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# College of Sciences

## Administration

Dean: Thomas R. Scott

Associate Dean for Undergraduate Studies:  
Catherine J. Atkins-Kaplan

Associate Dean for Research and Graduate Studies:  
Philip J. Langlais

Assistant Dean for Student Affairs: Estralita Martin

Assistant Dean for Underrepresented Student Programs:  
Lawrence Alfred

Director of Development: Laura A. Benedict

## General Information

The College of Sciences, composed of seven departments and various subprograms, offers bachelor's, master's, and doctoral degrees, and curricula for preprofessional students in medicine, veterinary medicine, and dentistry. The science curriculum is enhanced by research centers which provide field experience as well as special seminars with guest speakers. The off-campus sites include the Mt. Laguna Observatory, and about 5,000 acres in four biological sciences research stations. The majority of tenured Sciences faculty have active research programs which offer student involvement.

## Curricula Offered

Refer to the Courses and Curricula section of this catalog for a complete listing of program requirements and courses offered by departments within the College of Sciences.

### Doctoral Programs

Biology, Chemistry, Clinical Psychology, Computational Science, Ecology, Mathematics and Science Education

### Master's Degrees

Applied Mathematics (M.S.), Astronomy (M.S.), Biology (M.A., M.S.), Chemistry (M.A., M.S.), Computational Science (M.S.), Computer Science (M.S.), Geological Sciences (M.S.), Mathematics (M.A.), Microbiology (M.S.), Physics (M.A., M.S.), Psychology (M.A., M.S.), Radiological Health Physics (M.S.), Regulatory Affairs (M.S.), Statistics (M.S.).

### Bachelor's Degrees

Astronomy (B.S.), Biology (B.A., B.S.), Chemical Physics (B.S.), Chemistry (B.A., B.S.), Computer Science (B.S.), Environmental Sciences (B.S.), Geological Sciences (B.S.), International Security and Conflict Resolution (B.A.; jointly with the College of Arts and Letters and the College of Professional Studies and Fine Arts), Mathematics (B.A., B.S.), Microbiology (B.A., B.S.), Physical Science (B.S.), Physics (B.A., B.S.), Psychology (B.A.), Statistics (B.S.).

### Minors

Astronomy, Biology, Chemistry, Computer Science, Energy Studies, Geological Sciences, History of Science and Technology, Mathematics, Oceanography, Physics, Psychology, Statistics.

### Certificate Programs

Geographic Information Science, Introductory Mathematics, Recombinant DNA Technology, Single Subject Mathematics.

## Other Curricula

Allied Health, Pre dental, Premedical, Preoptometry, Prepharmacy, Prephysician Assistant, Prepodiatry, Preveterinary.

## Research Centers and Institutes

### The Edwin C. Allison Center for the Study of Paleontological and Geological Sciences Richard H. Miller, Curator

The Allison Center has supported research in paleontology, geology and related sciences since 1972. The Center maintains a research library containing journals, reprints, textbooks, maps, and copies of master's theses and senior theses completed in the Geological Sciences. The library is open to faculty and students. In addition, the Center houses a collection of fossil and recent vertebrates, invertebrates, and plants. Research space is available for students, faculty, and visiting scholars.

### Center for Behavioral and Community Health Studies John P. Elder, Director

The Center for Behavioral and Community Health Studies is housed at 9245 Skypark Court, Suite 231, San Diego, CA 92113. The Center, formerly known as The Center for Behavioral Medicine, was established in 1982 for the purpose of promoting research and academic programs relevant to the applications of behavioral science principles to medicine and health care. Administratively, the Center has three co-directors who report to the deans of the College of Sciences and the College of Health and Human Services. The interdisciplinary center encourages participation from all of the University colleges and departments. Currently, active investigators come from the Departments of Exercise and Nutritional Sciences, Psychology, and the Graduate School of Public Health. Current Center projects involve collaboration between scientists and physicians from a variety of specialties as well as a variety of other institutions, including the County of San Diego and University of California, San Diego. Funding for the Center comes from federal and private foundation grants including several National Institutes of Health agencies. Current sponsors include the American Heart Association, Department of Defense, National Cancer Institute, National Heart, Lung and Blood Institute, the State of California Department of Health Services, and the University of California Tobacco Related Disease Research Program.

The Center provides important research experience to students who intend to pursue related careers and offers opportunities for project staff and graduate students to participate in community interventions.

### Center for Behavioral Teratology Edward P. Riley, Director

Teratology is the study of birth defects. The faculty and students at the Center for Behavioral Teratology (CBT) are interested in how prenatal exposure to various drugs influences both brain and behavioral development. The CBT is truly an interdisciplinary research organization, with a broad range of basic and clinical research interests. While the primary purpose of the CBT is to promote research in teratology, personnel in the Center also act as a resource to the University and the community. The staff provides in-service talks at local hospitals, schools, and drug treatment facilities, as well as lectures to various classes at the University. The CBT staff has active collaborations with faculty from UCSD, the VA Hospital, Children's Hospital, and the Scripps Research Institute. Faculty in the Center have grants from the National Institutes of Health, March of Dimes, Tobacco-Related Disease Research Program, and the State of California.

**Coastal and Marine Institute**  
**Richard M. Gersberg, Director**

The Coastal and Marine Institute provides a focus for oceanography and marine studies at SDSU. The Institute assists departments within the University in the development of instructional, research, and public service aspects of coastal and ocean-oriented programs and provides special supporting services including advising students, assistance to faculty and students in research, preparation of manuscripts, operation of the SDSU Marine Laboratories and boats at Mission Bay, and liaison with other institutions and the community. The Institute is operated as a special unit of the College of Sciences and is administered by a director and an advisory council committee consisting of faculty members elected from participating departments. Additional information about marine studies is available from the Coastal and Marine Institute office or from the office of the Dean of the College of Sciences.

**Computational Science Research Center**  
**José E. Castillo, Director**

**Associate Directors: Massimo Boninsegni and Donald R. Short**

The Computational Science Research Center (CSRC) promotes the development and advancement of the interdisciplinary subject of computational science. This is accomplished by fostering research, developing educational programs, and promoting industrial interaction, outreach, and partnership activities.

The Center provides an environment for scientific research at San Diego State University. It facilitates the interaction between applied mathematics, computer science, and other disciplines by providing the necessary infrastructure for productive research efforts. Real world applications are the focus of faculty and student projects. These projects provide an educational opportunity for students to hone industrially relevant computational skills.

The goals of the Center are to encourage and facilitate research in computation, simulation, visualization, and numerical modeling in all disciplines (business and finance, biology and bioinformatics, engineering, physical sciences, and geography); to interact with other centers, laboratories, universities, and local industry; reduce lag time between algorithm development/analysis and applications; to participate in programs with other countries, including international programs sponsored by the National Science Foundation; to arrange visits by professors, including foreign visitors on sabbaticals and professional staff on industrial sabbaticals; to arrange part time and adjunct appointments for consulting activities by professional staff from local research laboratories; to provide employment, experience, and contacts for students; to sponsor conferences, workshops, and courses; to facilitate collaboration with government laboratories with private sector; to provide bridges to regional industry; and to direct the computational science program at San Diego State University.

Interested students and faculty may obtain more information by calling the CSRC office at (619) 594-7205, [www.sci.sdsu.edu/csrc](http://www.sci.sdsu.edu/csrc).

**Center for Computer Simulation**  
**William A. Root, Director**

The Center for Computer Simulation pursues research opportunities involving the creation of complex simulations, particularly those addressing challenges in the public sector. The diversity of fields in which computer simulation now plays a role allows the Center to provide research opportunities for undergraduate and graduate students in a wide variety of academic majors.

The Center supports an extensive collection of simulation software under site license, and maintains cooperative relationships with prominent public and private sector simulation software developers to ensure that the Center's capabilities keep pace with the state-of-the-art.

Currently the Center includes members from the faculties of Applied Mathematics, Computer Science, Physics, and Statistics. The Center is administered by a director appointed by the Dean of the

College of Sciences, and resides in facilities provided by the Department of Mathematics and Statistics. For information, call the Center for Computer Simulation office at (619) 594-6837.

**Center for Energy Studies**  
**Alan R. Sweedler, Director**

The San Diego State University Center for Energy Studies (CES) facilitates, promotes and supports research and academic programs relating to energy, with particular emphasis on energy matters of concern to the San Diego and local southwest region including the international border with Mexico. The Center encourages interdisciplinary research and instructional programs in the broad areas of energy modeling, technology assessment of energy systems, local energy policy planning and data collection relating to energy usage in the San Diego region. SDSU offers through the Center an interdisciplinary minor in energy studies. Completion of the minor will give the student a broad understanding of the technical, economic, social, and political aspects of energy issues. For more information call the Center at (619) 594-6240 or (619) 594-6155. The Center works closely with local and state agencies concerned with energy policy and planning, and serves as a community resource in matters concerning local energy issues, and the impact of energy use of the environment.

**Field Station Programs**  
**Sedra S. Shapiro, Executive Director**

The Field Station Programs provide opportunities for a broad community of students and faculty to explore the natural ecosystems of southern California. In addition, the field stations serve SDSU by functioning as a liaison to broader public community, highlighting SDSU's expertise regionally, nationally, and internationally. The Field Station Programs manage over 9,000 acres of San Diego and Riverside county land for university teaching and research.

SDSU currently has four field stations: the Sky Oaks Field Station, 1,600 acres of high elevation redshank chaparral habitat in the Chihuahu Valley east of Temecula Valley; the Santa Margarita Ecological Reserve (SMER), a 4,334 acre reserve located along the upper Santa Margarita River inland from Camp Pendleton in San Diego and Riverside Counties; Fortuna Mountain, 500 acres close to the SDSU campus located within Mission Trails Regional Park; and the Tijuana River National Estuarine Research Reserve, a 2,513-acre reserve which serves as an auxiliary field station for SDSU.

Providing research and education opportunities for the future requires detailed knowledge of how changes in the environment outside the boundaries of a certain area affect ecosystem dynamics within that area. As habitat continues to be lost to development, areas such as the SDSU field stations will increase in importance as sites for studying natural ecosystems.

The proximity of sensitive habitats to a rapidly urbanizing landscape makes this region a recognized biodiversity "hot spot." San Diego State University has an extremely dynamic group of scientists (faculty, researchers, and students) working to understand these unique and threatened ecosystems. Research ranges from the global scale examining global warming and the impacts of increased carbon dioxide on native vegetation to the meso- and micro-scales of chaparral ecosystems dynamics, as well as plant, vertebrate, insect, and fungal diversity. Researchers at SDSU are also increasingly using sophisticated computer modeling and molecular techniques for analyzing environmental change. Natural sciences are the core users of the SDSU field stations. Biology, geography, geological sciences, hydrogeology, and other field sciences are consistent areas of study. There are growing opportunities for interdisciplinary work as well as for non-traditional study in the fields ranging from public health, civil and environmental engineering, recreation, business, and art, to education.

Persons interested in conducting research, instructional use, or access to the SDSU field stations should contact the academic programs of the SDSU Field Station Programs at (619) 594-0580. Inquiries can also be made through the SDSU Field Station Web site at [www.sci.sdsu.edu/BFS/](http://www.sci.sdsu.edu/BFS/)

### **Heart Institute**

**Christopher C. Glembotski, Director**

The Heart Institute is sponsored by the College of Sciences and the College of Health and Human Services. The goals of the Institute are to enhance basic and clinical research in the cardiovascular sciences, to foster undergraduate and graduate education in cardiovascular physiology and medicine, and to provide a community outreach service focused at heightening the awareness of cardiovascular disease and its prevention in the San Diego region surrounding SDSU. The Institute is comprised of faculty members representing four different colleges at SDSU, as well as physicians and scientists from local hospitals and clinical research centers. Importantly, the Institute also sponsors SDSU undergraduate and graduate student memberships, which strengthens the involvement of students in all aspects of Heart Institute activities. The unusual blend of talent and expertise that comprise the Institute membership results in an interdisciplinary approach to cardiovascular research, education and community outreach that is unique to the Heart Institute. The Institute sponsors special seminars, on- and off campus, which cover a wide range of topics in the field, and provides funding for the support of graduate students who are involved in cardiovascular research at SDSU. Areas of focus for the Institute include studies of the molecular basis of cardiovascular disease, establishment of unique approaches for the early detection and prevention of cardiovascular disease, and the promotion of cardiovascular health in San Diego area K-12 schools. An important feature of these efforts that distinguishes the Heart Institute is the central role that SDSU students play in each of these areas. Funding for Heart Institute activities comes from a variety of sources, including the National Institutes of Health, the American Heart Association, the Muscular Dystrophy Association, the Rees-Stealy Research Foundation, and several San Diego-based biotechnology companies. For more information contact the Heart Institute office at (619) 594-5504.

### **Center for Inland Waters**

**Stuart H. Hurlbert, Director**

The Center for Inland Waters is an interdisciplinary academic unit consisting of faculty members from four SDSU colleges (Arts and Letters, Engineering, Health and Human Services, Sciences). Its purpose is to foster basic and applied collaborative research among SDSU scientists and scholars on inland water resources and ecosystems, the application of their expertise to the solution of water-related problems in southern California and adjoining regions, and the coordination and development of courses, curricula, and physical facilities for water-related instruction and research. Inland water resources include the water supply for domestic, agricultural and industrial uses, the growing system of aqueducts, reservoirs, and aquifers in which this supply is transported and stored, and the rivers, lakes, and wetlands important as habitat for wildlife, as maintainers of environmental health, and as recreation areas. Of special interest to the Center are social, economic, hydrological, public health, and ecological issues concerning the Colorado River and its delta, the Salton Sea, and the new Tijuana and Santa Margarita Rivers and their watersheds. The Center is operated as a special unit of the College of Sciences and is administered by a Director and an elected Executive Committee. Information on the Center and regional water resources is available at [www.sci.sdsu.edu/salton/](http://www.sci.sdsu.edu/salton/).

### **Center for Innovation in Computer Science Education**

**William A. Root, Director**

The Center for Innovation in Computer Science Education serves the University by promoting the integration of computer science education at SDSU into the business, social and educational fabric of the San Diego community at large. The Center's mission focuses on three complementary and interdependent areas: industry partnerships, university curriculum innovation, and community outreach.

The Center works to broaden and intensify the relationship between SDSU and local industry in the computer science area, by promoting and administering internships, faculty consulting, and participation of local industry professionals in team-teaching advanced-technology computer courses at SDSU. The Center aims to foster innovation in SDSU's computer science curriculum by undertaking research in novel computer science pedagogy. Finally, the Center seeks to improve the number and quality of SDSU's incoming computer science students by actively promoting and administering cooperative programs linking SDSU, private sector technology firms, and San Diego area K-12 schools. The goal of these programs is to ensure that promising students in local schools are exposed early to the excitement of computer science, and are well prepared to make a seamless transition from secondary school to a challenging first-year university computer science curriculum.

The Center is comprised of an interdisciplinary group of faculty who have interest and technical expertise in computer science, and, particularly, in computer science education. Currently, the Center includes members from the faculties of Computer Science, Mathematics, and Physics. For information, call the Center for Innovation in Computer Science Education at (619) 594-6837.

### **Institute for International Security and Conflict Resolution**

**Alan R. Sweedler and Dipak Gupta, Co-Directors**

The SDSU Institute for International Security and Conflict Resolution (IISCOR) encourages and facilitates teaching and research in the multidisciplinary area of international security and conflict resolution. Specifically, topics such as nuclear armaments, international and intranational conflict, sociopolitical violence, and global environmental issues as they relate to security are covered.

The Institute is a joint effort of the Colleges of Sciences, Arts and Letters, and Professional Studies and Fine Arts. IISCOR is administered by two co-directors, advised by an executive committee consisting of faculty members representing the different disciplines that provide input into the study of international security and conflict resolution.

The Institute promotes teaching and research by organizing public forums, faculty and student seminars, developing appropriate curricula for undergraduate and graduate instruction and facilitating research and scholarly activities. SDSU offers, through IISCOR, a multidisciplinary Bachelor of Arts degree in International Security and Conflict Resolution. Students and faculty can obtain more information by calling the IISCOR office at (619) 594-6240.

### **Center for Research in Mathematics and Science Education**

**Kathleen M. Fisher, Director**

The Center for Research in Mathematics and Science Education (CRMSE) is an interdisciplinary consortium of faculty interested in research on substantive questions related to the learning and teaching of science and mathematics. The Center currently has members from the faculties of Biology, Geological Sciences, Mathematics and Statistics, Physics, Psychology, and Teacher Education. It is administered by a director appointed by the dean of the College of Sciences and an associate director appointed by the dean of the College of Education. Through its activities, CRMSE initiates, encourages, and supports the scholarly pursuit of important theoretical and applied problems in mathematics and science education. CRMSE supports faculty in their current research projects and in the preparation of manuscripts for publication and grant proposals for continued research. The Center also administers the Doctoral Program in Mathematics and Science Education that is offered jointly by SDSU and the University of California, San Diego and the Professional Development Collaborative to serve area teachers. The Center is located at 6475 Alvarado Road, Suite 206, San Diego, CA 92120-5013; telephone (619) 594-5090; campus mail code 1862.

### Center for Microbial Sciences

**Stanley R. Maloy, Director**

**Anca M. Segall, Associate Director**

The Center for Microbial Sciences is a non-profit research center dedicated to the study of microorganisms. The Center's mission is to provide a productive, stimulating, and interactive research environment that will lead to rapid progress in the fields of microbial biology. The Center integrates multiple scientific approaches to elucidate basic biological principles that helps in combating human health problems caused by microorganisms and stimulates applications of microorganisms in the biotechnology industry.

The Center encourages multidisciplinary scientific research by bringing together a group of creative, cooperative investigators with different scientific backgrounds to attack major questions in microbial biology using a variety of experimental approaches. The Center also trains scientists to attack important but neglected problems in microbial biology. The close proximity of the Center for Microbial Sciences is a nucleus of biotechnology companies facilitates interactions with industry. The Center also collaborates with neighboring institutions with expertise in other biological areas (UCSD, Scripps Research Institute, Salk Institute, Scripps Institution of Oceanography, and others) providing additional intellectual and physical resources.

The primary goals of the Center are:

- *Research* – To attract a group of imaginative, interactive investigators and provide a stimulating environment for productive, innovative research in microbial biology;
- *Training* – To train a new generation of scientists to solve important problems in microbial biology using innovative experimental approaches;
- *Outreach* – to provide expertise and facilities for visiting scientists from academia and industry to learn new technologies.

### Microchemical Core Facility

**Long T. Wen, Director**

The Microchemical Core Facility (MCF) is a component of the California State University Program for Education and Research in Biotechnology (CSUPERB). The MCF is a full-service, state-of-the-art facility that provides DNA synthesis, sequencing, and purification services for cell and molecular biologists associated with any of the 22 CSU campuses. In addition, the MCF provides for CSU faculty access

to the most recent advances in computer-assisted analyses of molecular structure. Located in the Biology Department at SDSU, the MCF provides state-of-the-art molecular analyses and characterization to CSU scientists for the lowest possible cost, as well as fostering the training of university faculty at all levels in the most recent techniques available in the molecular life sciences. Funding for the establishment and maintenance of the SDSU MCF is derived from the National Science Foundation with matching funds provided by the State of California. Call (619) 594-1669 for more information.

### Molecular Biology Institute

**Greg L. Harris, Director**

The Molecular Biology Institute was established to serve interested departments of the biological and physical sciences in the coordination, support and enhancement of research and instruction in the molecular biological sciences. Interests and activities of the MBI encompass all approaches which aim to explain biology at the molecular level. The MBI sponsors a weekly seminar series that facilitates faculty and student interaction with scientists from other institutions. Currently, full members of the Institute are drawn from the Departments of Biology and Chemistry, and the Graduate School of Public Health, and participate in the respective Ph.D. programs. Associate members are drawn from a variety of disciplines that are cognate with the molecular biological sciences. The Institute is also constituted as the University unit authorized to administer the master's degree program with an emphasis in molecular biology. The research programs of the MBI members are supported by a variety of agencies including the National Institutes of Health, the National Science Foundation, NASA, the American Heart Association, the American Diabetes Association, the Muscular Dystrophy Association, the Department of Energy, the US Department of Agriculture, and the California Metabolic Research Foundation. Additional information is available from the MBI office; (619) 594-7429.