CSUN
CALIFORNIA STATE UNIVERSITY NORTHRIDGE

MASTER OF SCIENCE IN

ASSISTIVE TECHNOLOGY ENGINEERING

EMPOWER THOSE IN NEED

With this degree, you can create devices and software to assist or rehabilitate a variety of populations:

- Veterans
- The aging
- Persons with disabilities

Table of Contents

About the Program

This online master's degree prepares you for a career in assistive technology development. Designed for working adults, the program emphasizes hands-on experience and helps you build a portfolio of design projects to share with prospective employers.

In courses with other working engineers, you'll learn how to:

- Design and develop new assistive technology products
- Manage highly technical teams and projects
- Identify new uses for existing assistive technologies
- Develop a systems mindset
- Expand your technical abilities

Gain Essential Knowledge from a World-Renowned Disability Services Leader

Internationally recognized for its expertise in disability services, CSUN created its online Assistive Technology Engineering program to meet the growing demand for skilled engineers who can develop technologies to empower those in need.

Participate in the World's Largest Assistive Technology Conference

For more than 33 years, CSUN's Center on Disabilities, through the CSUN Assistive Technology Conference, has provided an inclusive setting for researchers, practitioners, exhibitors, end users, speakers and other participants to share knowledge and best practices in the field of assistive technology.

In 2017, the conference drew more than 4,800 people to San Diego. Known as a forum that showcases cutting-edge technologies as well as practical solutions for persons with disabilities, the conference is the largest of its kind in the world.

" Over a billion people are estimated to live with some form of disability. This corresponds to about 15% of the world's population. Between 110 million and 190 million people 15 years and older have significant difficulties in functioning. Furthermore, the rates of disability are increasing in part due to aging populations and an increase in chronic health conditions."

– World Health Organization

What Is an Assistive Technology?

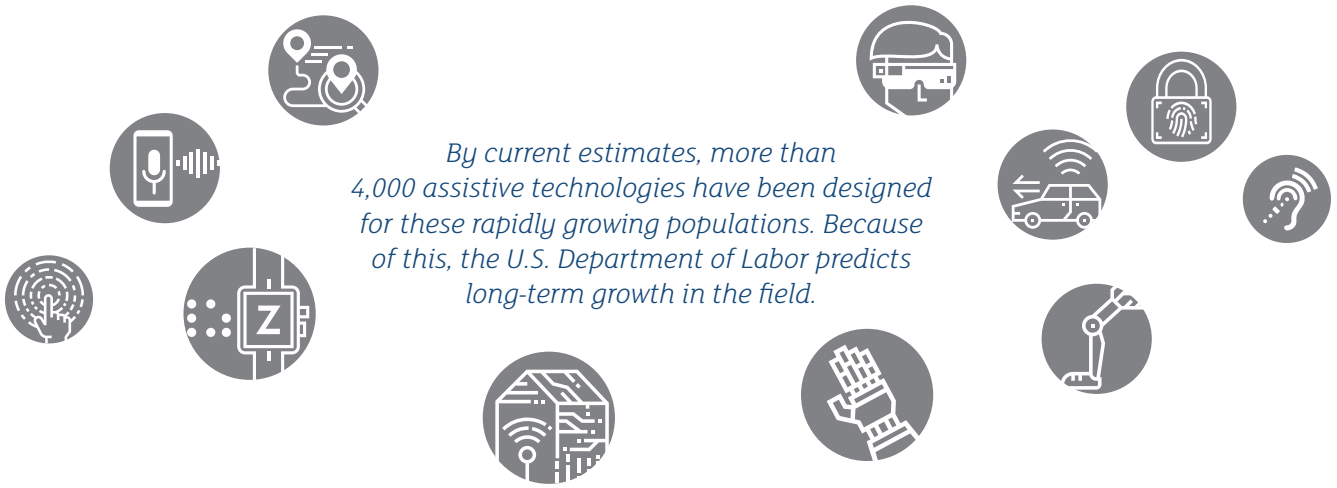
An assistive technology is anything that helps a person achieve enhanced performance, improved function or accelerated access to information.

You're likely familiar with many assistive technologies, such as hearing aids and prosthetics. Text-to-speech software, closed captions, and even the touch screen you use each day on your cell phone – these, too, are assistive technologies.

The Future of Human Development

In addition to mechanical products and devices, the field is deeply involved in artificial intelligence, machine learning and neuroscience. Brain machine interfaces, for instance, allow users to control wheelchairs with thought alone; and in some emergency rooms, self-service kiosks can take your blood pressure, pulse and weight, all without any human intervention.

These technologies, and others like them, will only grow more prevalent with time – as will the need for engineers to design them.



By current estimates, more than 4,000 assistive technologies have been designed for these rapidly growing populations. Because of this, the U.S. Department of Labor predicts long-term growth in the field.

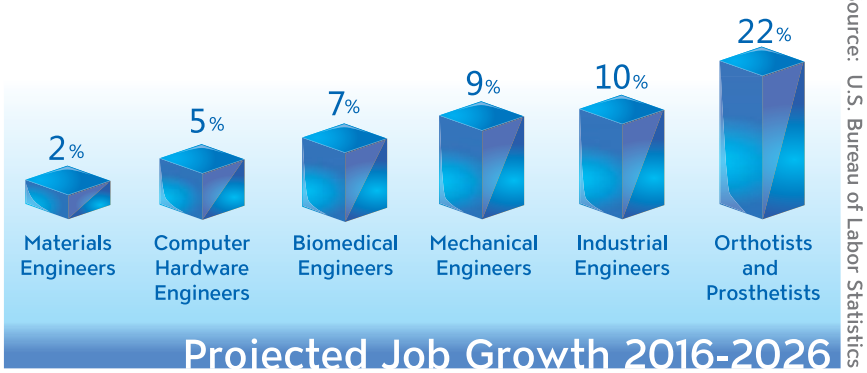
2018 annual salaries for ATE-related occupations ($69,120-$114,600) were well above the median earnings of full-time wage and salary workers ($47,060) in the first quarter of 2019, according to the Bureau of Labor Statistics.

A Career in the Next Big Thing

Commercially, the field encompasses an even greater range of products, services and applications. Siri, which lets you use your voice to call and text, is one example. Google, which lets you search the web, is another.

A booming field, assistive technology applies to an ever-increasing range of people and organizations, including:

- Biomedical engineering companies
- Military and intelligence
- St. Jude's Hospital
- Boston Scientific
- Second Site
- Northrup Grumman
- Microsoft
- Facebook
- Apple
- Google



Source: U.S. Bureau of Labor Statistics

Learn by Doing

The program provides hands-on training with many of the field's professional tools and technologies. In group projects with other working professionals, you'll build and test prototypes, and then create a portfolio to share with prospective employers.

This, in addition to classroom instruction, equips you with the project management skills to lead teams of other engineers in the design and execution of highly technical assignments.

"ATE fits a variety of fields in occupations with projected job growth. In many ATE fields, a master's degree is either required or preferred."

— Bureau of Labor Statistics

Alumni

CSUN alumni create a network for connections in California, across the nation and around the globe. When choosing a university, it is useful to know that others who have earned their degree at that university have achieved success and often rise to leading roles in their fields. Graduating from CSUN will make you a part of an extensive network of over 300,000 alumni that will enable you to build relationships for continued professional success.

Our **Assistive Technology Engineering students work at the following organizations** as well as many others:

ADVANCED BIONICS

Boston Scientific
Advancing science for life™

amf
Alfred Mann Foundation

belkin

PHYN

DSC Physical Therapy

Medtronic

tlc

UROLOGIX
The Leader for In-Office BPH Therapy

HOLLAND
Electronics LLC

Assistive Domotics

National Science Foundation
WHERE DISCOVERIES BEGIN

Courses designed for career advancement

CSUN's Master of Science in Assistive Technology Engineering features a curriculum designed to meet the career development needs of working professionals. Courses are listed in the order in which they are presented. Later courses build on earlier ones to provide a powerful, cumulative learning experience.

Program Features Designed to Meet the Needs of Working Professionals

Understanding that working professionals have special needs, our staff and faculty are committed to providing you with the highest level of support to address your concerns in the most timely and efficient manner. What you can expect:

- **Work-friendly scheduling** – This online program provides you with significant flexibility for completing course work at times and in places that fit your schedule. CSUN's online programs are held to the same high standards of academic excellence and student achievement as the university's on-campus programs.
- **A community of peers** – Students enter and progress through the program as a group or cohort. The cohort format not only ensures on-time completion and maximizes interaction with faculty, but also encourages the development of valuable professional relationships with classmates who share similar career interests and goals.
- **Exceptional support services** – Chief among these is the personal assistance of a program coordinator whose expertise with program-related administrative matters frees you to focus on your studies and career.
- **Guaranteed enrollment** – We automatically enroll you in all courses, giving you the peace of mind to continue your studies uninterrupted.
- **Federal financial aid** – Many of our students access financial aid to help pay for their education. A team of financial-aid specialists dedicated exclusively to our professional students is available to help process applications and distribute funding for those who qualify.
- **Industry event participation** – CSUN hosts its annual CSUN International Technology and Persons with Disability Conference – the world's largest of its kind – in which AT students are encouraged to participate.

Course Highlights

ATE 501 Functional Biology, Biomaterials, and Design Innovation

This course explores biological systems and biomaterials, with a focus on their relevance to assistive technology. In the course, students will learn how to apply the principles of functional biology to assistive technology design and development. The course also introduces the biological causes that create a need for assistive technology – such as a missing limb – and examines how knowledge of biological systems translates into the design of new technologies, including state-of-the art developments and future applications and challenges.

ATE 502 Seminar in Human Characteristics in Relation to Usability of Assistive Technologies

This seminar explores the fundamentals of human function from psychological and physiological perspectives. Students will learn how to use these viewpoints to design and develop technologies that enhance quality of life for users throughout their lifespans.

ATE 603 Applied Biomechanics and Motor Control

This course introduces the principles of biomechanics and motor control, focusing especially on their applications to assistive technology and biomedical engineering. In addition, the course explores basic anatomical movements and neuromuscular control, as well as the pathological human movements of neuromuscular disorders. In the course, students will also learn various techniques in kinematics and kinetics analyses of human movements. Biomechanical modeling and simulations will be introduced as well as advanced technology in anthropometrics.

ATE 604 Instrumentation and Measurement

This course presents the basic components of medical electronic instrumentation: sensors, amplifiers, signal conditioning, and signal processing. Multidisciplinary analysis, design, and simulation of biomedical engineering instrumentation and measurement are studied and implemented using computer methodology and techniques from engineering, physics, and mathematics.

ATE 605 Robotic Applications and Control Interface in Assistive Technology

This course analyzes the latest achievements in robotics technology, focusing on the relationship between human factors and the demand for real-life applications. It also addresses the principles, concepts and details needed to design robots for use in health care environments, specifically those that offer autonomy, intelligence, manipulation, and mobility.

ATE 606 Assistive Technology Software Development and Applications

This course introduces the concepts and principles of assistive technology (AT) software applications, emphasizing regulatory policies and ethical issues. In the course, students will evaluate existing AT software applications (both proprietary and open source), including screen reading, screen reader, study skills, screen enlargement, voice recognition and web software. The course discusses concepts, principles, and methodologies of AT software development, including processes, requirements and specification (emphasizing accessibility, usability, reliability and dependability); analysis and design (emphasizing human-computer interface); and implementation, maintenance, verification and validation.

ATE 607 Product Design and Development for Assistive Technology

This course explores product design and development in the fields of assisted technology and biomedical engineering. Topics include human factors, man-made interfaces, biomimicry, biomaterials, safety engineering design, medical devices, and FDA approval processes, regulations, and standards. The course blends the perspectives of marketing, design, and manufacturing into a single approach to product development. The integrative methods introduced in this course are intended to facilitate problem solving and decision making among people with different disciplinary perspectives.

ATE 608 Augmentative and Alternative Communication

This course explores the analysis, design, and manufacture of augmentative and alternative communication techniques and devices. Examined also are the past and current uses of augmentative devices and systems for speech-impaired, blind, and deaf subjects, as well as the design and development of new equipment for subject groups.

ATE 609 Assistive Technology Project Management

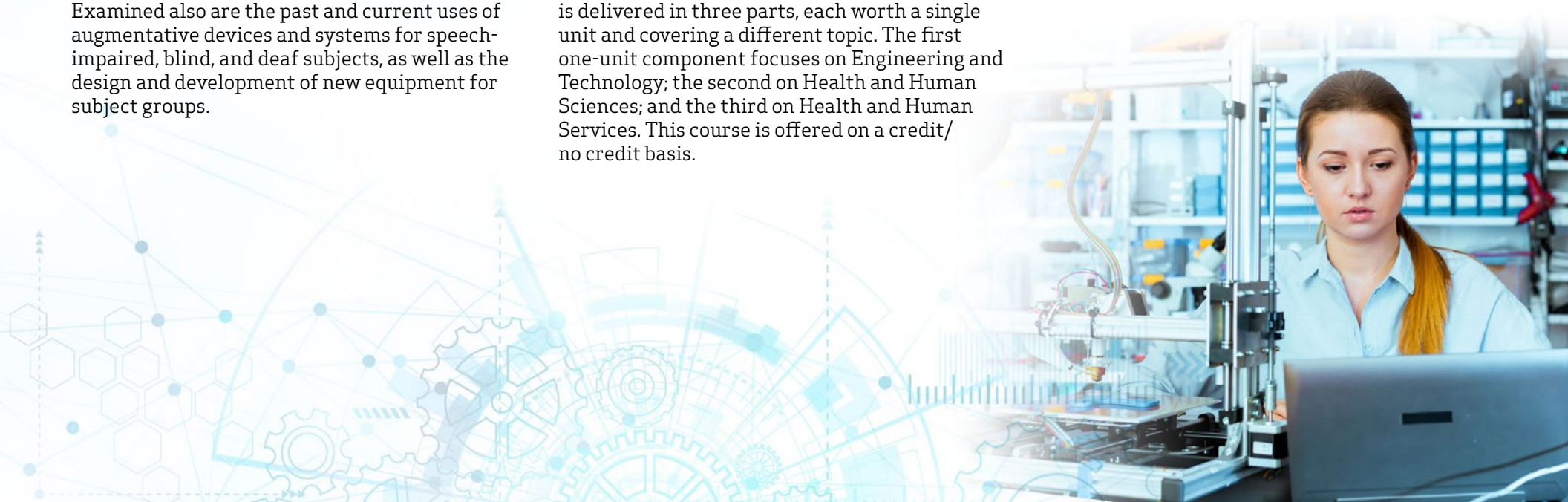
In this course, students will learn the principles of project management, including process management, requirements management, quality management, project planning, project scheduling, project cost estimation, risk management, and people management. Emphasis is placed on requirements management and quality control, providing students with an understanding of the regulations and compliance laws specific to assistive technology products and software.

ATE 694 Current and Emerging Topics in Assistive Technology

This one-unit seminar incorporates advanced study of current and emerging topics in assistive technology. Through case studies, presentations, demonstrations and classroom discussion, students will develop a robust understanding of the field's discourse and future. This seminar is delivered in three parts, each worth a single unit and covering a different topic. The first one-unit component focuses on Engineering and Technology; the second on Health and Human Sciences; and the third on Health and Human Services. This course is offered on a credit/no credit basis.

ATE 698 Graduate Project

In order to begin the graduate project, students must have completed all course work, including three interdisciplinary seminar courses, and received permission from the supervising faculty adviser of the graduate project committee. Includes a written project report and an oral defense, each needed to fulfill the culminating experience requirement for the Master of Science in Assistive Technology Engineering degree. (Credit/No Credit Only)



Distinguished Faculty

The Master of Science in Assistive Technology Engineering program is designed and taught by CSUN faculty members in collaboration with assistive technology industry professionals who are leaders in their areas of specialization. This blend of practitioners with outstanding CSUN faculty ensures that you will graduate with a solid academic background and be well prepared for the realities of practice in the field.

Robert Conner, Ph.D.

Robert Conner is a professor in CSUN's Department of Manufacturing Systems Engineering & Management, and specializes in advanced engineering materials. His current research interests include the physics of bulk metallic glasses and glass foams.

Dr. Conner earned his Ph.D. in Materials Science at the California Institute of Technology, has published numerous highly-cited research papers and holds seven materials-related patents. He teaches Functional Biology, Biomaterials & Design Innovation (ATE 501) in the ATE program.

Xiyi Hang, Ph.D.

Xiyi Hang is a professor in CSUN's Department of Electrical and Computer Engineering. His current research interests include biomedical signal/image processing, machine learning and bioinformatics. Dr. Hang received both his master's and doctoral degrees in biomedical engineering from Ohio State University. He teaches Instrumentation and Measurement (ATE 604).

Taeyou Jung, Ph.D., ATC., CAPE

Taeyou Jung is a professor in CSUN's Department of Kinesiology and a program director in the university's Center of Achievement through Adapted Physical Activity, which provides internationally recognized exercise therapy and aquatic therapy services for people with special needs.

In addition to teaching undergraduate and graduate-level classes, Dr. Jung has conducted multiple research projects involving individuals with physical disabilities. His research area is clinical biomechanics in populations with neuromuscular disabilities and, more specifically, the investigation of their balance and gait outcomes after therapeutic exercise.

Dr. Jung has published several studies in field-related journals and has made presentations to both national and international professional organizations. Prior to coming to CSUN, he worked in the Gait Analysis Laboratory at the Kluge Children's Rehabilitation Center in the University of Virginia, where he earned his doctorate in kinesiology with an emphasis in sports medicine and adapted physical activity. Dr. Jung teaches Applied Biomechanics and Motor Control (ATE 603).

Li Liu, Ph.D.

Dr. Li Liu is an assistant professor in CSUN's Department of Computer Science. He is passionate about enabling accessibility of computing. His research breaks barriers created by computing technology, especially for people with special needs. His work on a tongue-machine interface is the first of its kind to use a tongue as a computer input device in a non-contact way.

At CSUN, he co-directs the Human Computing Lab and serves on the Scientific/Research Committee of the annual CSUN Assistive Technology Conference. Dr. Liu teaches Assistive Technology Software Development and Applications (ATE 606) and Augmentative and Alternative Communication (ATE 608).

Distinguished Faculty

(Continued from the previous page)

Benjamin Mallard, M.S.E.E.

Benjamin Mallard is a lecturer in CSUN's Department of Electrical and Computer Engineering. He came to the CSUN faculty with 15 years of industrial experience, which included working as a microelectronic circuit design engineer at TRW Defense and Space Systems and as an engineer specialist at Northrop Corporation.

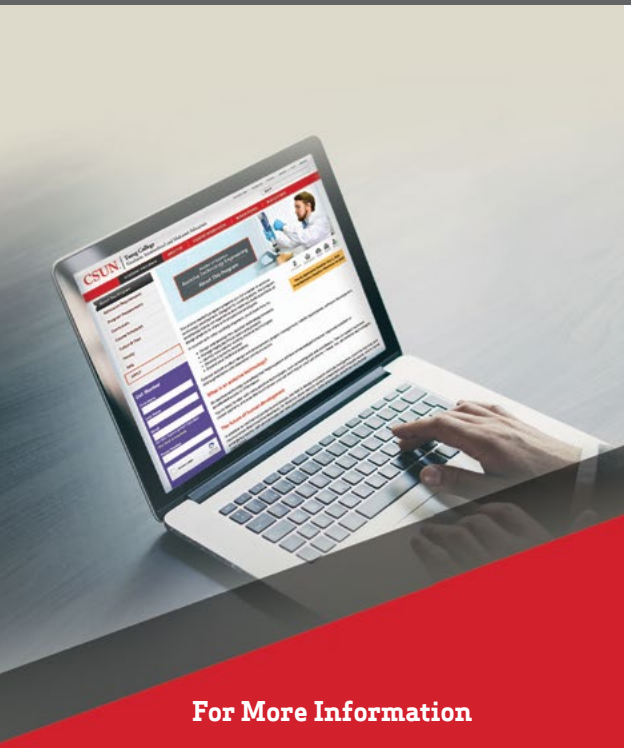
As an instructor for more than 15 years, Mallard has taught subjects covering solid-state devices, introductory circuit and network theory, and electronics and data-acquisition architectures. His areas of interest include high-speed data converters, biosensors, bioinstrumentation, wideband amplifiers, low-power electronics and nanotechnology.

Mallard holds a B.S. in electrical engineering from the Massachusetts Institute of Technology and received his M.S. in electrical engineering from the University of Southern California. He co-teaches Product Design and Development for Assistive Technology (ATE 607) and Augmentative and Alternative Communication (ATE 608).

George Wang, Ph.D.

Dr. George Wang is a professor in CSUN's Department of Computer Science and coordinator of software engineering program assessment. He specializes in software process, design methodologies, project management, testing, data and information management, and web technologies. He frequently participates in international IEEE-Computer Society conferences, such as the International Conference on Semantic Computing and International Symposium on Multimedia, both as a program committee member and as a conference organizer.

Prior to joining CSUN, Dr. Wang was a researcher with the Department of Electrical Engineering and Computer Science and the Center of Biomedical Engineering at University of California, Irvine, where he earned his doctorate in computer science and electrical engineering. Dr. Wang teaches Assistive Technology Project Management (ATE 609).

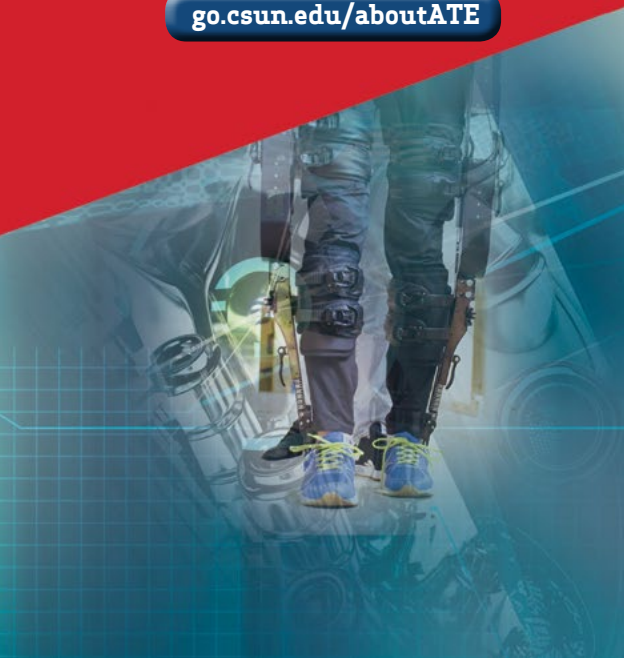


For More Information

(818) 273-6877

programs@csun.edu

go.csun.edu/aboutATE



Admission to the Assistive Technology Engineering Program

To be admitted to the program, applicants must possess (at the time of enrollment):

- **Educational Background**: Bachelor's degree from an accredited college or university – i.e., a B.S. in engineering or computer science, or a B.S. or B.A. in physical, biological or health science discipline.
- **Cumulative GPA**: A minimum GPA of 2.5 or above in the most recent 60 semester or 90 quarter units. Applications with a cumulative GPA below 3.0 must score at or above the 50th percentile in one section of the Graduate Record Examination (GRE).
- **English Proficiency Requirements for Non-U.S. Degree and International Students Only**: If a graduate applicant has earned a bachelor's or master's degree from a college or university outside the U.S. then an English language proficiency exam may be required. Please visit the Admission Requirements web page for more information.

Accreditation

California State University, Northridge is accredited by the Commission for Senior Colleges and Universities for the Western Association of Schools (WASC), an institutional accrediting body recognized by the Council on Higher Education and Accreditation. Program faculty and industry experts are active participants in Assistive Technology-related national professional organizations and at national Assistive Technology conferences.