NATIONAL UNIVERSITY

COLLEGE OF PROFESSIONAL STUDIES

BACHELOR OF SCIENCE IN ELECTRICAL AND COMPUTER ENGINEERING

Making Hardware and Software Speak the Same Language

LEARN MORE TODAY

There's an intricate exchange between hardware and software. In the Electrical and Computer Engineering program at National University, you'll be in the communications center between the two, guiding the way to make them collaborate. The program's curriculum focuses on the theories, principles, and practices of traditional electrical engineering and mathematics and applies them to the design of computers and computer-based devices — devices that now seem to run the world.

You'll study the design and development of both digital hardware systems and the software that enables that hardware — and how both users and other hardware interact with those systems. Because clean computer engineering is at the heart of how hardware and software work together, a central focus will be on embedded systems that rely on both, such as cell phones, digital audio players, digital video recorders, alarm systems, X-ray machines, and laser surgical tools.

Your analytical thinking and design skills will be encouraged and developed in the pursuit of the finest integration of the devices making a profound difference in everyday life.

Program Highlights:

- Entire program can be completed online
- Apply mathematics, science, and engineering to design a component, a system, or a process to meet desired needs
- Use the techniques, skills, and modern engineering tools necessary for engineering practice
- Work effectively on a team and be able to communicate orally and in writing to identify, formulate, and reach common engineering goals
- Identify engineering solutions in a global and economic environment

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MAJOR IN ELECTRICAL AND COMPUTER ENGINEERING

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The Electrical and Computer Engineering program involves the study of hardware, software, communications, and the interactions between them. Its curriculum focuses on the theories, principles, and practices of traditional electrical engineering and mathematics and applies them to the design of computers and computer-based devices. Electrical and Computer Engineering students study the design of digital hardware systems, including communications systems, computers, and devices that contain computers. They study software development, focusing on software for digital devices and their interfaces with users and other devices. The program emphasizes a balanced approach between hardware and software, both built on an engineering and mathematics foundation. Currently, a dominant area within electrical and computer engineering is embedded systems: the development of devices that have software and hardware embedded within. For example, devices such as cell phones, digital audio players, digital video recorders, alarm systems, X-ray machines, and laser surgical tools all require integration of hardware and embedded software, and all are the result of computer engineering. The undergraduate program is structured to establish analytical thinking and design skills in areas such as computer architecture, digital logic design, circuits analysis, computer communication networks, digital computer control, integrated circuit engineering, project management, VLSI design, digital signal processing, and embedded systems.

PROGRAM EDUCATIONAL OBJECTIVES

The educational objective of the BS in Electrical and Computer Engineering program is to prepare graduates to achieve success in one or more of the following within a few years after graduation:

- Succeed in pursuing a chosen career path and demonstrate technical competence in utilizing electrical and computer engineering principles and skills in industry, academia, or the public sector.
- Engage in sustained learning through graduate education, professional development, and self-study in engineering and other professionally-related fields.
- Function well on a diverse and multidisciplinary team with effective communication skills.
- Exhibit leadership, high standards of ethical conduct, and societal responsibility in the practice of engineering.

PROGRAM LEARNING OUTCOMES

Upon successful completion of this program, students will be able to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. Communicate effectively with a range of audiences
4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.

DEGREE REQUIREMENTS

To receive a Bachelor of Science in Electrical and Computer Engineering, students must complete at least 180 quarter units to include a minimum of 70.5 units of the University General Education requirements; 76.5 quarter units must be completed at the upper-division level, and 45, including the senior project courses (CEE 498, CEE 499A, and CEE 499B), must be taken in residence at National University. In the absence of transfer credit, students may need to take additional general electives to satisfy the total units for the degree. Students should refer to the section on undergraduate admission procedures for specific information on admission and evaluation. All students receiving an undergraduate degree in Nevada are required by state law to complete a course in Nevada Constitution.

PREREQUISITES FOR THE MAJOR

(8 courses; 33 quarter units)

MTH 215*	College Algebra & Trigonometry *Prerequisite: Accuplacer test placement evaluation or MTH 12A and MTH 12B*
PHS 104*	Introductory Physics *Prerequisite: 2 years of high school algebra and MTH 204, MTH 215, or MTH 216A and MTH 216B*
PHS 130A	Physics Lab for Engineering (1.5 quarter units)
CSC 208*	Calculus for Comp. Science I *Prerequisite: MTH 215*
CSC 209	Calculus for Comp. Science II *Prerequisite: CSC 208*
CSC 220	Applied Probability & Stats. *Prerequisite: MTH 215*
CSC 242*	Intro to Programming Concepts *Prerequisite: MTH 215*
CSC 252*	Programming in C++ *Prerequisite: CSC 242*

* May be used to meet a General Education requirement.

REQUIREMENTS FOR THE MAJOR

(24 Courses; 93 quarter units)

CSC 300	Object-Oriented Design *Prerequisite: CSC 252*
CSC 310	Linear Algebra and Matrix Comp *Prerequisite: CSC 300*
CEE 300	Advanced Engineering Mathematics *Prerequisite: CSC 209 and CSC 310*
PHS 231	Calculus-Based Physics 1 *Prerequisite: PHS 104 and MTH 220 or CSC 208 and MTH 221, or CSC 209*
PHS 232	Calculus-based Physics 2 *Prerequisite: PHS 104, PHS 231, and MTH 220 or CSC 208 and MTH 221 or CSC 209*
CSC 331	Discrete Structures and Logic *Prerequisite: CSC 252 and CSC 310*
CEE 310	Circuit Analysis *Prerequisite: CEE 300* *Corequisite: CEE 310L*
CEE 310L	Circuit Analysis Lab (1.5 quarter units) *Corequisite: CEE 310*
CSC 340	Digital Logic Design *Prerequisite: CSC 208 or EGR 220, Corequisite: CSC 340L*
CSC 340L	Digital Logic Design Lab (1.5 quarter units) *Corequisite: CSC 340*
CSC 342	Computer Architecture *Prerequisite: CSC 340 and CSC 340L*
CSC 350	Computer Ethics
CSC 436	Comp. Communication Networks *Prerequisite: CSC 335 or CSC 340 and CSC 340L*
CEE 340	Embedded Systems *Prerequisite: CSC 208 and CSC 252 or CSC 262*
CEE 340L	Embedded Systems Lab (1.5 quarter units) *Corequisite: CEE 340*
CEE 324	Linear Systems and Signals *Prerequisite: CSC 208 or MTH 220 and CEE 310* *Corequisite: CEE 324L*
CEE 324L	Linear Systems and Signals Lab (1.5 quarter units) *Corequisite: CEE 324*
CEE 420	Microelectronics *Prerequisite: CEE 310* *Corequisite: CEE 420L*
CEE 420L	Microelectronics Lab (1.5 quarter units) *Corequisite: CEE 420*
CEE 430	Digital Signal Processing *Prerequisite: CEE 420*
CEE 440	VLSI Design *Prerequisite: CEE 430*
CEE 498	Capstone Design Project I *Prerequisite: Complete all core courses except CEE499 or permission of the program lead.*
CEE 499A	Capstone Design Project II *Prerequisite: CEE 498*
CEE 499B	Capstone Design Project III *Prerequisite: CEE 499A*