

**CSUN**

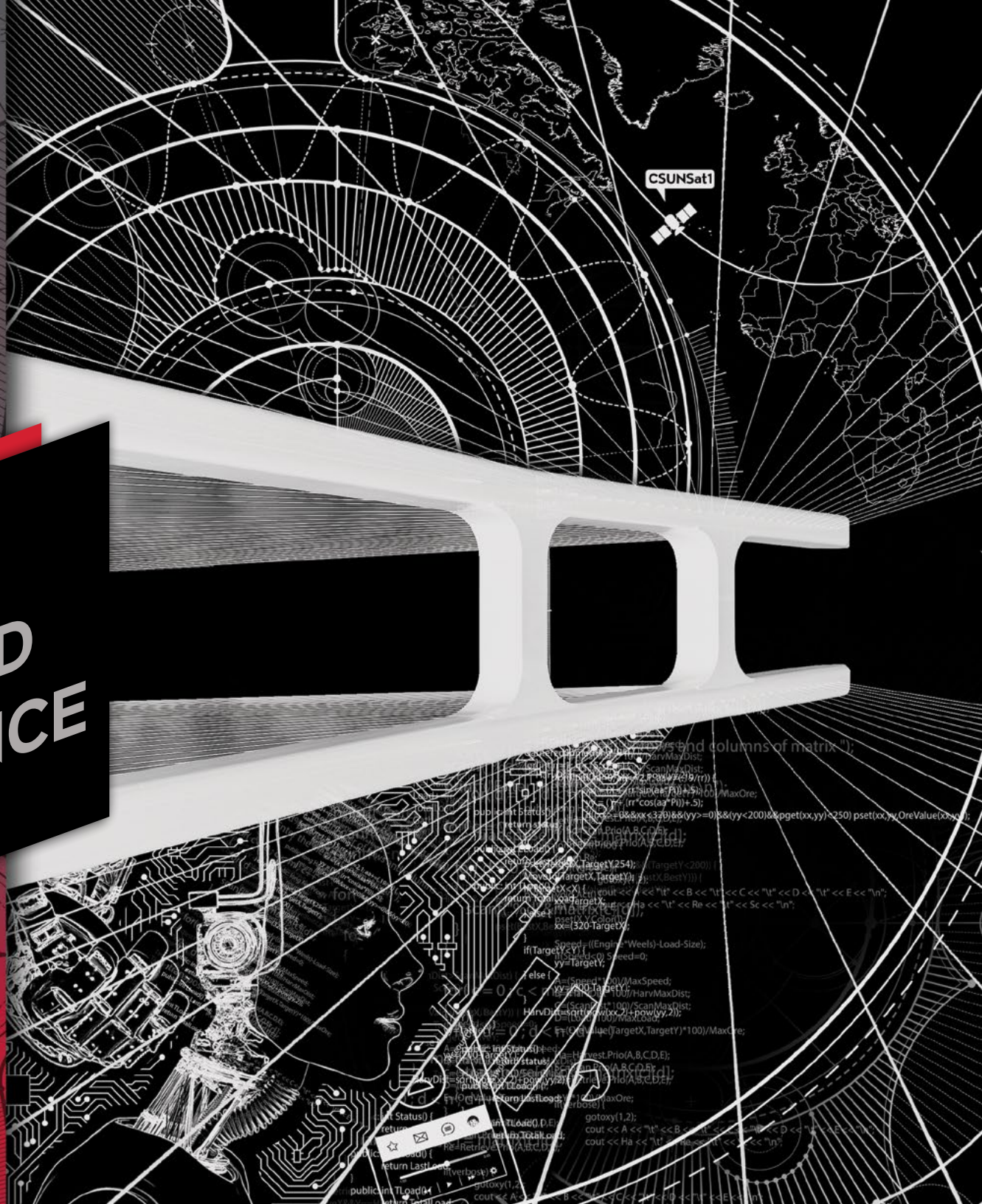
CALIFORNIA  
STATE UNIVERSITY  
NORTHRIDGE

CSUN's College of  
Engineering and  
Computer Science  
ranked in the  
top 10 percent  
in the nation.

Best Engineering  
Colleges

# COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

CSUNSat1





CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

# COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

Everything at the College of Engineering and Computer Science is done with the student in mind. That applies as much to research opportunities and projects as it does to the carefully selected faculty.

It's also why hands-on practice is so central to the college's curriculum. With access to the same technologies and methods used by industry, students walk away ready to tackle humanity's greatest challenges – equipped, in mind and in spirit, with the practical knowledge needed to act.

Whether it's solving societal problems, such as climate change, or cracking the technical tasks of big-name firms, graduates of the college carry the promise of answers to important global questions.

They lie on the forefront of innovation and discovery...

Building the next century and beyond.



## More than 4,000 students ...

Like the larger campus, students in the college stem from broad points of origin. From the international, first-time visitor, to the full-time midcareer professional, the college's student body is a beacon of global diversity. A place where passion meets purpose. And where students meet the world.

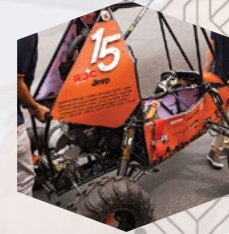
## ... in 5 departments ...

Through painstaking, peer-reviewed work and student-centric curriculum, the college offers a superior selection of courses, methods and disciplines in five distinct departments: Civil Engineering and Construction Management, Computer Science, Electrical and Computer Engineering, Manufacturing Systems Engineering and Management, and Mechanical Engineering.

## ... designed by engineers for engineers.

*"The CSUN College of Engineering and Computer Science is home to a remarkable team of faculty and students who recognize that engineering and computer science are essentially highly creative professional fields. Faculty and students engage in research projects that seek fresh and important solutions to big challenges, including renewable energy, smart manufacturing, cybersecurity, software engineering, satellite communications, artificial intelligence, virtual reality, embedded systems, assistive technology engineering and robotics. The college is made both excellent and distinctive by the strong and enduring connections it has with industry and by its ability to constantly innovate and reinvent itself in a changing world."*

— S.K. Ramesh, Ph. D.  
Former Dean, College of Engineering and Computer Science, CSUN



*"STEM majors not only have the **highest wages**; they experience the **largest wage growth** over the course of their careers."*

*2015 Report,  
Georgetown University  
Center on Education  
and the Workforce*





# CIVIL ENGINEERING AND CONSTRUCTION MANAGEMENT

CSUN ranked **second** in the 2017 SAE (Society of Automotive Engineers) International "Aero Design West 2017" competition for engineering students. Engineering students designed an aircraft called The Dragon, capable of dropping humanitarian aid packages.



Civil engineers construct the world's physical infrastructure. Society's roads, bridges and waterways depend on their work. As do architectural marvels like the Empire State Building, the Golden Gate Bridge and the Eiffel Tower. Students learn to design, build and manage those structures – or ones like them – in the Department of Civil Engineering and Construction Management.

A large part of its curriculum stems from the best professional practices of contemporary industry. Such as learning to use **smart infrastructure** for real-time data acquisition. Or how to integrate **sustainable materials** into large scale works, while at the same time mitigating construction costs, building to code and assessing a project's expected lifetime.

Through instruction in vibration analysis, hydraulics, soil mechanics and more, the department equips students with what they need to jump immediately into careers in fields ranging from government, business, architecture, construction, transportation and more.

And behind each academic principle is the promise of **applied practice**. That means students experience industry firsthand, conducting research and doing projects in multidisciplinary teams, right alongside faculty and civil engineering professionals.



The American Society of Civil Engineers awarded CSUN **third place** in display and **ninth place** overall at the 2017 National Student Steel Bridge Competition.

The California State University (CSU) system received \$66 million in federal grants in 2016 to advance STEM education. Twelve CSUs recognized as Hispanic Serving Institutions benefited from these grants. CSUN will receive \$5.9 million to boost Latino student success in STEM fields.

# COMPUTER SCIENCE

The Department of Computer Science teaches students to design, develop and program computer technologies and software.

That includes learning what's needed to build and maintain the **digital infrastructures** of start-ups, tech firms and major global industry. As well as how to secure **big data** – now the world's most valuable resource – in safe, reliable structures.

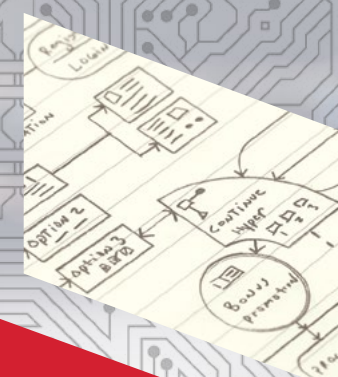
*In 2016 the U.S. Department of Education chose CSUN's proposal, "Bridging the Gap: Enhancing AIMS<sup>2</sup> (Attract, Inspire, Mentor and Support Students) for Student Success" for a \$6 million grant. The College will use the money to bolster student success and support underrepresented minorities in engineering and computer science. The White House Initiative on Educational Excellence for Hispanics has recognized the AIMS<sup>2</sup> program as a "Bright Spot in Hispanic Education."*

To accomplish this, as well as many other goals, the department puts a major emphasis on experiential learning. That means exposing students to professional projects early and often – letting them conduct real research, design actual programs and gain authentic industry experience, all before they graduate.

In addition to **practice-based curriculum**, students gain a foundation in mathematics and theory, with course work on algorithms, programming languages and abstract concepts. This ensures students develop a solid understanding of how – and why – computers work.

They'll also acquire the expertise to play vital roles in the fields of virtual reality, video gaming, high-speed networks, parallel computing, computer security, artificial intelligence, robotics and much more.

The college operates a number of high end HP UNIX servers. Available software includes C, C++, Java, Prolog, Scheme, Smalltalk, Visual Basic, Ada, database systems, computer simulators, multimedia applications and standard office applications.



*"The median annual wage for engineers in 2015 was \$90,060. For all types of engineers, a bachelor's degree is the typical education needed to enter the occupation."*

*– U.S. Bureau of Labor Statistics, October 2016*

*The National Association of Colleges and Employers puts engineering as the top occupation for "Starting Salary Projections for the Class of 2017."*





**CSUN is an active research and innovation partner with the Advanced Manufacturing Partnership for Southern California (AMP SoCal). The collaboration of government, academia and industry has more than 100 companies and organizations from the public and private sector involved.**

# ELECTRICAL AND COMPUTER ENGINEERING

Many technologies – from city lights to semiconductors, spacecraft and even the internet – depend on electricity. But equally important are the expert engineers who build, test and deploy ways to harness its power.

And nowhere is that expertise more apparent than in the Department of Electrical and Computer Engineering. Here, students learn both general engineering principles – math, theory and design – as well as those specific to electrical and computer engineering, such as electrical circuitry.

Faculty and students conduct joint professional projects in the department’s 17 **state-of-the-art labs**, each equipped with industry-standard technology and software packages.

A recent department project is the launch of **CubeSAT1**, a NASA-funded mission in which students, faculty and space industry insiders designed and launched a data-collecting satellite into geosynchronous orbit. Other projects include work on electrical power systems, microcontroller-based applications and medical instrumentation for healthcare.

Graduates go on to careers in countless roles, including those in telecommunications, electronic manufacturing, public utilities, aerospace, energy, transportation and solid-state engineering.

*Faculty members Sembiam R. Rengarajan and Ronald Pogorzelski received major funding from the U.S. Navy in support of a project entitled “Determine Optimum Search Strategies for Rapidly and Accurately Locating a Beam Pointing Direction.”*



# MANUFACTURING SYSTEMS ENGINEERING AND MANAGEMENT

This department focuses on manufacturing systems engineering, materials engineering and engineering management. Those in the field of **manufacturing systems engineering** play a key part in the creation of most goods and products. That's as true for clothing and computers as it is for cars, phones and frozen foods. The department prepares students for a range of roles in industry – among them, product development, designing manufacturing systems, and guiding production processes and resources.

The same can be said of **materials engineering**. Except this field is more concerned with the materials than the process. Which means designing, discovering and manufacturing the physical components of goods, products and technologies. Materials engineering projects address nanotechnology, smart materials, microelectronics, MEMS, sensors, biomaterials and more.

Directing engineering teams and projects takes an understanding of the industry's business and technical components. That's where **engineering management** comes in. This field trains engineers to lead technical teams, systems and resources, including supply chains, big data and industrial manufacturing.

Doing so means more than reiterating engineering principles. Which is exactly why innovation and entrepreneurship are so vital to the curriculum: to get students to think outside the box, embrace global change and take smart risks for huge returns.



## Distinguished Alumni

**Mory Ejabat**, B.S., Industrial Engineering; M.S., Systems Engineering, CEO and Founder of Dictum Health, a next-generation provider of mobile and cloud-based telehealth solutions; Co-Founder and former CEO and Chairman of telecommunications company Zhone Technologies.



Student teams from the Manufacturing Systems Engineering and Management program **won the Grand Prize three years in a row at the SMI (Small Manufacturers' Institute) Manufacturing Challenge and Exposition.**

**CSUN is a founding member of the White House Maker Faire initiative, launched by President Barack Obama to emphasize advanced manufacturing, entrepreneurship and innovation.**





The Formula SAE (Society of Automotive Engineers) student team annually **designs, assembles and races a formula-style car** for a senior project. Under supervision of a faculty member, the Matador Motorsports team competes against teams from around the country.



The college's 3000-square-foot **Student Design Center** features a high-end computational cluster with solid modeling capability, as well as finite element analyses, large scale dynamic simulations, computational fluid dynamics and more.

# MECHANICAL ENGINEERING

The Department of Mechanical Engineering involves the design, processing and construction of mechanical systems and products.

Broadly speaking, anything that uses moving parts to power a system – cars, aircraft, engines and so forth – is the work of mechanical engineers. It's their job to put the pieces together, and once in place, keep them in optimal working condition.

That starts with early conceptualization, moves into the design phase and culminates with **manufacturing and production**. Mechanical engineers also maintain the products, devices and systems used by fields as varied as aerospace, telecommunications, transportation, robotics, construction and more.

And, like the rest of the college, the department weaves **design concepts and projects** directly into the curriculum. These team-based assignments closely mirror industry work groups. As such, graduates enter professional practice with the same skills used by those already on the job.

Courses feature content from across the engineering spectrum, covering topics like thermodynamics, materials science, electrical systems, heat transfer and mechatronics, as well as mathematics, physics and computer programming. Students also learn computer-aided design (CAD) and analysis.

*The Mechanical Engineering student team took **first place in the 2017 E-Fest North America West Human Powered Vehicle (HPV) Challenge**, hosted by the American Society of Mechanical Engineers. E-Fests are built around design, advanced manufacturing and robotics technologies.*

*The department's **Haas Laboratory** area features a CNC lab, engine dynamometer test cell, systems engineering research lab, and a CAD/CAM lab.*



*Nhut Tan Ho, professor of mechanical engineering, received \$235,460 from the Department of Defense in support of a project entitled "**An Experimental Investigation of how Robotic Learning and Cloud-Based Information Affects Trust in Human-machine Teaming Contexts.**"*



## Our Sustainable Promise

Like the larger CSUN campus, the college is committed to a sustainable future. That starts with small, daily decisions, like recycling waste, turning off lights and using only what's necessary. The rest happens by design.

Whether it's a practical technology, or a big, blow-your-mind idea, the college keeps its green promise through constant, groundbreaking work. In November 2016, CSUN received an Environmental Sustainability Award from then-State Senator Fran Pavley for environmental leadership and achievement. This recognition stemmed largely from the college's cutting-edge research, curriculum and projects.

Take, for example, the portable water desalination system. Designed to remove salt from sea water, the system, once completed, will be entirely solar powered.

There's also the college's self-sustained household power system. This collaborative project, conducted by students and faculty, proposes using pure hydrogen as a household's sole source of energy. The team is currently testing the technology's large-scale feasibility. And to curb the world's overreliance on fossil fuels, the college is assessing the viability of biodiesel as an alternative fuel source.

These clean, sustainable innovations offer only a glimpse of the college's many ongoing endeavors.

*The VEX Robotics Club (Matabots) competed in and won every round of the 2017 VEX Robotics regional tournament held at the University of Southern California. The club built two robots and competed against 321 schools registered as a university team. The Matabots also won the Excellence Award, earning it a spot at the VEX Robotics World Championships. In 2016, the Matabots placed in the top 10 robotics teams in the world.*

## Student Clubs and Organizations

- › American Society of Civil Engineers
- › American Society of Mechanical Engineers
- › CAL GEO
- › Computer Science and Technology Club
- › Construction Management Association of America
- › Engineering Management Student Association
- › IEEE
- › IEEE-HKN (Eta Kappa Nu)
- › Layer 8
- › Management Information Systems Association
- › Matador Pedal Sports
- › Mobile Robot Club
- › National Society of Black Engineers
- › Society for the Advancement of Material and Process Engineering
- › Society of Automotive Engineers
- › Society of Hispanic Professional Engineers
- › Society of Women Engineers
- › VEX Robotics Club
- › Women in Science, International



The college's **Research Seminar Series** features presentations by faculty on topics such as 3D bioprinting, human powered vehicles, electrical vehicle loads, medical image classification, cooling of electronic devices, and other specialized subjects.



# LA UP CLOSE

There's a reason the world flock to Los Angeles – and it's not just the year-round sunshine. One look at the city is enough to convince anyone that a life spent here is more aptly called an investment. That's because what's available already – a booming tech sector, a thriving business community and a legendary entertainment industry – is only half the story. The rest is in a future still being written by the prominent institutions that call the city home.

Of the nearly 700 tech firms in Los Angeles, 86 percent are located in Santa Monica's "**Silicon Beach.**" This innovation district of tech companies, start-ups and venture capital firms features the headquarters of **Snapchat, Hulu, and TrueCar.** As well as the offices of other industry giants, such as **Google, Youtube, and Facebook.**

Just a few miles from the Los Angeles International Airport (LAX), Elon Musk and his fleet of Mars-minded engineers are busy at work in **SpaceX's** Hawthorne headquarters. There, among many other projects, the private aeronautics company designs and manufactures re-usable rocket technology in a bid to revolutionize space travel.

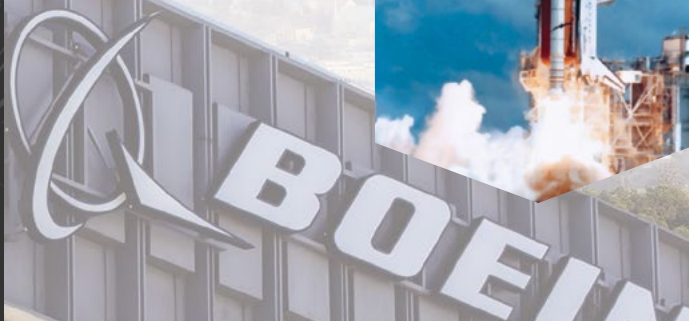
From Long Beach, Sir Richard Branson and his privately-funded space company, **Virgin Galactic,** labor to create the world's first commercial spaceline, complete with luxury packages to launch tourists into orbit.

On Hollywood's Sunset Boulevard, from its new 92,000-square-foot, five-story headquarters, video streaming giant **Netflix** broadcasts its exclusive digital content.

*The **global space industry** is now worth more than **\$335 billion.***

***CSUN Partners** (among others) are JPL, Northrop Grumman, Boeing, Aerojet Rocketdyne, and Haas Automation.*

*Through the College's **Ernie Schaeffer Center for Entrepreneurship and Innovation,** students engage in advanced manufacturing and entrepreneurship with the latest technologies.*





At the city's southern tip, **The California Science Center**, home of the Space Shuttle Endeavor, draws a global audience to its extensive catalogue of engineering innovations and artifacts.

In Pasadena, at **NASA's Jet Propulsion Laboratory (JPL)**, engineers develop aviation's most experimental technology. In test centers, control rooms and hangars larger than football fields, JPL builds and operates robotic spacecraft, like the Curiosity Rover, to explore the solar system's deepest cosmic terrain.

And less than five minutes from CSUN is a base of operations shared by **Boeing**, the world's largest aerospace company, and **Aerojet Rocketdyne**, an early pioneer of the space age.

**Employment in STEM occupations grew by 10.5 percent** between May 2009 and May 2015, compared with 5.2 percent net growth in non-STEM occupations.

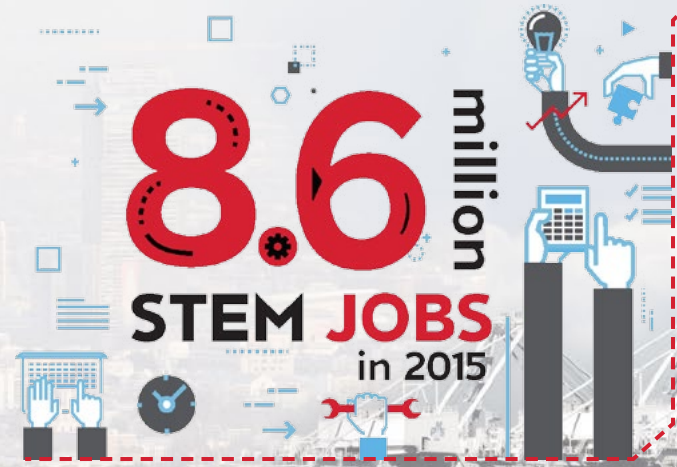
**Computer occupations and engineers had the highest gains.**

**STEM fields accounted for almost 8.6 million STEM jobs in 2015, representing 6.2 percent of U.S. employment.**



*The National Science Foundation ranked CSUN 38th nationally in its "Top 50 Baccalaureate Institutions of Hispanic or Latino Science and Engineering Doctorate Recipients: 2010-14". It ranked CSUN 10th in its national "Top 20 Academic Institutions Awarding Science and Engineering Bachelor's Degrees (Hispanic or Latino): 2011-2014."*

These institutions, among countless, unlisted others, are within close reach of CSUN's Transit Center. On the city's fleet of clean-air buses or via the subway system, visitors and students have easy public access to the region's many cultural and scientific assets.



# A DEGREE IN A GLOBAL CAPITAL

With the **fifth-largest economy in the world**, California more than lives up to its 'Golden State' promise. And L.A. plays no small part in that. Behind the city's glistening, rosy exterior are some of the **planet's highest per capita earners** – both personally and commercially.

The aerospace industry alone **employs more than 85,000 people in Southern California**. That's 14 percent of the entire industry. And that's not counting the 375,000+ employed in SoCal's manufacturing sector. Nor the state's jobs in guided missiles, space vehicles and related parts, which make up nearly a quarter of those nationally.

California  
contributed  
**1 OUT OF 16** JOBS  
in the  
NATION



It's no wonder that the tech industry is positioning itself so aggressively in the region. Getting in now means taking advantage of resources only bound to grow.

And even better, **being a CSUN student means being a part of it – all of it**. From the big name brands, like Northrop Grumman, to the big name people, like Elon Musk. It's all just part of the territory. There is no place better to get a degree than in an environment built on big city excitement and possibility.

## California is a leader in:

- › Manufacturing
- › Aerospace
- › International trade
- › Entertainment
- › Automotive



*"California contributed **one out of every six jobs** that the nation gained over the February 2010-to-July 2016 expansion period. The industry sectors that gained the most jobs were professional and business services, which have a **high concentration of high-tech, high-wage jobs.**"*

– State of California, Employment Development Department

*The annual **Space Tech Expo in Pasadena, California** draws thousands of aerospace and related industry professions from the engineering and manufacturing world, where leaders explore the **future of space technology.***

*The annual **International Conference on Mechanical and Aerospace Engineers** met in Los Angeles in 2017, with innovative academics and industrial experts from around the world in attendance.*

## Employers of CSUN Alumni

- › Aerojet Rocketdyne
- › AeroVironment
- › Amgen
- › Boeing
- › Boston Scientific
- › Edwards Air Force Base
- › Haas Automation
- › Jet Propulsion Lab (JPL)
- › LA Dept of Water and Power
- › LA County Dept of Public Works
- › LA Sanitation
- › Medtronic
- › NAVAIR
- › Naval Surface Warfare Center
- › Natel Engineering
- › Northrop Grumman
- › Orbital ATK
- › Raytheon Company
- › Southern California Edison
- › Southern California Gas Company
- › Teledyne Controls
- › Teradyne
- › The Aerospace Corporation
- › XYPRO Technology

## Alumni

When students graduate from CSUN, they join an extensive network of more than 330,000 alumni – in California, across the nation and around the globe – who thrive on helping Matadors find personal and professional success.



Engineering grad **Robert Taylor** received a 2016 Distinguished Alumni Award. He served as a leader in the National Urban League and the Los Angeles Urban League and has served on nearly two dozen corporate and nonprofit boards.

CSUN grad **Peggy Nelson**, M.S. Electrical Engineering, served as vice president of engineering and global production development in Northrop Grumman's aerospace systems sector.



Alumnus **Milad Girgis**, B.S. Mechanical Engineering, M.S. Engineering Management, serves as Vice President Global Deep Brain Stimulation and Program Management at Boston Scientific.

Computer Science alumnus, **Jon Ferrara** is a serial entrepreneur and a pioneer in the customer relationship management (CRM) industry. He co-founded GoldMine, one of the first contact management apps; his newest company, Nimble, is a social CRM service for small businesses.



*The International Conference on Aerospace Engineering, Flight Technology and Flight Vehicle Dynamics, scheduled in Los Angeles for 2017 and 2018, brings together leading academic scientists, researchers and scholars to share ideas and developments.*



*The 2017 Information Security Summit took place in Los Angeles, sponsored by the Information Systems Security Association of Los Angeles (ISSA-LA). Industry analysts and experts shared strategies related to this important issue.*



# OUTSTANDING VALUE

By choosing the College of Engineering and Computer Science, students receive an exceptional education from a highly respected leading California public university.

With **more than 85 post-baccalaureate programs**, including doctoral degrees and professional certificates, CSUN is the fourth largest university in California.

According to the Social Mobility Index, CSUN students go on to graduate at higher rates and earn more as alumni than those from peer institutions.

Through CSUN's extensive working relationships with aerospace and engineering firms, as well as start-ups, media organizations and tech companies, students gain unique access to **internships, job opportunities** and other **professional work**.

The costs to attend CSUN are also moderate in comparison with similar programs from Southern California private universities or the University of California.

## Students Outside California

Attending CSUN lets out-of-state and international students live the L.A. lifestyle as they earn the degree they need. And the best part is, by choosing CSUN, they can do it all from the comfort, safety and prestige of one of the nation's largest and most respected public universities.

Moreover, since Los Angeles is now ranked the world's **number one student city**, CSUN students can rest easy when it comes to what's out there. Because here, the answer is... Well, *everything!*

Accompanying the vast local culture is the institutional prowess of CSUN. Being a university of such size, the many resources at our disposal allow us to design programs and services that tap deeply into the student experience. That's as true for those from another state as it is for those from another country. Because it's not the "where" that matters to us – it's the student.

CSUN recently ranked number one among peer institutions for the **highest number of international students in the United States**, with a total enrollment of more than 3,900. Along with students, the university hosts visiting scholars from institutions in China, India, Korea, Kuwait, Iran and more.

CSUN offers a distinct set of services, designed specifically to meet the needs of the international community. These programs include

- Intensive English and University Pathways (IEP)
- Semester at CSUN (SAC)
- English and Cultural Experience (ELCE)

In addition to receiving academic and administrative support, international students also gain access to free tutoring and can participate in cultural expeditions that enable them to experience life in Los Angeles more fully.

*The SoCal Aerospace Council has more than 400 active participants from industry, labor, government, nonprofits and education dedicated to maintaining Southern California's status as the aerospace capital of the world.*

## Programs Offered

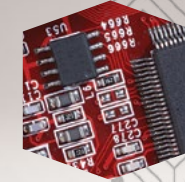
- Master of Science
- Bachelor of Science

	B.S.	M.S.
Civil Engineering	●	
Computer Engineering	●	●
Computer Information Technology	●	
Computer Science	●	●
Construction Management	●	
Electrical Engineering	●	●
Engineering Management	●	●
Manufacturing Systems Engineering	●	●
Materials Engineering		●
Mechanical Engineering	●	●
Software Engineering		●
Structural Engineering		●

Information subject to change

## Career Options

- Airplane/automobile/spacecraft designer
- Automated processes designer
- Biomedical engineer
- Civil engineer
- Computer hardware/software engineer
- Construction manager
- Digital systems engineer
- Electrical engineer
- Environmental engineer
- Facilities planner
- Heating/ventilation/air conditioning engineer
- Industrial engineer
- Instrumentation engineer
- Machinery designer
- Manufacturing engineer
- Materials engineer
- Mechanical engineer
- Network systems analyst
- Operations analyst
- Power plant engineer
- Production manager
- Programmer
- Robotics engineer
- Sound engineer
- Structural engineer
- Systems analyst/administrator
- Technical manager/sales support
- Telecommunications
- Transmission/power systems engineer



**SOCAL AEROSPACE COUNCIL**  
has more than **400**  
**ACTIVE PARTICIPANTS**

**Statement of Nondiscrimination and Disability Services Information:** CSUN does not discriminate on the basis of age, color, disability, national origin, race, religion, sex, sexual orientation or veteran status, as monitored by the Department of Labor (Office of Federal Contract Compliance) and the Department of Education, or in violation of section 504 of the Rehabilitation Act of 1973 and the regulations adopted thereunder.

**Students Needing Classroom Accommodations or Auxiliary Aids:** Students requiring classroom accommodations should contact either the Center on Disabilities or the National Center on Deafness (for those who are deaf or hard of hearing) for assistance as soon as the decision to enroll has been made.



## CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

CSUN is an active research partner with the Advanced Manufacturing Partnership for Southern California (AMP SoCal).

The collaborative is charged with strengthening aerospace and defense manufacturing and its supply chain.

