice Chancellor Enrique Lavernia, has embarked upon an ambitious strategic plan titled, “UCI: Bright Past, Brilliant Future” with the following guiding pillars:

- Growth That Makes a Difference: Expanding Our Capacity to Improve Lives
- First in Class: Elevating the Student Experience to Prepare Future Leaders
- Great Partners: Making Regional and Global Connections that Enhance Our Mission and Serve the People
- New Paths For Our Brilliant Future: Forging Best Practices to Power the Coming Century

UCI has an annual operating budget exceeding $2.86 billion and an endowment of $951 million; the University successfully concluded its “Shaping the Future” campaign, surpassing the $1 billion goal, making UCI the youngest University in the country ever to complete a $1 billion fundraising campaign. In addition to tripling the UCI endowment, the campaign also funded more than 500 scholarships and graduate fellowships and endowed over 50 academic chairs campus-wide. UCI has an annual economic impact on Orange County of $5 billion and is a significant contributor to the region’s talent-rich workforce.

The campus has also added nearly five million square feet of new space, including the 500,000-square-foot UCI Douglas Hospital and the 275,000-square-foot Student Center, as part of a $1.8 billion effort to build out the remainder of the University’s land grant. Twenty-seven of its buildings have earned LEED Platinum status, the highest award possible, and nine other buildings have earned LEED Gold status. UCI has been ranked in the top three of the Sierra Club’s prestigious “Coolest School” annual ranking of America’s greenest colleges; the campus has been included in the top 10 for the past seven years. For more on UCI, visit: www.uci.edu.

Leadership at UCI

Dr. Howard Gillman was appointed the sixth Chancellor of UCI in September 2014, having previously served as provost and executive vice chancellor since June 2013 and interim chancellor since July 1, 2014. Before coming to UCI, he served for more than two decades as a professor of political science, history, and law at the University of Southern California (USC), including five years as Dean of the USC Dornsife College of Letters, Arts and Sciences. He has received many awards for his scholarship, and for his teaching excellence and dedication to students. He received his bachelor’s, master’s, and doctoral degrees, all in political science, from University of California, Los Angeles.

Dr. Enrique Lavernia was appointed provost and executive vice chancellor of UCI in July 2015. Before coming to UCI, he served as Dean of the University of California, Davis College of Engineering. In his role, he serves as UCI’s chief academic and operating officer, with primary responsibility for the University’s teaching and research enterprise, which includes 13 schools, more than 1,240 ladder-rank faculty, over 4,000 other academics, and 192 degree programs. He received his bachelor’s degree in solid
mechanics from Brown University and a master’s degree in metallurgy and doctoral degree in materials engineering from the Massachusetts Institute of Technology.

**The University of California System**

UCI is one of ten campuses in the University of California system (UC). Founded in 1869, the UC system is recognized as one of the world’s largest and most successful academic institutions, with a tripartite mission of research, teaching, and public service. The ten campuses that make up the UC system – Berkeley, Davis, Irvine, Los Angeles, Merced, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz – collectively enroll approximately 233,000 students and are supported by more than 190,000 faculty and staff and 1.7 million alumni living and working around the world. Another half million people benefit from UC’s continuing education courses each year, as well as from research centers and educational programs operating throughout the state. UC extends its work beyond its campuses through national laboratories, medical centers, and outreach programs in neighboring communities, throughout California, around the world, and online. To learn more about the UC system, please see [www.universityofcalifornia.edu](http://www.universityofcalifornia.edu).

**About the School of Physical Sciences**

The School of Physical Sciences (SPS) has grown in both size and reputation since its founding in 1965. The School first opened its doors with 212 undergraduate students, 55 graduate students, and 22 faculty members across the departments of Chemistry, Mathematics, and Physics & Astronomy. In 1989, Earth System Science was founded as a graduate program, and was formalized as a department in 1994.

The School finalized its most recent strategic plan in 2016, intending to achieve six critical and long-term goals by the end of fiscal year 2021. These goals operate within the framework of UCI’s four pillars of excellence. These six goals are related to undergraduate education; graduate education and research; research and teaching faculty; research and teaching infrastructure; technology transfer and sponsored research; and community, alumni engagement, and fundraising. To learn more about the School of Physical Science’s strategic plan, please see: [https://strategicplan.uci.edu/unit-plans/](https://strategicplan.uci.edu/unit-plans/)

At the forefront of scientific innovation, the School has contributed significantly to UCI’s rapid rise to an internationally recognized university. Not only does the School excel in research in the pure sciences, the School is at the cutting-edge of interdisciplinary research. All four departments (Appendix A) have been active in leading the University toward a future of highly integrated scientific inquiry, education, and innovation. This is exemplified through several key research centers (Appendix B) and research facilities (Appendix C). This past summer, construction began on UCI’s newest multidisciplinary building, the Interdisciplinary Science and Engineering building, made possible from a unique funding collaboration among campus, state, and private donors. This building will include more than 200,000 square feet of research, office, and meeting space. Projected for completion in late 2020, it will house faculty, staff, and students from the Henry Samueli School of Engineering, School of Physical Sciences, and Donald Bren School of Information & Computer Sciences, and will facilitate collaboration on a wide range of scientific challenges.

The School of Physical Sciences is committed to inclusive excellence at all levels: faculty, staff, graduate and undergraduate education. Twenty-eight percent of faculty members are women, a doubling in percentage over the previous decade. The School’s favorable record in gender diversity and policies related to equity was recognized by the Clare Booth Luce program (Henry Luce Foundation), which gave SPS a $500k award to further recruit and support female faculty members. In recognition of student inclusion efforts, the National Science Foundation awarded the School nearly $1 million for scholarships
and research into the best ways to support low-income and academically meritorious students in physics, building on the strong mentoring that already exists.

**Role of the Dean**

The Dean is the chief academic and administrative officer for the School of Physical Sciences. Reporting directly to the Provost and Executive Vice Chancellor, Dr. Enrique Lavernia, the Dean will oversee a budget of nearly $110 million and manage 160 tenure-track faculty, over 240 other academic appointees, and 103 staff. The Dean’s direct reports include the Associate Dean for Research and Innovation, Associate Dean for Undergraduate Affairs, Associate Dean for Graduate Studies, Equity, and Inclusion, Assistant Dean, Executive Director of Development, and four department chairs. The Dean of Physical Sciences also serves as a member of the Chancellor's Advisory Council, advising the Chancellor on a broad range of strategic university issues.

The successful candidate will provide academic leadership to foster a commitment to excellence in research, teaching, and service; engage in long-range planning and execution for the School of Physical Sciences in collaboration with the faculty and cross-campus leadership; enhance graduate and professional education; and grow the collaboration with other academic units to ensure that SPS reflects UCI’s culture of interdisciplinary scholarship. In addition, the Dean will be an active participant in fundraising and the cultivation of private giving and corporate support. The Dean plays a significant role assisting chairs in the recruitment and retention of faculty and ensures equal opportunity in the recruitment process while building consensus within the School. Additionally, the Dean will participate in the recruitment and retention of staff, including active participation in staff development opportunities.

The Dean will provide overall leadership for systems, programs, policies and procedures that foster fiscal integrity, preservation of school resources, and meet all state and federal policies and standards. Moreover, they will be responsible for cultivating an educational environment that is respectful and supportive of faculty, staff, and students, and enhances the diversity of faculty, staff, students, and programs.

**Key Opportunities and Challenges for the Dean**

The Dean will play a key role in guiding the evolution of the School of Physical Sciences in the years to come. This individual will be a strong communicator and will promote a culture of transparency. The Dean will also be expected to address several key opportunities and challenges, detailed below:

**Execute the vision of the strategic plan while maintaining a culture of collegiality and respect**

In response to UCI’s aspirational motto (“Bright Past, Brilliant Future”), the School finalized a five-year strategic plan in 2016 with six long term goals. The goals are multi-faceted and complex, and the School needs a Dean who can hit the ground running, executing the plan that is already underway while recognizing that there is always room for refinement and improvement. The Dean will be responsible for implementing the plan in a collaborative and transparent manner, and will recognize and leverage the expertise, experience, and abilities of the faculty and staff within the School. SPS has been highly successful thus far in its endeavors, which can be partly attributed to the culture of collegiality and respect. The Dean will be expected to lead by example in this regard and will continue to foster a supportive and professional environment within the School.
Facilitate collaboration within the School and across campus

Within the School, there is already a highly collaborative spirit and great aptitude among faculty members for identifying interdisciplinary and multidisciplinary opportunities. These ideas have developed organically, and the Dean will leverage these strengths and continue to foster an environment that values and encourages teamwork. In addition, the Dean will encourage and support faculty members to look outward and identify opportunities for partnerships across campus.

The new Interdisciplinary Science and Engineering building will aid in this endeavor by bringing together physical sciences with engineering and information and computer sciences in the same physical space. The Dean should maximize this opportunity and consider collaborations with other disciplines as well, such as biological sciences and public health.

Acquire and allocate resources

Working closely with the Executive Director of Development for the unit, the Dean will be tasked with leading fundraising efforts through individual giving, corporate sponsorships, and philanthropic partnerships. The Dean must garner resources for more faculty and graduate teaching assistants as well as for more physical space and support services for students. Resources must also be procured for several flagship projects underway related to medicine and health, the universe, and environmental change, whose findings will have great implications on society. Further, the Dean will play an active role in helping the School secure a naming gift that will have the ability to transform the School of Physical Sciences, and ensure that the School will continue to grow, thrive, and lead in the physical sciences in the decades to come.

Continue to foster a culture of inclusivity and a commitment to diversity

Within the School, the Dean will set the expectation that diversity, equity, and inclusion is a priority and responsibility for all. UCI strives to be a more inclusive and diverse campus, and as such, the University is fulfilling that commitment by serving a greater number of first-generation students, students from underrepresented groups, transfer students, and international students. The Dean will partner within the School and across campus to continuously evaluate and address the academic and social needs of the student population to ensure they have the resources they need to succeed at UCI and beyond. Furthermore, the Dean will seek out diverse perspectives by continuing efforts to recruit and support faculty, staff, and students and by ensuring that the environment in the school is accepting and inclusive.

Recruit and retain excellent faculty and staff

Outstanding faculty and staff are critical to fulfilling the School’s mission, and to this end, the next Dean will be expected to not only attract and hire high-quality and diverse faculty, but also to retain them by mentoring, developing, and supporting them in becoming engaged and innovative leaders in their respective disciplines. The Dean will work well within a shared governance structure and be a skilled manager. This individual will also oversee all staff and will provide mentorship and professional development opportunities to ensure their continued success. Furthermore, the Dean should strive to be accessible, inclusive, and consultative, advocating for more faculty and staff involvement and recognition institution-wide.

Increase the visibility of the School locally, nationally, and internationally

The School of Physical Sciences has contributed significantly in putting UCI on the map locally, nationally, and internationally, and it will be the responsibility of the Dean to continue to enhance that
reputation and increase the visibility of the School. The School has a powerful composition of highly-ranked and productive departments that are both individually and collectively poised to make a lasting impact in areas such as air quality, climate change and global health. The Dean will seek and create opportunities for faculty, staff, and students to bring their great work onto the national and global stage and further solidify UCI as a thought leader in these areas.

An equally important task for the Dean is local community engagement. Initiatives in progress include a breakfast lecture series and outreach in local K-12 schools. The Dean will further strengthen existing relationships and will seek out opportunities for new partnerships, particularly those that will reach low-income, minority communities in Southern California.

Qualifications and Characteristics

The Dean of the School of Physical Sciences must be able to articulate a strong vision for the School and demonstrate an ability to understand and react to current complexities that public universities face in today’s changing higher education environment and that undergraduates and graduates face in the rapidly changing job market. The Dean must understand the role and importance of the public university in society, and should be committed to seek ways to enhance research and translate outcomes to better serve society.

The Dean must also have knowledge of financial strategy and a creative vision for how public and land grant institutions may adapt to changes in the external financial environment, including significant reductions in state funding. Underlying all the above, the Dean should have a positive attitude, an active, energetic mind, and a leadership style that is characterized by highly ethical practices and a commitment to diversity, openness, flexibility, and integrity. In particular, the successful candidate will demonstrate most, if not all, of the attributes below:

- A strong academic record commensurate with appointment to the rank of full professor with tenure is required;
- A desire to support a culture of integrity and mutual respect;
- A commitment to the diversity of the student body, faculty, and staff;
- Impeccable academic judgment, a record of appreciating excellence and participating in the successful recruitment and retention of a superb faculty, and a record of significant contribution to the growth of innovative programs, departments, and/or schools;
- Demonstrated success in leading a complex academic unit;
- A commitment to promoting interdisciplinary research while appreciating the value of knowledge discovery in the basic sciences;
- A commitment to innovative and engaging undergraduate and graduate education;
- Excellent financial strategy and financial management skills, and demonstrated experience working with complex budgeting models;
- The ability to communicate internally to staff, faculty, students, and others, and to build cohesiveness and community among constituents;
- A deep understanding of and appreciation for the importance of excellent communication externally across academic schools, to the Office of the Provost, alumni, donors, legislators, and others;
- A commitment to transparency in policy, strategy, and financial management, with an appreciation of and support for shared governance;
- Demonstrated ability to understand and react to current complexities, including the political, financial, technological, and global challenges that public universities face today;
- Excellent interpersonal skills;
Search for the Dean, School of Physical Sciences  
University of California, Irvine

- Self-confidence without self-importance;
- Honesty, integrity, enthusiasm, energy, and perspective; a strong work ethic, supported by commitment and follow-through; and
- The desire and ability to develop a deep appreciation for the mission and aspirations of UCI, with the capacity to effectively articulate the School’s vision to key stakeholders.

Location

Irvine, California is located in the heart of Orange County with two major freeways, rail service and its own airport – John Wayne Airport. Laguna Beach, Huntington Beach, Corona Del Mar, and Catalina Island are only a short distance away. Irvine is located less than an hour from Los Angeles Airport and downtown Los Angeles. The city of Irvine, incorporated on December 28, 1971, is among the nation’s largest planned urban communities, encompassing more than 65 square miles. Located in the heart of Orange County, in a city named “Safest City in America” for six consecutive years, UCI enjoys the best of what Southern California has to offer: beaches, mountains, deserts, and a broad variety of cultural, entertainment, and intellectual activities. To learn more about Irvine, see www.destinationirvine.com.

Many UCI faculty and administrators reside in University Hills, which was created as an academic community in residence to provide affordable housing to eligible full-time employees. It is within walking distance of Irvine shopping, restaurants, and entertainment, as well as campus academic and athletic activities, and neighborhood recreational amenities. The community has three apartment communities, two condominium associations, townhomes, paired homes, single-family detached homes, and a few custom homes. In all, University Hills has 1,122 homes and 360 apartments on more than 300 acres, and continues to grow.

Applications, Inquiries, and Nominations

Screening of complete applications will begin immediately and continue until the completion of the search process. Inquiries, nominations, referrals, and applications should be submitted via the Isaacson, Miller website for the search: www.imsearch.com/6889. Electronic submission of materials is strongly encouraged.

Complete applications include a CV, cover letter, and a separate diversity statement that describes past activities that promote diversity and inclusion and plans for future contributions. For further information about UCI’s commitment to inclusive excellence, please visit: https://uci.edu/diversity.

The University of California, Irvine is an Equal Opportunity/Affirmative Action Employer advancing inclusive excellence. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, age, protected veteran status, or other protected categories covered by the UC nondiscrimination policy. A recipient of an NSF ADVANCE award for gender equity, UCI is responsive to the needs of dual career couples, supports work-life balance through an array of family-friendly policies, and is dedicated to broadening participation in higher education.

Isaacson, Miller
Page 8 of 15
Appendix A

School of Physical Sciences Departments

The Department of Chemistry operates one of the largest chemistry teaching enterprises in the U.S., graduating 100-140 B.S. majors each year – a number in the top five nationwide. The Department now offers lecture videos of its entire lower division undergraduate curriculum, in addition to videos of most of its upper division lecture classes and three graduate courses (http://ocw.uci.edu). The Department of Chemistry has considerable research strengths in synthesis; hard and soft materials science and nanoscience; physical chemistry and time dependent spectroscopy; and chemical theory. Atmospheric chemistry remains an area of notable strength, especially with the strong overlap with the Department of Earth System Science. The Department of Chemistry has trained nearly 1,500 graduate students – one third are industry scientists (working at companies such as Pfizer, GlaxoSmithKline, Amgen, Gilead Sciences, and KLA Tencor); one quarter are industry executives and managers; and one quarter are teachers at universities, colleges, and high schools. The Department is already close to an appropriate size for a major research university. Further departmental growth will be aimed mainly at strategic synergy with interdisciplinary programs across campus.

The Department of Earth System Science is the prototype for successful convergent science on the UCI campus. It is the world’s first department designed to bring together a diverse group of scientists to study global climate change, and to contribute through research and teaching to a fundamental scientific understanding of the Earth as a coupled dynamic system. The department offers two bachelor’s degrees: Environmental Science B.A. and Earth System Science B.S., and teaches geosciences and climate science to a large number of undergraduates as part of their general education courses. Research strengths in the department include atmospheric science, oceanography, marine and terrestrial ecology including carbon cycle studies, and ice sheet dynamics; the Department of Earth System Science has a cluster of the world’s leading glaciologists. As an inherently interdisciplinary field, each area of strength is synergetic with several other departments on campus. It is also a young department that has trained over 100 graduate students thus far; more than half have faculty careers, almost a quarter have careers at national or university laboratories, and a quarter are in industry positions, and most continue to do research related to climate change or deal with environmental issues. Emphasis for new faculty member hires will be in areas related to the broader impact of climate change – the intersection of the human system with natural systems – as well as modest growth of polar science.

The Department of Mathematics has research excellence in both basic mathematics and the application of mathematics to interdisciplinary problems. Areas of strength include analysis and partial differential equations, geometry, number theory, computational mathematics, mathematical biology, cryptography, and financial mathematics. The bulk of the Department’s undergraduate teaching is to non-math majors, but the growth of mathematics majors over the past decade has been dramatic. Within the mathematics major, the Department now offers specializations/concentrations in mathematics education, applied and computational mathematics, mathematical biology, and mathematical finance. The Department of Mathematics has trained more than 800 graduate students. Three quarters of the graduate student alumni are faculty members and the remaining quarter are in industry (working at companies such as Wells Fargo and Google). The research excellence and enrollment growth has resulted in significant teaching workload increases, as both undergraduate and graduate students are attracted to the Department. It is crucial that the faculty of the Department of Mathematics grow significantly over the near term to adequately meet its rapidly increasing teaching workload.

The Department of Physics & Astronomy is home to preeminent faculty working to understand the universe at its most fundamental levels. World-class research within the Department of Physics & Astronomy spans the smallest scales in nature (particle physics) to the largest scales observable.
(astrophysics and cosmology); it explores matter from cold quantum systems (condensed matter) to the living world (biophysics) to the frontier of fusion energy (plasma physics). The undergraduate curriculum provides degrees in physics and in applied physics with concentrations in biomedical physics, computational physics, physics education, philosophy of physics, and a specialization in astrophysics. The Department of Physics & Astronomy ranks 15th in the nation in Ph.D. production and has trained over 800 graduate students. About half of these graduates become industry scientists and engineers (working in companies such as Intel, Google, Boeing, and Tri Alpha Energy); one quarter have careers in national laboratories or university research groups. Future growth will focus on attracting preeminent scholars who complement and build upon existing research strengths, with an eye towards the most cutting-edge science appealing to the best and brightest students in the world.
Appendix B

Interdisciplinary Research Centers

**AirUCI** is dedicated to understanding and solving the urgent challenges related to air quality, climate change, and green technology, at the local and global level. The center has 26 UCI faculty member affiliates across the disciplines of chemistry, physics, engineering, and medicine as well as national and international collaborators.

**Chemistry at the Space-Time Limit (CASTL)** is a National Science Foundation funded center that develops the essential science and technology to probe single chemical events in real space and time.

**Center for Complex Biological Systems (CCBS)** integrates expertise and perspectives from diverse scientific fields to develop a deeper understanding of systems biology, includes faculty member representation from all four of our departments, and is affiliated with the graduate program: Mathematical, Computational, and Systems Biology.

**Center for Cosmology** brings together particle physicists and astronomers to explore links between the largest and smallest scales in nature. The Cosmology Center takes advantage of the fact that Physics & Astronomy have a combined department at UCI.

**Center for Solar Energy** is dedicated to studying the fundamental scientific principles of solar energy conversion.

**Chao Family Comprehensive Cancer Center** brings together a multidisciplinary group to discover, teach and heal within the broad discipline of cancer medicine. Members from the Departments of Chemistry and Mathematics play an important role in this center.

**Data Science Initiative** coordinates and links the activities of researchers and students across campus involved in various aspects of data science.

**Institute for Mathematical and Behavioral Sciences (IMBS)** is a specialized research center that facilitates interaction among scientists to formulate precisely and test theories of human behavior.

**Irvine Materials Research Institute (IMRI)** is an umbrella institute for materials research at UCI, and provides major instrumentation and staff support for materials characterization for UCI, other universities, and industry.

**NSF-Simons Center for Multiscale Cell Fate Research (CMCF)** brings together scientists across the physical and biological sciences to take on the formidable multiscale challenges associated with investigating complex cell fate systems using an integrated mathematical and experimental approach.

**Southern California Center for Galaxy Evolution**, led by UCI Department of Physics & Astronomy, brings together members from five University of California campuses to promote research in how galaxies are formed.

**UCI OCEANS (Oceans, Changing Environments, Arts, and Nearshore Societies)** is a campus-wide initiative that tackles, through research and education, pressing marine and on-shore environmental concerns and investigates questions at both global and local scales.
Water UCI facilitates seamless collaboration around questions of fundamental and applied water science, technology, management, and policy, and includes participation from faculty and students in the Department of Earth System Science.
Appendix C

Research Facilities

**Biomolecular Spectrometry Facility, School of Physical Sciences and Ayala School of Biological Sciences**
This joint facility has an 800 MHz NMR spectrometer for biomolecular studies. The 800 MHz NMR spectrometer can detect proton, carbon and nitrogen signals and is equipped with hardware optimized for biomolecular applications.

**Center for Isotope Tracers in Earth Science (CITIES), Department of Earth System Science**
The CITIES facility houses a range of sophisticated analytical instrumentation to prepare and analyze gases, organic matter, inorganic samples, and water for stable isotope composition. This includes four stable isotope mass spectrometers (IRMS) – capable of measuring air, water, soil, plant, and rock samples – and a High-Resolution Inductively Coupled Plasma Mass Spectrometer (HR-ICP-MS) that is utilized for measuring elemental and isotopic tracers in natural samples. The Nu AttoM HR-ICP-MS can be utilized for high-precision analysis of nearly every element in the periodic table in both inorganic and organic solution matrices for a wide range of applications.

**Greenplanet: Cluster Computing**
The Greenplanet Cluster in the School of Physical Sciences in partnership with the Department of Chemistry Modeling Facility is a 362-node (6648-CPU, 20-GPU) research computing cluster based on both Intel and AMD processors. Inter-node networking uses Intel QDRIFinfiniband tuned for MPI parallel processing. Greenplanet is on the UCI Lightpath, with seven 10-Gb/s links to the Internet. Datastorage resources were recently doubled to 950TB with the addition of a 360TB BeeGFS array. Physical Sciences Computing Support staff and the Modeling Facility Director architect, operate, maintain, and provide user support for several hundred users from physical sciences and related fields.

**Irvine Materials Research Institute (IMRI)**
IMRI serves as the cross-campus nexus for materials characterization and fabrication. IMRI operates a range of state-of-the-art, open-access user facilities for the characterization of inorganic, organic, and biological materials and devices ranging from sub-Å to macroscopic length scales. IMRI is home to five transmission electron microscopes (TEMs), including the two highest-performance instruments in the world (Nion UltraSTEM 200 HERMES and JEOL Grand ARM) and a cryo-TEM (JEOL JEM-2100F) as well as comprehensive sample preparation instrumentation. IMRI also offers a wide range of state-of-the-art nanofabrication and characterization techniques, including scanning electron microscopy (SEM), focused ion beam (FIB) milling and deposition, electron beam lithography, thermal and e-beam evaporation, glancing angle deposition, energy-dispersive X-ray spectroscopy (EDS), electron backscatter diffraction (EBSD), in situ electrical/optical/mechanical nanoprobing, atomic force microscopy (AFM), X-ray diffraction (XRD), X-ray computed tomography, surface metrology, 3D light microscopy, and sample preparation.

**Instrumentation Development Facility, Department of Earth System Science**
The IDF is equipped to support electronic instrumentation from simple interconnects to complex systems. Services include advice, repair, design & development, and parts services. The IDF is open to all of campus.

**Laser Spectroscopy, Department of Chemistry**
Laser Spectroscopy Facility incorporates three laboratories for linear and nonlinear optical spectroscopy and materials characterization: Linear, Microscopy and Ultrafast Laboratories. Linear Spectroscopy Laboratory incorporates various techniques, as absorption/reflection/scattering spectroscopy,
fluorescence, IR spectroscopy, circular dichroism, dynamic and static light scattering. Microscopy lab provides all-optical, Raman and fluorescence microscopy capabilities. Ultrafast laboratory equipped with several high energy pulsed laser systems: nanosecond, picosecond and high power femtosecond beamline. The spectral range of the experiments span from far UV to far infrared range to perform various transient absorption experiments, time-resolved fluorescence, four-wave mixing, THz time-domain spectroscopy to name a few.

**Machine Shop, School of Physical Sciences**
The research machine shop provides quality machined parts and welding services to faculty, students, and staff. The shop works with a range of materials, such as titanium, molybdenum, stainless steel, nickel alloys, tool steel, tungsten, aluminum, composite materials, plastics, and wood. The shop also assists researchers in designing equipment to meet their needs with FeatureCam/Gibbs technology to use CAD programs for fabricating parts. The shop operates a fully stocked tool crib that sells materials and hardware.

**Glassblowing Shop, School of Physical Sciences**
The School of Physical Sciences supports a world-class glass blowing facility that specializes in making complex, custom-designed glassware to support research in SPS and across campus.

**Mass Spectrometry, Department of Chemistry**
The facility has over ten instruments that can study molecules as light as gases or as massive as proteins and polymers. A very unusual feature is that four of the mass spectrometers are student-operated and are available on a 24/7 basis. The facility also has multiple instruments applicable to biological applications. LC-ESI-MS (TOF and QqQ) and GC-MS are available in Open Access format for small molecule analysis, e.g., for identification and quantification of drugs and endogenous compounds. Protein analysis and identification is offered using nano-LC-MS/MS and MALDI-TOF.

**Molecular Modeling, Department of Chemistry**
This facility provides cutting-edge resources for performing computational simulations of chemical systems, spanning quantum-mechanical electronic structure of molecules and materials to molecular dynamics of large biomolecules and membranes. Calculations are primarily performed on the Greenplanet cluster. Current software packages include Turbomole, Spartan, Gaussian, NAMD, CP2K, AMBER, Octopus, NWChem, and AutoDock.

**Nuclear Magnetic Resonance Spectroscopy (NMR), Department of Chemistry**
The facility has four high-resolution instruments including a 600 MHz NMR spectrometer, two 500 MHz NMR spectrometers, and one 400 MHz NMR instrument. The instruments are equipped with a range of probeheads to enable access to a wide range of experiments, covering multi-dimensional, multi-nuclear and variable temperature NMR. The facility is available to all researchers at UCI, once they are trained, and operates 24/7 in open-access hands-on mode.

**Nuclear Reactor, Department of Chemistry**
The reactor is a 250-kilowatt steady-state power Mark I TRIGA built by General Atomic and includes a variety of sample irradiation facilities. Several gamma-ray spectrometer systems are available, with a variety of detectors and modern software systems. A Compton suppression system and a multi-sample automatic changer provide for low background level and long sequenced counting. A delayed neutron counting system allows determination of small quantities of fissionable materials. A cesium-137 source provides gamma irradiation capability for specimens up to 12 inches in size. The facility is both a research and teaching tool, and open for use by students or classes at other universities and colleges.
UC Observatories
UCI School of Physical Sciences researchers use and help manage the UC Observatories, which include the Lick Observatory, the Keck Observatory, and the Thirty Meter Telescope.

W.M. Keck Carbon Cycle Accelerator Mass Spectrometer (KCCAMS) Facility, Department of Earth System Science
The KCCAMS facility operates a modified 500 kV compact accelerator mass spectrometer (AMS) unit from National Electrostatics Corporation (NEC 0.5MV 1.5SDH-1 spectrometer) dedicated to measuring 14C. The spectrometer is equipped with an in house designed 60-sample MC-SNICS Cs sputter ion source, allowing measurement of ~800 unknown samples per month. Target preparation for AMS dating is available as part of the facility: samples handled routinely include organics (plant material and bone), carbonates, water, and CO2 and CH4 in air. Space for processing test samples (swipes) and low-level 14C-tracer work is maintained in neighboring building within the School of Physical Sciences. Further, the KCCAMS facility is further equipped with two stable isotope mass spectrometers (Thermo-Finnigan Delta+), with dual inlet or continuous flow capability. Peripheral interfaces include an elemental analyzer for elemental and isotope analysis of carbon and nitrogen in solids, a Gasbench II for isotope analysis of CO2, a thermal combustion elemental analyzer for isotope analysis of H2O, and a pre-concentrator coupled to a gas chromatograph for isotope analysis of trace gases, including N2O and CH4.

X-Ray Crystallography, Department of Chemistry
The facility contains two Bruker SMART APEX2 single-crystal diffractometers, each equipped for low-temperature data collection. There are several computer workstations available for structure determination. The Cambridge Structural Database is available in the lab and to the entire campus via a site license.