MS-CES is a graduate program focused on interconnection between electrical engineering hardware and computer science software. The 32-unit curriculum blends relevant academic coursework with practical engineering experience, thereby addressing the evolving demands upon engineering in our progressively technology-driven world.

**Who is it for?** The MS-CES program is designed for professionals holding bachelor degrees in diverse areas of engineering and sciences who desire to further their career paths by adding new knowledge, tools and skills from a cross-disciplinary perspective. It provides value to both practicing engineers and engineering educators. The program is designed to accommodate both full-time and part-time students who work during the day.

**How long does it take?** The duration of studies will depend on the relevance of their undergraduate degrees to electrical engineering. Students with a background in electrical engineering will be able to complete the program in less than two years.

**What if I don’t have an electrical engineering degree?** Interested students with undergraduate degrees in computer science, physics, materials science, and other science and engineering fields are highly encouraged to apply. Admitted students will set up a meeting with their designated adviser to design the most efficient plan of studies for the graduate courses as well as the appropriate prerequisites.

**Where can I find a job after I graduate?** Our main goal is to prepare the MS-CES students for employment in high-tech industries. The curriculum includes internships and opportunities for collaboration with local industries. The North Bay industries that provide internships and employ our graduates include, PG&E, Broadcom, Ciena, Cyan, Keysight Technologies, Parker Hannifin Corporation, Pocket Radar, and more.

**What if I am an International Student?** Our students come from a diverse background. Many are international students from China, India, the Middle East, Europe and Latin America. Due to the diverse academic backgrounds of our incoming students, we do not require a GRE at the time of admission. Teaching assistantships and other forms of financial assistance are offered to qualified students.
### Master of Science in Computer & Engineering Science (MS-CES)

**Fall 1**

- **Pre-Requisites**
  - Undergraduate Courses
    - CES 400: Advanced Linear Systems Theory (3)
    - CES 440: Networking (3)

**Spring 1**

- CES 544: Wireless Communications (3)
- CES xxx: Digital Signal Processing (3)

**Fall 2**

- CES 524: Advanced Computer Architecture (3)
- CES 520: Embedded Systems (3)
- CES xxx: Elective
- CES xxx: Digital Signal Processing
- CES xxx: Wireless Communications

**Spring 2**

- CES 574: Artificial Intelligence or Data Mining (3)
- CES 591: Internship (1)
- CES 599: Thesis (2)

### Sample Program for New Students with Limited Pre-Requisites

- Students willing to take more units per semester can complete the degree requirements sooner.

### Course Title

- CES 400: Advanced Linear Systems Theory (3)
- CES 440: Networking (3)
- CES 524: Advanced Computer Architecture (3)
- CES 520: Embedded Systems (3)
- CES 574: Artificial Intelligence or Data Mining (3)
- CES 591: Internship (1)
- CES 599: Thesis (2)

### Course Description

- **CES 400**: Advanced Linear Systems Theory
  - Analysis of linear time-invariant systems, correlation, convolution, impulse response, complex variables, Fourier series and transform, and more.
- **CES 440**: Networking
  - Introduction to mobile/wireless communication systems, cellular communication, data transmission and signaling, noise and interference, analog and digital techniques.
- **CES 524**: Advanced Computer Architecture
  - Three major topics covered in this course are: controlling specialized I/O devices with particular attention to bit patterns and priority interrupts.
- **CES 520**: Embedded Systems
  - IC technology review; hardware description languages and describing hardware using one of the languages, modern VLSI design: bus control, memory systems, cache.
- **CES 574**: Artificial Intelligence or Data Mining
  - Introduction to data models, data warehousing, association rules, data mining, Web mining. Association rule mining, clustering the Web, Web mining, association rule mining, clustering the Web, data mining.
- **CES 591**: Internship
  - Internship will be done at an industry, R&D laboratory, government organization, or a laboratory or center at an academic institution to gain professional training, teamwork experience, communication skills and project opportunities.
- **CES 599**: Thesis
  - Series of lectures presented by experts from academia and government organizations, often to be done at a industry, R&D laboratory, government organization.

### Credits

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[http://www.sonoma.edu/engineering/](http://www.sonoma.edu/engineering/)