



SAN DIEGO STATE  
UNIVERSITY

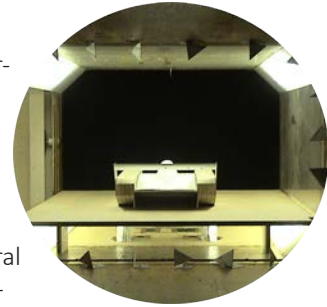
College of Engineering

# College of Engineering

## ACADEMIC PROGRAMS AND AREAS OF STUDY

### Aerospace Engineering

The Bachelor of Science degree program in Aerospace Engineering at San Diego State University excels in teaching and research in traditional and modern Aerospace Engineering including a renewed emphasis on space. The program provides a rigorous curriculum that establishes a strong fundamental background and practical skills that successfully prepares our students for entry into the workforce or continuation of their studies. The Department has state-of-the-art experimental and computational facilities including low speed and supersonic wind tunnels and a water tunnel. Principal areas of study and research activity include aerodynamics, jet and rocket propulsion, aeroelasticity, structural design and optimization, guidance and control, and space flight mechanics. Many opportunities exist for students to participate in research and co-curricular activities such as the AIAA, Design Build Fly, and Rocket Project. The Department enjoys a close relationship with the local aerospace industry which is the major employer of our graduates.



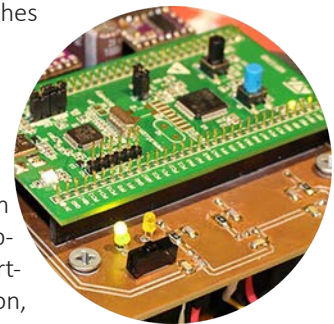
### Civil, Construction & Environmental Engineering



The mission of the Department of Civil, Construction, and Environmental Engineering (CCEE) Department is to provide a high quality undergraduate and graduate education as well as advising and other support needed to ensure our students' academic success and preparation for a productive engineering career. Our three majors directly affect the well-being, health, and safety of all citizens as students learn to design and supervise the construction of buildings, dams, transportation systems, and water and waste water facilities. Our programs are based on strong, practice-oriented instruction, and student involvement where the Department values and cherishes our diversity in cutting-edge, externally sponsored research projects. Our students have won many awards in regional and national competitions. In addition, CCEE has excellent relations with the local industry which sponsor several professorial endowments and offer multiple internships and scholarships.

### Electrical & Computer Engineering

The Electrical and Computer Engineering Department at San Diego State University teaches our students the latest technologies in communications, digital signal processing, optoelectronics, fiber optics, power electronics, power systems, bioelectronics, digital circuits, VLSI design, controls, multimedia, and computer networks. The strategic vision of the Department is to provide an education characterized by quality, access, and relevance. Students take a balanced set of courses to obtain a solid foundation in Electrical and Computer Engineering. The Department benefits from the explosion of the local San Diego telecommunication and biotechnology industries, offering our students unique opportunities through internships and industrial sponsored projects on campus. The Department maintains close relations with many top firms including QUALCOMM, Nokia, Ericson, Motorola, IBM, Intel, Conexant, Northrop Grumman, Cubic, General Atomics, and many more.



### Mechanical Engineering



Mechanical Engineering at San Diego State University provides an education that seamlessly combines engineering theory, analysis, and practice. The curriculum is design-oriented and emphasizes the development of problem-solving skills through hands-on experience in various laboratories, and machine and fabrication shops. Our students are strongly encouraged to get involved in research projects. Participation in student organizations including ASME, Formula SAE, Baja SAE, and Mechatronics, and in national competitions that feature Formula One teams, solar-powered vehicles, and autonomous vehicles contributes to a vibrant educational experience. Graduates from the Department are well prepared to address contemporary challenges in automation and control, bioengineering, energy and sustainability, novel materials, powder technology, mechanics

of materials, robotics, and design and manufacturing. Our graduates are employed by aerospace, automotive, bio-medical, construction, energy, and manufacturing industries among others, and our alumni hold leading positions in both industry and government.

#### Bachelor's Degrees

- Aerospace Engineering
- Civil Engineering
- Computer Engineering
- Construction Engineering
- Electrical Engineering
- Environmental Engineering
- Mechanical Engineering
- Bioengineering Emphasis (in ME)

#### Minor

- Engineering

#### Master of Science (M.S.) or Master of Engineering (M. Engr.) Degrees

- Aerospace Engineering
- Bioengineering
- Civil Engineering
- Electrical Engineering
- Environmental Engineering
- Mechanical Engineering

#### Certificate Program

- Rehabilitation Technology

#### Doctoral Degrees with UCSD

- Engineering Sciences:
- Bioengineering
- Electrical & Computer Engineering
- Mechanical & Aerospace Engineering
- Structural Engineering

#### College of Engineering

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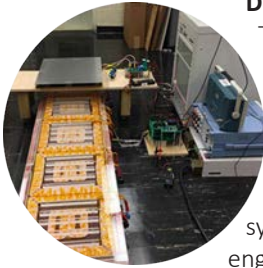
## NSF Center for Sensorimotor Neural Engineering

The NSF Center for Sensorimotor Neural Engineering is conducting research on flexible microelectrode neural pads that can be implanted in the brain to record data and/or stimulate specific sites in collaboration with researchers at the University of Washington and MIT. The core contribution in this area is in developing a new class of sensing and stimulating electrodes based on patternable glassy carbon which is considered the gold-standard in electrochemistry. Novel fabrication techniques for integrating these electrodes with a flexible substrate and CMOS processes are being developed. The research integrates microfabrication, fluid dynamics, and biology. Related work is also conducted on microfluidic devices that can contribute to patient-specific therapies, including isolating stem cells from blood. A class 100 clean room facility is employed for much of the work.



## DOE GATE Center for Electric Drive Transportation

The Center for Electric Drive Transportation (CEDT) was established in 2011 at the University of Michigan-Dearborn and was transferred to San Diego State University in 2015, with a grant from the U.S. Department of Energy's Graduate Automotive Technology Education (GATE) Program. The DOE's GATE initiative will award \$6.4 million over the course of 5 years to support 7 Centers of Excellence at American colleges, universities, and university-affiliated research institutions. As one of the seven university research centers that were awarded the prestigious grants, CEDT is dedicated to achieving synergy among technological development, research, and graduate education in automotive engineering. The CEDT's focus is on the development of electric drive transportation including power electronics, hybrid powertrain, wireless power transfer, and battery management.



## NASSCO Ship Structural Testing and Analysis

Full-scale structural testing and analysis of 8' x 8' swaged steel ship panels is conducted in the SDSU Structural Engineering Laboratory. Pressed in swages add strength and stiffness to the steel panels and cost significantly less than welding on stiffeners. The lab has a unique, self-reacting test frame designed by Dr. Robert Dowell and his SDSU team; it can produce over one million pounds of applied force. This research is funded by NASSCO Shipyard and the National Shipbuilding Research Program (NSRP). Because of the success of the structural testing and analysis performed at SDSU Structural Engineering Laboratory, NASSCO has a long-term multi-million dollar cooperation plan with SDSU, which will bring better and more cost effective shipbuilding technology to American shipyards.



## Computational Physics Laboratory

The Computational Physics Laboratory studies explosions, blast waves, and multiphase reactive flows with applications such as the control of supersonic combustion in scramjets. Particle-laden blast waves involve complex physics that occur at widely disparate length scales. The goal of the laboratory's research is to develop a computational method that enables the predictive simulation of high-speed, particle-laden shocked flows and to analyze the environment in which particles, turbulence and shock waves co-exist.

## The Powder Technology Laboratory

The Powder Technology Laboratory is currently involved in a variety of research projects on processing of powder materials including fundamental research on sintering and multi-scale analysis of various powder processing techniques. The projects conducted by the laboratory are based on experimentation and computational modeling of powder processing, including novel ceramic, metallic, and composite material synthesis with applications in fuel and solar cell technologies, fabrication of bio-implants, development of novel components for wireless devices, and 3D printing of complex shape powder parts.



## Blue Gold Area of Excellence

The Blue Gold Area of Excellence combines campus-wide expertise in water research to address issues such as rapid urban growth, agricultural water transfers, extreme events, and cross-border issues, that impact water resources in water-scarce regions now, and in years to come. SDSU College of Engineering faculty, Drs. Natalie Mladenov and Alicia Kinoshita, have led efforts to study water quality and hydrologic response to restoration in urban watersheds, such as SDSU's Alvarado Creek on campus.



## Professional Societies & Student Organizations

- 3D for Everyone (3D4E)
- Associated General Contractors of America/Construction Management Association of America (AGC/CMAA)
- American Institute of Aeronautics and Astronautics (AIAA)
- Alpha Omega Epsilon (AOE)
- American Society of Civil Engineers (ASCE)
- American Society of Mechanical Engineers (ASME)
- American Water Works Association (AWWA)
- Aztec Baja - Society of Automotive Engineers (Baja SAE)
- Aztec Electric Racing (AER) - Society of Automotive Engineers (Formula SAE)
- Aztec Racing - Society of Automotive Engineers (Formula SAE)
- Aztec Robotic Technologies (ART)
- Biomedical Engineering Society (BMES)
- Chi Epsilon (XE)
- College of Engineering Student Council (CESC)
- Design Build Fly (DBF)
- Engineers Without Borders (EWB)
- Eta Kappa Nu (HKN)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute of Transportation Engineers (ITE)
- Mechatronics
- National Society of Black Engineers (NSBE)
- Pacific Asian Society of Engineers (PASE)
- Rocket Project
- Society for the Advancement of Material and Process Engineering (SAMPE)
- Society of American Military Engineers (SAME)
- Sigma Gamma Tau (SGT)
- Sigma Phi Delta (SPD)
- Society of Hispanic Professional Engineers (SHPE)
- Society of Women Engineers (SWE)
- Tau Beta Pi (TBP)

## SUPPORT



The **Peer Advising Center for Engineering Students (PACES)** provides dedicated advising services to all engineering students, especially those in lower division. The Peer Advisors are highly qualified and trained engineering students who are available to answer student inquiries regarding academic advising and course planning, student success and resources, and progress toward graduation. For more information, please visit: <https://sdsupaces.wixsite.com/paces>

## EXTRACURRICULAR ACTIVITIES

The **SDSU Mechatronics Club** is a student organization whose goal is to create an environment that not only promotes STEM education, but does so in a way that provides students with hands-on experience building autonomous robots within a team. The SDSU Mechatronics Club is broken down into three divisions: Apprentice Program, RoboSub, and RoboAir. All three divisions provide students with a diverse educational habitat in which to build skills in engineering, time management, and team-based cooperation. The Mechatronics Club is an interdisciplinary organization comprised of world-class electrical, mechanical, software, and business teams that work in conglomeration to compete in global competitions and promote STEM education at San Diego State University, the United States of America, and the world.



Student members of the **Rocket Project** design, build, test, and fly advanced rockets. Since its inception in 2003, students have successfully tested and launched multiple rockets, including liquid propellant, hybrid and solid rockets, to altitudes over 12,000 feet. Students learn manufacturing techniques, systems and ground testing, electronics and avionics, structures, design and analysis, aerodynamics, recovery systems and more.

**Aztec Racing (Formula SAE)** is a student organization that builds race cars and participates in a national competition organized by the Society of Automotive Engineers (SAE) International. The race cars are built over a period of about a year and the team effort provides real-world experience to students preparing to enter the engineering workforce. All aspects of engineering practice, including design, manufacturing, testing, marketing, management, and finances are integrated into the competition. The organization is built around a concept of a fictional manufacturing company.



The **Pacific Southwest Conference** is ASCE's (American Society of Civil Engineers) annual student chapter competition to test a variety of university students on their civil engineering skills. At the Conference, there are many different competitions such as the Concrete Canoe designed to test their ingenuity, knowledge of engineering subjects, and physical mettle. For the Concrete Canoe Competition, students have to design and fabricate a buoyant canoe made of concrete.



## Mathematics Engineering Science Achievement (MESA)

Funded in part by MESA California, **Mathematics Engineering Science Achievement (MESA)** is a STEM program designed to help students become the engineers and scientists urgently needed by the U.S. technical workforce. Since 1982, SDSU's College of



Engineering has partnered with MESA to provide a unique combination of enrichment activities, hands-on competitions, academic assistance, college preparation, industry involvement and a supportive community environment at both the undergraduate and pre-college levels which result in highly skilled graduates in the San Diego community; many of whom are first in their families to attend college. MESA is nationally recognized for its innovative and effective academic development program in STEM fields. The program serves over 25,000 middle school, high school, community college, and university level students via 67 local centers throughout California; and the model has been replicated in 12 other states.

## Project Lead The Way (PLTW)



The **Project Lead The Way (PLTW) SDSU Affiliate** responds to California's need for more STEM professionals by providing a rigorous, relevant, and interesting project-based and problem-based program through the teaching of principles and concepts in Engineering, Biomedical Science, and Computer Science to elementary, middle school, and high school students. It also oversees teacher trainings, year-round professional development of teachers, industrial and private sector partnerships, and general support for the school programs in California. Additionally, it provides a Preferred Admissions Program through SDSU's College of Engineering, student scholarships, STEM summer camps, a girls technology camp at the SDSU's buildIT Lab, as well as other STEM opportunities for students throughout the year. More than 10,500 schools in the US have implemented the PLTW curriculum, reaching over 2.4 million K-12 students. Qualcomm contributes to the growth of the SDSU College of Engineering Femineer™ Program, which provides K-12 students with project-based learning, female engineering student mentors, and opportunities to visit a Femineer™ affiliate university, while building a sustainable program and community for current and future STEM leaders.



## Troops to Engineers

The **Troops to Engineers** program is a pioneering initiative, supported by public and private industry partners to develop unique, practical solutions to ensure successful transition of our military men and women to college and careers. Through this program, SDSU's College of Engineering offers special services to our veteran and active duty students, with the goal of developing a model for assimilating veterans that can be adopted on a national scale. Initiatives under this program include: internships specifically designed for veterans, counseling and academic support for veterans, and consideration of academic credit for military training.

## Engineers Without Borders - "Building a Better World, One Community at a Time"



**Engineers Without Borders (EWB) USA** is a non-profit humanitarian organization which partners with developing communities worldwide in order to improve their quality of life. EWB specifically encourages students to participate in international engineering projects, allowing students to experience a hands-on application of material learned in class. For more information, please visit the SDSU EWB website: [ewbsdsu.weebly.com](http://ewbsdsu.weebly.com)



## Students Reaching out to Students



Several engineering student organizations facilitate community outreach events throughout the San Diego community that expose K-12 youth to the exciting fields of engineering and to college life at SDSU. Examples of these events include the National Society of Black Engineers (NSBE) 'Hands-On STEM Fair' and the Society of Hispanic Professional Engineers (SHPE) 'Engineering in the Barrio' that are held at sites around the county. In addition, events are held on campus at SDSU such as Society of Women Engineers (SWE) 'Girls Day Out' and SHPE's High School Engineering and Science Fair. To schedule a student led tour of the College of Engineering, please visit: [www.engineering.sdsu.edu/tour.aspx](http://www.engineering.sdsu.edu/tour.aspx)