

UC San Diego

JACOBS SCHOOL OF ENGINEERING
NanoEngineering

Chemical Engineering

NanoEngineering

nanoengineering.ucsd.edu



Student Handbook

2022-2023

Welcome to the NanoEngineering Department!

Congratulations on being admitted to UC San Diego and to the Department of NanoEngineering in the Jacobs School of Engineering. This student handbook will help you become familiar with your program, requirements, expectations, and processes. For any additional questions or concerns, please contact the NanoEngineering Student Affairs office. For detailed department information, please visit the NanoEngineering website: <https://ne.ucsd.edu>.

NanoEngineering Undergraduate Student Affairs

The NanoEngineering Department Student Affairs Office has one undergraduate advisor to assist students with academic plans, major requirements, and general program questions. The advising office is located in the SME Building, 2nd floor, room 241B. All advising questions and requests can be submitted via the Virtual Advising Center (VAC)* and by appointment only. Unfortunately, your advisor cannot assist students over email or phone. Information in regards to petitions, EASy requests, 199 approval forms, academic plans and tentative schedules can be found on our website.

*For questions regarding general education requirements, students must contact their College advisors at their College Academic Advising Office.

NANO Undergraduate Advising

ne-ugradinfo@eng.ucsd.edu

NanoEngineering Program Overview

The Department of NanoEngineering specializes in nanoscale science, engineering, and technology that have the potential to make valuable advances in different areas that include new materials, biology and medicine, energy conversion, sensors, and environmental remediation, to name a few. The undergraduate degree programs focus on integrating the various sciences and engineering disciplines necessary for successful careers in the evolving nanotechnology industry.

The NanoEngineering Department offers undergraduate programs leading to the B.S. degrees in **Nanoengineering** and **Chemical Engineering**. Both programs are accredited by the Engineering Accreditation Commission of ABET.

Program Mission and Objectives:

NanoEngineering

- Nanoengineering graduates will have a strong technical background, enabling them to be successful in careers that cross traditional areas of applied science and engineering.
- Students will be fluent in a multidisciplinary body of knowledge for participating in and seeding new technologies.
- Students will constitute a high-technology workforce with professional, scientific, and technical skills; they will conduct themselves ethically and knowledgeably in a wide range of professional environments.

Chemical Engineering

- To provide chemical engineering students with a strong technical education and communication skills that will enable them to have successful careers in a wide range of industrial and professional environments.
- To prepare students for rapidly changing technological environments with the core knowledge central to multidisciplinary development and personal improvement throughout their professional careers.
- To instill in students a strong sense of humanistic values and professionalism such that they can conduct ethically and knowledgeably regarding technological impact in societal issues.

ABET Accreditation

ABET is the accrediting agency for programs in applied and natural science, computing, engineering and engineering technology. ABET accreditation provides assurance that a college or university program meets the quality standards of the profession for which that program prepares graduates.

NanoEngineering Curriculum Plan

The B.S. program in NanoEngineering is tailored to provide breadth and flexibility by taking advantage of the strength of basic sciences and other engineering disciplines at UC San Diego. The intention is to graduate nanoengineers who are multidisciplinary and can work in a broad spectrum of industries.

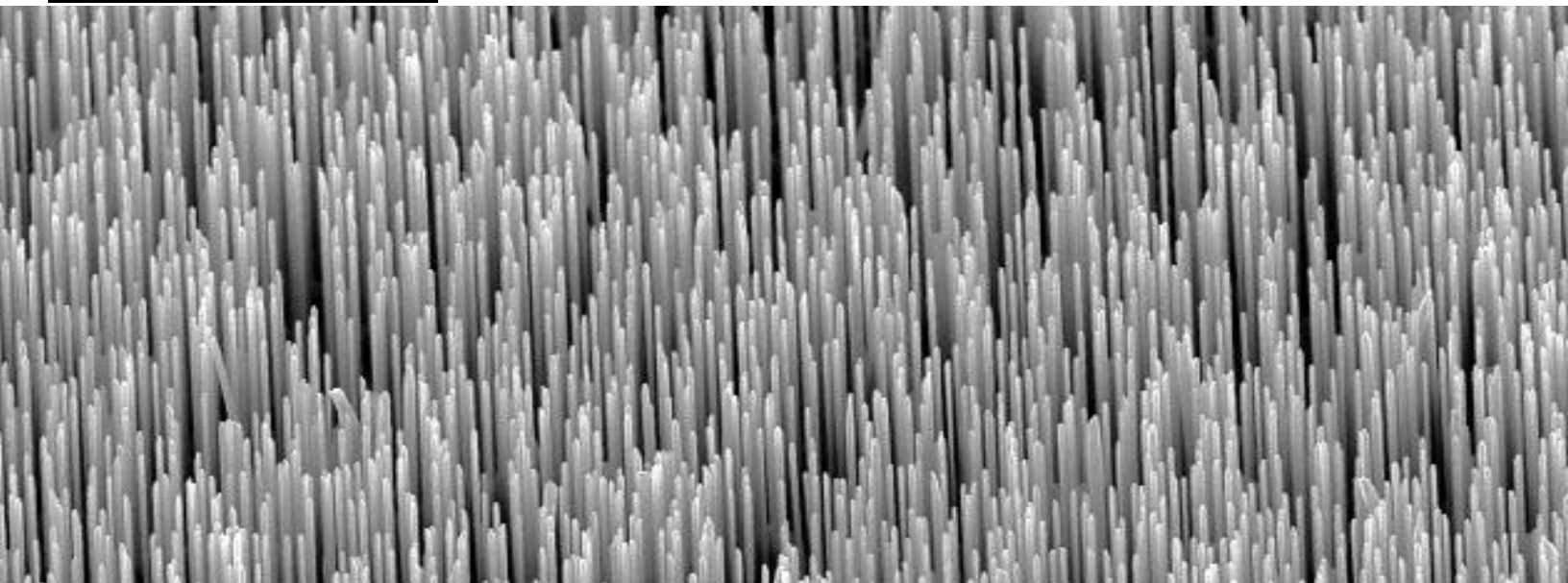
The NanoEngineering curriculum is four years for new freshmen and two years for transfer students. All NANO courses are taught **only once per year** and are scheduled to be consistent with the curriculum below. Every course (except NANO 4 and NANO 199) **must be taken for a letter grade**. To graduate, students must maintain an overall GPA of at least 2.0 and the department requires at least a C- grade in each major core course.

The curriculum includes five Nano elective courses. Students can select any available non-core Nano classes to meet this requirement.

To receive a B.S. in NanoEngineering, students must complete 137 units (plus the College general education requirements). The unit breakdown is as follows:

- **General education requirements (varied units)** – Intended to fulfill the general education requirements (G.E.) from the respective College.
- **Basic sciences and mathematics (sixty units)** – Includes twenty-four units of mathematics, sixteen units of physics, sixteen units of chemistry, and four units of biology.
- **Engineering Preparation (twelve units)** – Covers basics in computer programming, circuit analysis, and circuits lab.
- **Nanoengineering core (forty-five units)** – 3 one-unit labs and eleven core courses.
- **Nanoengineering electives (twenty units)** – Must be chosen from among the upper-division NANO courses offered by the department, or a NANO graduate course that has been approved by a student petition.

NanoEngineering Lab (Credit: UCSD)



Incoming Freshmen Curriculum Plan

All courses are 4-units unless stated below

FRESHMEN YEAR		
Fall	Winter	Spring
MATH 20A	MATH 20B	MATH 20C
CHEM 6A	CHEM 6B	CHEM 6C
NANO 4 (1-unit)	NANO 11	PHYS 2A
NANO 15	G.E.	G.E.
G.E.		
SOPHOMORE YEAR		
Fall	Winter	Spring
MATH 20D	MATH 18	MATH 20E
CHEM 7L	PHYS 2C	PHYS 2D
PHYS 2B	BILD 1	NANO 108
NANO 102	NANO 104	G.E.
NANO 20L (1-unit)		
JUNIOR YEAR		
Fall	Winter	Spring
NANO 111	NANO 107	NANO 112
NANO 148	NANO 117	NANO 115L
NE Elective (1)	NE Elective (2)	G.E.
G.E.	G.E.	G.E.
SENIOR YEAR		
Fall	Winter	Spring
NANO 119 (1-unit)	NANO 120A	NANO 120B
NANO 110	N.E. Elective (4)	N.E. Elective (5)
N.E. Elective (3)	GE	G.E.
G.E.	G.E.	GE

NANO 4: This course should be taken in the first Fall Quarter. Students will not graduate without taking NANO 4.

NANO 15: Offered in the Fall and may be offered in the Winter Quarter. If you cannot register for NANO 15 in the Fall, you may enroll in NANO 15 in the Winter, or MAE 8 in Winter or Spring Quarter, if offered.

NanoEngineering Electives (twenty units): This requirement must be chosen from among the upper-division NANO courses (NANO 100 – 199) offered by the Department.

G.E. (various units): This requirement varies by college and must be discussed with your college advisor.

Transfer Student Curriculum Plan

Two-Year Plan

FIRST YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
MATH 20E	NANO11	NANO 108
BILD 1	NANO 104	NANO ELECT
NANO 102	NANO 107	NANO ELECT
NANO 15	GE	GE
NANO 4 (1-unit)		
SECOND YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
NANO 111	NANO 120A	NANO 112
NANO 110	NANO 117	NANO 115L
NANO 148	NANO ELECT	NANO 120 b
NANO 119 (1 unit)	NANO ELECT	NANO ELECT
NANO 20L (1-unit)	GE	

Three-Year Plan (only with College approval)

FIRST YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
MATH 20E	NANO 11	NANO 108
NANO 4 (1-unit)	NANO 104	G.E.
NANO 20L (1-unit)	NANO 15	G.E.
NANO 102	G.E.	G.E.
SECOND YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
		NANO 112
NANO 111	NANO 107	NANO 115L
NANO 148	NANO 117	NE Elective (1)
G.E.	G.E.	G.E.
THIRD YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
NANO 119 (1 unit)	NANO 120A	NANO 120B
NANO 110	NE Elective (3)	NE Elective (4)
NE Elective (2)	G.E.	NE Elective (5)
G.E.	G.E.	G.E.
G.E.		

The following courses are also required for all NanoEngineering transfer students as a major requirement and to move forward in the major courses.

Math	Chemistry	Physics
MATH 20A – Calculus I – for Science and Engineering	CHEM 6A – General Chemistry I	PHYS 2A – Physics – Mechanics
MATH 20B – Calculus II – for Science and Engineering	CHEM 6B – General Chemistry II	PHYS 2B – Physics – Electricity and Magnetism
MATH 20C – Calculus and Analytic Geometry	CHEM 6C – General Chemistry III	PHYS 2C – Physics – Fluids, Waves, Thermodynamics, and Optics
MATH 20D – Differential Equations	CHEM 7L – General Chemistry Laboratory	PHYS 2D – Physics – Relativity and Quantum Physics
MATH 18 (formally MATH 20F) – Linear Algebra	Biology	
	BILD 1 – The Cell	

Chemical Engineering Curriculum Plan

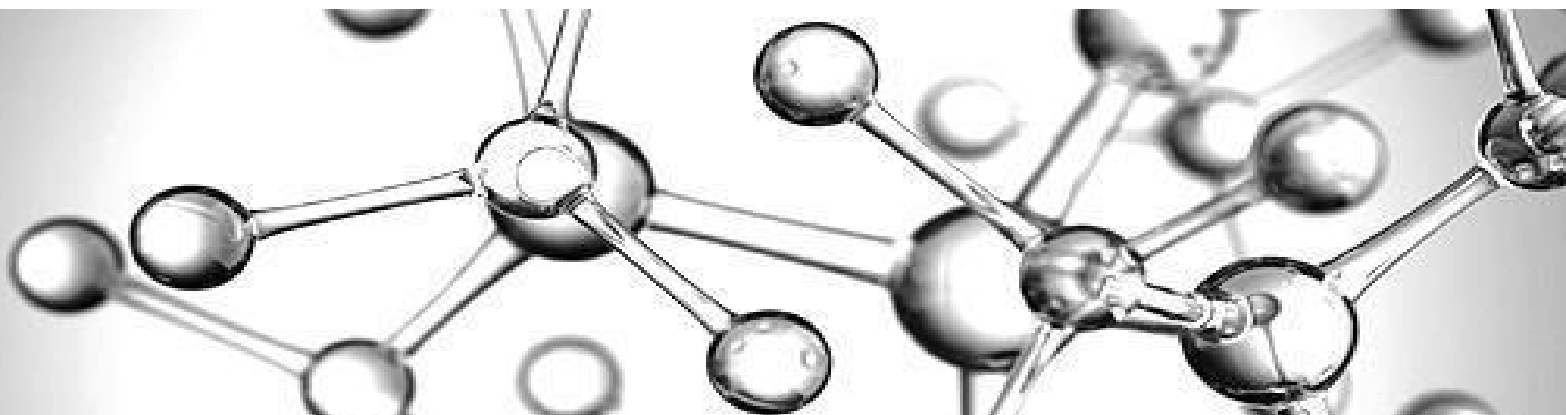
The B.S. program in Chemical Engineering prepares graduates by placing a strong emphasis on the development of communication skills, both written and oral. Experiences are provided which enhance the ability of graduates to work effectively in team efforts. Whether the career goal is industry, or graduate or professional school, the curriculum has a strong emphasis on developing problem-solving skills and the ability to think and learn independently.

The Chemical Engineering curriculum is designed to be completed in four years for incoming freshmen. Transfer students will follow a two-year path. All CENG core courses are taught **only once per year** and are scheduled to be consistent with the curriculum shown below. Students are encouraged to follow the curriculum as designed. Every course (except CENG 4, and CENG 199) **must be taken for a letter grade**.

The curriculum includes Technical Electives or an Area of Specialization. These courses help prepare graduates for a career in various fields, rather than solely traditional chemical and petrochemical industries. Students can select three electives in different areas, to enhance breadth of knowledge. However, selecting three courses within the same discipline allows for an area of specialization. All eligible courses are pre-approved.

To receive a B.S. in Chemical Engineering, students must complete 139 units (plus the college general education requirements). The unit breakdown is as follows:

- **General education requirement** - Intended to fulfill the general education requirements (G.E.) from respective College.
- **Basic sciences and mathematics (fifty-four units)** – Includes twenty-four units of mathematics, fourteen units of physics, and sixteen units of chemistry.
- **Chemistry core (twelve units)** – Three advanced chemistry electives must be selected from among the pre-approved courses.
- **Chemical engineering core (thirty-two units)** – Covers chemical process modeling, solution thermodynamics, transport phenomena, chemical reaction engineering, process control, and unit operations.
- **Process laboratory and design (sixteen units)** – This requirement is crucial to fulfilling the Engineering Accreditation Commission of ABET design content.
- **General engineering (twelve units)** – Covers basics in computer programming, probability and statistics, and instrumentation.
- **Electives in an area of specialization (twelve units)** – Electives are intended to broaden and enhance professional goals. They may be chosen to achieve either breadth or depth in one's education. All electives must be upper-division courses in engineering and are pre-approved.



Incoming Freshmen Curriculum Plan

All courses are 4-units unless stated below

FRESHMEN YEAR		
Fall	Winter	Spring
MATH 20A	MATH 20B	MATH 20C
CENG 15	CHEM 6B	CHEM 6C + 7L
CENG 4 (1-unit)	PHYS 2A	PHYS 2B
CHEM 6A	G.E.	G.E.
G.E.		
SOPHOMORE YEAR		
Fall	Winter	Spring
MATH 20D	MATH 18	MATH 20E
CENG 100	CENG 102	CENG 113
PHYS 2C + 2CL (2-units)	Adv. Chem. (1)	Adv. Chem. (2)
G.E.	G.E.	G.E.
JUNIOR YEAR		
Fall	Winter	Spring
CENG 101A	CENG 101B	CENG 101C
MAE 170	CENG 114	A.S./T.E. (1)
Adv. Chem. (3)	G.E.	G.E.
G.E.		
SENIOR YEAR		
Fall	Winter	Spring
CENG 122	CENG 124A	CENG 124B
CENG 120	CENG 176A	CENG 176B
A.S./T.E. (2)	A.S./T.E. (3)	G.E.
G.E.	G.E.	

CENG 4: This course should be taken in the first Fall Quarter. Students will not graduate without taking CENG 4.

CENG 15: Offered in the Fall and may be offered in the Winter Quarter. If you cannot register for NANO 15 in the Fall, you may enroll in NANO 15 in the Winter, or MAE 8 in Winter or Spring Quarter, if offered.

Chemistry Core: Must be selected from CHEM 41A-C, 130, 131, 132, 114A (or BIBC 100), 114B (or BIBC 102), 120A, 120B,.

Area of Specialization/ Technical Electives: Electives are intended to broaden and enhance professional goals. They must be upper-division courses in engineering. Pre-approved courses are listed here::

<https://ne.ucsd.edu/undergrad-programs/degree/bs-chemical-engineering/technical-electives>

G.E. Courses: This requirement varies by college and must be discussed with your college advisor.

Chemical Engineering Transfer Curriculum Plans

Two-Year Plan

FIRST YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
CENG 100	CENG 102	CENG 113
CENG 4 (1-unit)	CENG 101B	CENG 101C
CENG 101A	CENG 15	Adv. Chem. (1)
MATH 20E	CENG 114	MAE 170
G.E.		G.E.
SECOND YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
CENG 122	CENG 124A	CENG 124B
CENG 120	CENG 176A	CENG 176B
Adv. Chem. (2)	Adv. Chem. (3)	G.E.
A.S./T.E. (1)	A.S./T.E. (2)	A.S./T.E. (3)

Three-Year Plan

(only with College approval)

FIRST YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
CENG 100	CENG 102	CENG 113
CENG 4 (1-unit)	Adv. Chem. (1)	MAE 170
CENG 15	MATH 20E	Adv. Chem. (2)
G.E.	G.E.	G.E.
SECOND YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
CENG 101A	CENG 101B	CENG 101C
Adv. Chem. (3)	CENG 114	A.S./T.E. (1)
G.E.	G.E.	G.E.
THIRD YEAR @ UC SAN DIEGO		
Fall	Winter	Spring
CENG 122	CENG 124A	CENG 124B
CENG 120	CENG 176A	CENG 176B
A.S./T.E. (2)	A.S./T.E. (3)	G.E.

The following courses are also required for all Chemical Engineering transfer students as a major requirement and to move forward in the major courses.

Math*

MATH 20A – Calculus I – for Science and Engineering

MATH 20B – Calculus II – for Science and Engineering

MATH 20C – Calculus and Analytic Geometry

MATH 20D – Differential Equations

MATH 18 (formerly MATH 20F) – Linear Algebra

Chemistry

CHEM 6A – General Chemistry I

CHEM 6B – General Chemistry II

CHEM 6C – General Chemistry III

CHEM 7L – General Chemistry Laboratory

Physics

PHYS 2A – Physics – Mechanics

PHYS 2B – Physics – Electricity and Magnetism

PHYS 2C – Physics – Fluids, Waves, Thermodynamics, and Optics

PHYS 2CL – Physics Laboratory – Electricity and Magnetism

*Students on the 2-year plan can submit a Student Petition to take MATH 20E and CENG 101A concurrently in their first quarter.

Academic Opportunities

Additional academic opportunities not required in the NanoEngineering or Chemical Engineering curriculum plans are available to undergraduates. The NanoEngineering Department, the Jacobs School of Engineering, and UC San Diego as a whole, offer a number of student resources to promote a well-rounded and enriching academic experience.

CENG 199 or NANO 199 – How to enroll:

First Quarter

1. The student finds and discusses with a faculty member the possibility of a Special Studies project in the faculty member's field of competence.

2. The student obtains a [CENG 199 Contract](#) or [NANO 199 Contract](#) from our website, and discusses with the faculty advisor the nature of the project, frequency of contact, prerequisite knowledge needed, and the means of evaluation, which is a graded final report. The contract also provides information about receiving credit for two Technical Electives (TEs) or NanoEngineering (NE) Electives upon completion of two consecutive quarters. The contract must be completed, approved, and processed prior to taking the 199.

3. After obtaining the faculty member's concurrence on the topic and scope of the study, the student submits the following two forms online through the [Enrollment Authorization System \(EASy\)](#):

- [Special Studies course request](#) (to request to enroll in the 199 course)
- [CENG 199 Contract](#) or [NANO 199 Contract](#) form. The 199 Contract form must be uploaded and attached in the "Supporting Documents" field in EASy, along with the Special Studies course request.

Click [here](#) for instructions on how to submit a Special Studies request and upload documents in EASy

4. After the request is approved by the faculty and Department Chair, the EASy system will pre-authorize the student to enroll in the 199 course. The student will be notified through email.

5. The student must enroll themselves in the 199 course through [WebReg](#). Enrollment is not automatic, so the student must check their schedule and confirm their enrollment in the 199 course.

Second Quarter

1. Prior to the start of the second quarter, the student submits another [Special Studies Course request](#) online through [EASy](#). Click [here](#) for instructions on how to submit a Special Studies enrollment request.

2. After the request is approved by the faculty and Department Chair, the EASy system will pre-authorize the student to enroll in the 199 course. The student will be notified through email.

3. The student must enroll themselves in the 199 course through [WebReg](#). Enrollment is not automatic, so the student must check their schedule and confirm their enrollment in the 199 course.

4. As discussed previously with the faculty advisor, a required final report must be submitted at the completion of the second quarter. The 199 course is graded on a P/NP basis. For ABET accreditation purposes, the instructor will assign a letter grade on the final report.

5. After completion of the two quarters, the student will submit the following forms online:

- **Undergraduate Student Petition** (requesting to have the work accepted as two TEs or NE Elective courses)
- The graded final report. It must be uploaded and submitted with the **Undergraduate Student Petition**.

6. The petition and final report will be reviewed by the Undergraduate Affairs Committee and Department Chair. If the petition and final report are approved, the student's degree audit will be updated to reflect credit for two TEs or NE Electives.

Quick links to websites and forms:

- **Structure of the Report** for CENG 199 or NANO 199 (guidelines discuss with faculty advisor)
- **CENG 199 Contract** (form outlining the proposed research project, and information on how to receive credits for two Technical Electives; to be discussed with and signed by the faculty advisor)
- **NANO 199 Contract** (form outlining the proposed research project, and information on how to receive credits for two NanoEngineering Electives; to be discussed with and signed by the faculty advisor)
- **Special Studies Course Request** (to request enrollment in CENG 199 or NANO 199 each quarter)
- **WebReg** (To enroll in the 199 course, after obtaining clearance, since enrollment isn't automatic)
- **Undergraduate Student Petition** (to request credit for two Technical Electives or NanoEngineering Electives after the completion of the second quarter)
- **Enrollment Authorization System/ EASy** (for pre-authorization to enroll in CENG 199 or NANO 199 each quarter)
- https://academicaffairs.ucsd.edu/Modules/Students/PreAuth/Documents/EASy_Special_Studies_Instructions_Student.pdf (instructions on how to submit a Special Studies request)

Study Abroad Unique opportunities to fulfill your Chemical Engineering or NanoEngineering prerequisites, or college G.E.s are available at many host institutions worldwide through the University of California's Education Abroad Program (EAP) or Opportunities Abroad Program (OAP). Because of the sequential nature of many of your required courses in the major, timing of your study abroad program will be critical if you plan to graduate in four years. Careful planning with a department advisor will ensure you are aware of all opportunities available to you in fulfilling department requirements. Complete and submit a petition for each course you plan to take to the NanoEngineering Department the quarter before you leave. For more information, contact the Study Abroad Office at <https://studyabroad.ucsd.edu>, and meet with one of their advisors. Be sure to return and discuss your plans with your NanoEngineering Department Advisor.

Student Resources and Organizations

UC San Diego

JACOBS SCHOOL OF ENGINEERING

Corporate Affiliates Program (CAP) provides custom services to achieve your corporate goals. Available services include industry access, research, leadership, and employment and internship opportunities. CAP works with some of the top engineering companies.

Academic Internship Program (AIP) allows students to engage in the community and explore careers through experiential learning. Students are given opportunities to engage in research and work in partnerships with different departments, programs, and faculty. Visit their website at aip.ucsd.edu.



IDEA Center supports several programs that promote academic and professional development for undergraduate students across all engineering departments. The IDEA Center provides information on engineering student organizations, success workshops, mentoring and internship programs, and tutoring. The IDEA Center is in Jacobs Hall (EBU-1) Room 1400, or online: <https://jacobsschool.ucsd.edu/idea>

UC San Diego

CAREER CENTER

UC San Diego Career Center helps students determine and fulfill their career goals. The Center delivers a wide range of services across two programmatic units:

The Career Education and Advising team (CEA) empowers students to develop and utilize their self-awareness, professional development skills, and proven resources to identify and pursue career employment and professional school admission.

The Industry Engagement team (IE) connects students with bona fide career opportunities, as well as experiential positions, including internships, part-time on- and off-campus jobs, work-study positions, and Peace Corps service. Visit their website at: career.ucsd.edu.



AIChE – American Institute of Chemical Engineers This student organization aims to promote the professional development of undergraduate and graduate chemical engineers at UC San Diego and to foster a community among its members through social activities, career-building events, and service opportunities. Please visit their website at aiche.ucsd.edu.



NETS – Nanoengineering and Technology Society This student organization at UC San Diego is dedicated to building and supporting the NanoEngineering community of students, faculty, and corporate affiliates through academic and professional advancement, social and networking events, and outreach opportunities. Please visit their website at <https://netsucsd.weebly.com/>