

UNIVERSITY OF CALIFORNIA, SAN DIEGO BASIC RESEARCH

Basic research is scientific investigation done purely for the discovery of knowledge. At UC San Diego, discovery-driven research is part of our primary mission. On our campus, this can best be defined as basic research that has a theory-driven base to explicate the underlying processes that have far reaching scientific impact. This research may have immediate application; however, it may not have any immediate application when undertaken, but rather focus on questions critical to understanding basic life in the world around us. The impact will come as other researchers build on this foundation. UC San Diego anticipates that basic research conducted on our campus will be eligible for publication in top-tier journals such as Science and Nature and will span all areas of scientific investigation.

At UC San Diego, the Basic Science Fund is just one of many mechanisms in place to permit donors to support research.

The UC San Diego Basic Science Fund is located within the UC San Diego Foundation and scientifically managed centrally in the Office of Research Affairs. UC San Diego seeks to honor the interests and wishes of donors while fostering stellar basic science and scientists. We will work with all donors to maximize the “fit” of their interests with basic research opportunities at UCSD. This tailored process includes multiple award mechanisms and options. As described below, each mechanism normally includes a competitive aspect; however, should the donor prefer, funds can be targeted to individual scientists and their area of science.

For funds directed to a given area (e.g., high density fusion science, molecular genetics, etc.) or level of scientist (e.g., junior faculty, graduate student), the Office of Research Affairs oversees a comprehensive review process for contributions to the UC San Diego Basic Science Fund in the Foundation. The review of applications for basic science funds involves a panel of both internal and external senior scientists using quality and distinctiveness criteria as well as donor criteria. Once applications and donations are reviewed, recommendations are made to the Basic Science Fund board. The recommendations undergo an administrative review in consultation with the donor. In all cases, a direct connection between the donor and the scientist is made and donations can be targeted to specific faculty or research areas, or directed more generally to, for example, research facilities. Other options include targeting a period in the researcher’s career trajectory (graduate students, postdoctoral scholars, junior faculty) or a generalized area of research such as breakthrough science. Tracking mechanisms are in place to identify successes and provide regular feedback to donors about the impact of their contribution.

The Process

UC San Diego will issue an annual call for proposals from all researchers at every level of the organization that will encourage the submission of basic science concept papers. The initial step in the process will be review by a blue-ribbon panel of internal and external senior scientists

who will consider each proposal and select those that best meet the following criteria:

- Innovative basic research with little chance of funding from conventional sources
- Promise of genuine and/or disruptive insight, and/or of laying groundwork for important further research
- Proposals that stress UC San Diego's ongoing mission to generate opportunities for multidisciplinary research requiring involvement across internal campus boundaries such as departments
- Lastly, UC San Diego recently completed a year-long, campus-wide, bottom-up strategic planning exercise that identified four Strategic Research Initiatives:
 - Understanding and Protecting Our Planet
 - Exploring the Basis of Human Knowledge and Creativity
 - Enriching Human Life and Society
 - Understanding Inequities

While not restricted to these themes, the review process will take into consideration a proposal's probability for enhancing big-picture basic science in one or more of these areas. This process will result in a partial inventory of UCSD research funding opportunities for consideration by potential SPA donors.

The receipt of a donation or expression of interest initiates the next step in the process. At this point, the panel reviews each donation and determines which proposals are best suited to the donor's requirements and requests, and determines whether a specific "call for proposals" is required. The match can be targeted to a research area, a scientific career level, or specific donor interest (e.g., under-represented minorities, high-risk science, etc.). Once prospective matches are selected, recommendations are made to the Foundation Board.

The final step in the review process is the administrative review in consultation with the donor. The direct connection between the donor and the scientist ensures that UC San Diego meets the donor's wishes.

Due to the recent downturn in basic science funding, UC San Diego's initial focus will be to achieve a balance between the need for current use funds to ensure continued basic science research and building an endowment (should a donor wish this) to permit the UCSD Basic Science Fund to plan for the long term. An important goal of this strategy will be to enable our Fund eventually to support one- to three-year packages of \$25K to \$100K per year for up to 20 primary investigators. Depending on the success of the program, the vetting process described above might require modification to include a pre-proposal step to reduce the number of faculty members spending the time necessary to prepare full proposals.

Again, tracking mechanisms are in place to identify successes and provide regular feedback to donors about the impact of their contribution. Metrics may include, but are not limited to, publications, presentations, and interviews.

Fundamental research areas based on UC San Diego's Strategic Research Initiatives:
Understanding and Protecting Our Planet

- UC San Diego has been in the forefront of the environmental movement since the Scripps Institution of Oceanography (SIO) first reported on the concept of climate change in the late 1950's. UCSD is a world-leader in a broad range of earth and environmental research and educational programs, and boasts a constellation of interdisciplinary basic research centers, in addition to departments and schools, that work collaboratively to understand the planet and develop solutions to environmental problems. The brand identity of SIO is synonymous with interdisciplinary climate research and provides a strong foundation for the development of cross-campus synergies.
- Examples of initiatives under this theme might include: understanding the physical and chemical mechanisms and impact of major changes like sea-level rise or a summer ice-free Arctic; origins of life; or reengineering photosynthetic organisms to generate renewable energy.

Enriching Human Life and Society

- We live in a time of dramatically changing technology, and new technologies serve to disrupt old solutions and offer fresh alternatives. UC San Diego embodies a campus "DNA" of innovation, experimentation, and comprehensive scope in intellectual inquiry. Understanding healthcare problems (disease, systems biology, disease processes, core resilience, etc.) represents a significant portion of our research enterprise. Funding for basic health-related research remains absolutely vital to our role as a public institution. Additionally, UC San Diego considers advanced analytics to be an important enabling mechanism for every form of basic science, and particularly for the future of solving complex, multisystem-level problems (e.g., genomics, proteomics, metabolomics, etc.).
- The Qualcomm Institute is a meeting ground for basic engineering, and information and communications technologies, while the San Diego Supercomputer Center (SDSC) exemplifies the tradition of developing technological infrastructure breakthroughs and new forms of integrated analytics to enable massive physical and life science data sets to be applied to complex phenomena. These, plus the many research centers at UC San Diego, allow faculty and students from all areas of the campus to come together to build new conceptualizations and paradigms for some of society's most pressing and serious problems.
- UCSD's Qualcomm Institute and SDSC demonstrate our ongoing commitment to the future of data technology. To be successful in the future, UC San Diego must have the means to analyze, catalog, and share data world wide; collaborate across disciplines; and compute using large data sets. Digital technologies are disruptive, posing great opportunities for solving critical basic research questions.

Exploring the Basis of Human Knowledge and Creativity

- UC San Diego scientists have an extensive history of examination of the relationship between the brain and behavior, cognition, development, and learning to build human knowledge and creativity. UCSD's Center for Brain Activity Mapping (CBAM) is well positioned to lead the way for technological breakthroughs in this important area of basic research. Opportunities exist in understanding brain processes and networks by

solving fundamental technological and biological challenges. A better scientific understanding of human memory, cognition, and decision making will contribute to improvements in neurological diseases, trauma treatment, and education. The discoveries possible in this area will have lasting impact around the world.

- The physical sciences – especially the study of the universe’s basic particles and their complex interactions – are leading us into areas of discovery with enormous potential for explicating nature and humankind. Physics faculty at UC San Diego are in the vanguard of these advances, including the search for and discovery of the Higgs particle, the origin of mass in the universe, as well as research in novel materials that hold promise to revolutionize energy harvesting and information processing in the not too distant future.

Understanding Inequities

- Foundational research in biology, chemistry, physics, mathematics, evolution, and genetics, as well as delving into the nature of human creativity and cognition, is increasingly important in a shrinking world and UC San Diego researchers are leading this work. Basic research in these areas also includes investigation of core means and mechanisms that contribute to individual differences as well as societal differences.

UC San Diego has long been a pioneer in multidisciplinary collaborations targeting big scientific questions. As a result, faculty and students often join one of the many Organized Research Units (ORUs), programs, or centers on campus which can jumpstart new areas of basic science research, and basic science careers. This approach rewards “big thinkers” and high-risk, high- payoff scientific efforts. The SPA will be particularly helpful in supporting basic science efforts which are leveraged by these campus entities. A comprehensive sampling of specific research areas is below.

This partial list indicates only some of the areas where the research energy of our campus is focused. We are seeing a renaissance of interdisciplinary scholarship and creativity in the interface of multiple basic science areas (e.g., neuromimetics, nanobioengineering, etc.). UC San Diego is preparing to launch our next major fundraising campaign, which will focus, in part, on basic research. Funds from this campaign will further leverage any SPA funds generated. UC San Diego and our world-class researchers need and welcome all sources of support that fuel our powerful engines of discovery.

UC San Diego - Department Research Groups, Organized Research Units (ORUs), and Centers

SAMPLE - April 2014

Research unit	Website
Advanced Nanoscience	http://can.ucsd.edu/
AIDS Research	http://cfar.ucsd.edu/
Algae Biotechnology	http://algae.ucsd.edu/
Algorithmic and Systems Biology	http://casb.ucsd.edu/
Alzheimer's Disease Research Center	http://adrc.ucsd.edu/
Arthur C Clarke Center for Human Imagination	http://imagination.ucsd.edu/
Astrophysics and Space Sciences	http://casswww.ucsd.edu/index.php/Main_Page
BioCircuits Institute	http://biocircuits.ucsd.edu/
Bioengineering Institute of California	https://bic.ucop.edu/
Biostatistics and Bioinformatics	http://biostat.ucsd.edu/
Burgasser Group, Astrophysics	http://pono.ucsd.edu/~adam/wordpress/
California Cooperative Oceanic Fisheries Investigations	http://www.calcofi.org/
California Current System Long-Term Ecological Research	http://cce.lternet.edu
Cancer: Rebecca & John Moores UC San Diego Cancer Center	https://cancer.ucsd.edu/Pages/default.aspx
Charles Lee Powell Structural Research Laboratories	http://structures.ucsd.edu/node/52
Christopher K Glass Lab - Cellular and Molecular Medicine	http://cmm.ucsd.edu/Lab_Pages/glass/glasslab/index.html
Circadian Biology	http://ccb.ucsd.edu/
Climate Change Center/California-Nevada Applications Project	http://meteora.ucsd.edu/cap/
Coastal Data Information Program	http://cdip.ucsd.edu/
Coastal Observing Research and Development Center	http://cordc.ucsd.edu/
Comparative Human Cognition Laboratory	http://lhc.ucsd.edu/
Comparative Immigration Studies	http://ccis.ucsd.edu/
Computational Mathematics	http://ccom.ucsd.edu/
Cooperative Institute for Marine Ecosystems and Climate	http://cimec.ucsd.edu/
Cymer Center for Control Systems and Dynamics	http://ccsd.ucsd.edu
Edward Dennis Group - Lipid Maps Program	http://cobra.ucsd.edu/Research/research_main.htm
Energy Research	http://cer.ucsd.edu
Renewable Resources and Integration, Center of Excellence	http://coimbra.ucsd.edu/
Engineering in Medicine Institute	https://iem.ucsd.edu/
Genomic Medicine Institute	http://igm.ucsd.edu/
Glycobiology Research and Training Center	http://grtc.ucsd.edu/
Global Ocean Observation Program	http://sio-argo.ucsd.edu/
Global Seismic Network for environmental catastrophes	http://ida.ucsd.edu/
HIV Neurobehavioral Research Center	https://hnrc.hivresearch.ucsd.edu/
Howard Hughes Medical Institute Investigators	http://www.hhmi.org/
Human Development	http://www.chd.ucsd.edu/
Imaging of Proteins	http://nmrresource.ucsd.edu/
Information Theory and Applications Center	http://ita.ucsd.edu/
Kavli Institute for Brain and Mind	http://kibm.ucsd.edu/
Brain Activity Mapping Center	http://cbam.ucsd.edu/
Magnetic Recording Research	http://cmrr.ucsd.edu/
Marine Biodiversity and Conservation	http://cmbc.ucsd.edu/
Networked Systems	http://cns.ucsd.edu/
Neural Circuits and Behavior	http://cncb.ucsd.edu/
Neural Computation Institute	http://inc.ucsd.edu/
Advanced Neurological Engineering	http://inc.ucsd.edu/cane.html
NeuroAIDS Tissue Network	https://cntn.hivresearch.ucsd.edu/
Ocean Environmental Acoustics Program	http://siostudents.ucsd.edu/Curricular_Groups/Programs/Climate/
Ocean Observatory Initiative Cyberinfrastructure	http://oceanobservatories.org/
Oceans and Human Health Center	https://scripps.ucsd.edu/scohh
Qualcomm Institute	http://www.calit2.net/
California Institute for Telecommunications and Information Technology	
Research and Training in Anthropogeny	http://carta.anthropogeny.org/
Research in Biological Systems	http://crbs.ucsd.edu/
Research in Language	http://crl.ucsd.edu/
Research on Aging, Stein Institute	http://sira.ucsd.edu/
San Diego Supercomputer Center	http://www.sdsc.edu/
Sanford California Institute for Regenerative Medicine	http://stemcells.ucsd.edu/
Scripps Genome Center	http://genomes.ucsd.edu/sgc_index.shtml
Southern California Coastal Ocean Observing System	http://www.sccoos.org/
Spatial Reference Center	http://csrc.ucsd.edu/
Susan S. Taylor Laboratory: protein research	http://susantaylorlab.ucsd.edu/
The Field Laboratory - signaling molecules	http://sethfield.ucsd.edu/
The Jack Dixon Lab - reversible phosphorylation	http://www.jackdixonlab.com/
Theoretical Biological Physics	https://ctbp.ucsd.edu/
Therapeutic Discovery Mass Spectrometry Center	http://chem-faculty.ucsd.edu/dorrestein/Dorrestein_Lab/Center.html
Western Weather and Water Extremes	http://cw3e.ucsd.edu/
Xiang-Dong Fu Laboratory - Cellular and Molecular Medicine	http://cmm.ucsd.edu/fu