



# UCIRVINE | EXTENSION

## Electrical Engineering Programs

- Communications Systems Engineering
- Device Software Engineering
- Digital Signal Processing
- Embedded Systems Engineering

**Accelerate Your Career**

## Improve Your Career Options with a Professional Certificate or Specialized Studies



**In today's competitive business market,** leaders are appointed based on credentials and experience. To stay ahead of the competition, advance your career and increase your earning potential, enroll in one of UC Irvine Extension's Electrical Engineering programs. Convenient and affordable, UC Irvine Extension makes it easy to learn on your own time, in your own way. Courses are designed to ensure you gain mastery of a particular topic, and instructors are highly qualified leaders in their professions.

UC Irvine Extension is the only continuing education provider in Orange County that represents the University of California. A certificate bearing the UC seal signifies a well-known, uncompromising standard of academic excellence.

### Electrical Engineering Programs

Businesses rely heavily on knowledgeable Engineering professionals who can apply their technical expertise in ways that help achieve business goals. UC Irvine Extension is the place where you can find certificate programs, specialized studies, and certification training

programs in existing and emerging technologies that drive business. We can help you broaden your skill set and gain the tools and techniques necessary to move ahead in your technical career.

# Digital Signal Processing Specialized Studies Certificate



Digital Signal Processing (DSP), one of the hottest fields in embedded design, has emerged as a very important technology for modern electronic systems. DSP is often considered to be the workhorse of choice for many computational-intensive applications. Modern applications include biomedical signal processing, communications signal processing, imaging processing, speech processing, video signal processing, and multimedia signal processing.

## Program Benefits

- Understand the essential mathematics and algorithms in DSP
- Gain hands-on experience in designing and implementing DSP algorithms
- Learn about DSP processors and architectures
- Learn how to program DSP code
- Create practical applications

## Who Should Enroll

This program is designed for individuals involved in the evaluation, design or development of systems employing digital signal processing, or as an introduction to DSP technology.

## Specialized Studies Requirements

Candidates should have a bachelor's degree in computer science or electrical engineering, or equivalent knowledge acquired through training and experience in hardware design and development. A Specialized Studies certificate is awarded upon completion of 3 required courses (9 units total) with a grade point average of "B" or better.

## Curriculum

### Prerequisite Courses

#### C Programming for Embedded Systems

EECS 805 (1.5 CEU)

#### MATLAB for Engineers

EECS X494.19 (3 units)

### Required Courses (Choose 9 units)

#### DSP Fundamentals, Modeling and Analysis

EECS X495 (3 units)

#### C Programming for DSP

EECS X495.1 (3 units)

#### Real-Time Embedded Digital Signal Processing

EECS X498.61 (3 units)

#### Digital Signal Processing with FPGAs

EECS X498.6 (3 units)

#### Image and Video Compression: Fundamentals, Standards, and Trends

EECS X498.11 (3 units)

#### DSP for Communication Systems

EECS X495.2 (3 units)

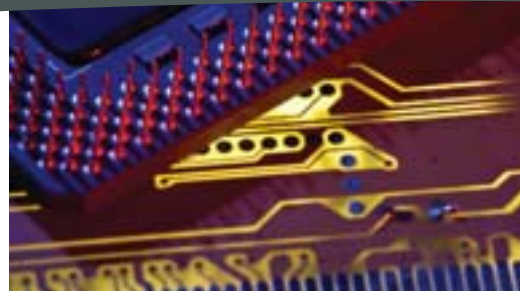
For more information:

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# Embedded Systems Engineering Certificate Program



Today's embedded systems development ranges from microprocessor-based control systems, to systems-on-chip (SoC) design, and device software development. A myriad of implementations can be found in consumer electronics, medical devices, and commercial and military applications.

This certificate program looks at embedded systems engineering as a synergistic function between hardware and software device development. The curriculum covers the latest embedded technologies and the essential concepts of embedded systems development, through a practical hands-on approach using electronic design automation (EDA) tools and design kits.

## Program Benefits

- Gain essential knowledge of embedded systems design and programming
- Learn how to program an embedded device
- Become proficient in programmable logic design and analysis
- Increase your understanding of real-time operating systems
- Learn about the latest embedded technologies
- Utilize EDA tools to optimize embedded systems designs

## Who Should Enroll

This program will benefit hardware/software engineers, computer engineers, communications and networking engineers, control systems engineers and other technical professionals involved in embedded systems design and development.

## Certificate Requirements

A certificate is awarded upon completion of 15 credit units (9 required and 6 elective), with a grade point average of "B" or better, and a completed application for candidacy. Candidates must complete EECS 805, C Programming for Embedded Systems; and EECS X497.2, Introduction to Digital Logic and Hardware Architecture; or possess equivalent experience or education in engineering or computer science, and demonstrate proficiency in C programming.

All requirements must be completed within five (5) years after the student enrolls in his/her first course.

## Transfer Credit

This program qualifies for degree credit at our partner universities. Visit [extension.uci.edu/partners](http://extension.uci.edu/partners) for information.

# Embedded Systems Engineering Certificate Program (con't)



## Curriculum

### Prerequisite Courses

#### C Programming for Embedded Systems

EECS 805 (1.5 CEU)

#### Introduction to Digital Logic and Hardware Architecture

EECS X497.2 (3 units)

### Required Courses (9 units)

#### Fundamentals of Embedded Systems Design and Programming

EECS X497.32 (3 units)

#### Embedded Systems Architecture

EECS X497.36 (3 units)

#### Real-Time Embedded Systems Programming

EECS X497.34 (3 units)

### Elective Courses (Choose 6 units)

#### Logic Design and Analysis using Verilog

EECS X494.92 (3 units)

#### VHDL Design and Modeling of Digital Systems

EECS X494.94 (3 units)

#### FPGA Design with Hardware Description Languages

EECS X494.95 (3 units)

#### Advanced VHDL Design and Modeling of Digital Systems

EECS X494.97 (3 units)

#### Integrating Embedded Systems Successfully

EECS X497.24 (1.5 units)

#### Writing Portable Device Drivers

EECS X497.19 (3 units)

#### Designing Embedded Software Using Real-time Operating Systems

EECS X497.31 (3 units)

#### Fundamentals of Embedded Linux

EECS X497.10 (3 units)

#### Linux Driver Primer

EECS X497.11 (1.5 units)

#### Embedded Systems Design Using ARM Technology

EECS X497.39 (3 units)

#### Applied Control Theory for Embedded Systems

EECS X497.4 (3 units)

#### Real-Time Embedded Digital Signal Processing

EECS X498.61 (3 units)

### Advisory Committee

- **Aaron Baranoff**, Co-founder, MataiTech, LLC
- **John Carey**, Director of Marketing, ATMEL Corporation
- **Bob Condie**, Senior Director, Engineering Firmware Development, Western Digital
- **Daniel D. Gajski**, The Henry Samueli Endowed Chair and Director, Center for Embedded Computer Systems, UC Irvine
- **Ian Harris**, Professor, Computer Science, UC Irvine
- **William Hohl**, University Relations Manager, ARM, Inc.
- **Hank Jacobs**, Software Engineer, General Monitors
- **John Koelsch**, Senior Architect, Safenet Government Solutions, LLC.
- **Farhad Mafie**, President and CEO, Savant Company Inc.
- **Rich Newman**, Test Management Product Specialist, Wind River Systems
- **Robert Weber**, Software Consultant, R&B Embedded Technologies

# Communications Systems Engineering Certificate Program



The continued need for highly efficient communications systems is universal with increased communications applications for data, voice, and video. The Communications Systems Engineering Certificate Program provides comprehensive knowledge on current and emerging technologies in the design and development of communications-based networks and systems. The program addresses advances in electronics, computing, networking, and wireless technologies.

## Program Benefits

- Gain knowledge needed in the design and development of modern-day communication systems
- Learn how to describe, analyze, and design practical applications for data, voice, and video systems
- Develop a “systems” approach to your organization’s communications engineering development process

## Who Should Enroll

This program is designed for engineering and technical professionals, information systems professionals, and others who want to develop a comprehensive understanding of communications engineering principles and practices.

## Certificate Requirements

A certificate is awarded upon completion of 15 credit units (6 required and 9 elective) with a grade point average of “B” or better, and a completed application for candidacy. Candidates must possess a degree or equivalent work experience; consult with the program director for consent. It is recommended that candidates complete the required courses prior to the elective courses.

All requirements must be completed within five (5) years after the student enrolls in his/her first course.

## Transfer Credit

Graduates from UC Irvine Extension’s Communications Systems Engineering program are eligible to transfer credits to Nebraska-Lincoln’s Masters in Engineering Management.

## Curriculum Required Courses

### Introduction to Communications and Networking

EECS X490 (3 units)

### Communication Systems Design

EECS X490.1 (3 units)

## Elective Courses (Choose 9 units)

### TCP/IP Network Design

EECS X491.18 (3 units)

### Network Systems Security

EECS X490.42 (3 units)

### Fundamentals of Wireless Communications

EECS X499.42 (3 units)

### Principles of Wireless Electronic Systems

EECS X499.52 (3 units)

### DSP Fundamentals, Modeling and Analysis

EECS X495 (3 units)

### Evolution of Wireless Networks: 2G to 3G

EECS X499.43 (3 units)

## Advisory Committee

**Tom Doyle**, Vice President, Business Development, Qualcomm, Inc.

**Farhad Mafie**, President and CEO, Savant Company Inc.

**Carlos Oliveira**, Vice President General Manager, Latisys-Irvine LLC

**Nazila Safavi**, Operations Manager, Global Technologies

**Shahram Shafie**, RF Systems Staff Engineer, Qualcomm Inc.

**Marty Wartenberg**, P.E., Business Consulting and Training

# Device Software Specialized Studies Certificate



Programming embedded devices in the electronics and computer engineering industry requires a different skill set than computer software programming. The coding must be precise and succinct to meet memory constraints and specialized needs of the product that the embedded system resides in, whether it be medical, automotive or consumer oriented.

The Specialized Studies Program in Device Software Engineering addresses best practices in managing the embedded software engineering process, design engineering, and hardware and software co-development. The purpose of the program is to provide a core competency in software engineering practices in embedded systems software development, with focus on device drivers.

## Program Benefits

- Develop concise and effective code for embedded systems applications
- Improve the hardware and software co-development process
- Organize your company's device software engineering strategies
- Further your career as an embedded systems engineer

## Who Should Enroll

This program is designed for individuals who want to write device drivers for embedded systems. It is also valuable to those who evaluate software development requirements, determine criteria for embedded development applications, establish programming methodologies to address embedded applications, and support hardware and embedded software development activities. Specialized Studies Requirements

## Specialized Studies Requirements

Candidates must possess a fundamental understanding of C programming for embedded systems; OR possess equivalent experience or education. The specialized studies award is provided upon successful completion of three required courses totaling 9 units, with a minimum grade point average of "B" or better.

## Curriculum

### Prerequisite Course

**C Programming for Embedded Systems**  
EECS 805 (1.5 CEU)

### Required Courses (Choose 9 units)

**Integrating Embedded Systems Successfully**  
EECS X497.24 (1.5 units)

**Writing Portable Device Drivers**  
EECS X497.19 (3 units)

**Designing Embedded Software Using Real-Time Operating Systems**  
EECS X497.31 (3 units)

**Fundamentals of Embedded Linux**  
EECS X497.10 (3 units)

**Linux Driver Primer**  
EECS X497.11 (1.5 units)

**C Programming for DSP**  
EECS X495.1 (3 units)

For more information:

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### On-Site Training

Bring these programs to your workplace. Through Corporate Training, we can deliver any of these programs or customize one that fits your company's specific needs.

Visit [extension.uci.edu/corporate](http://extension.uci.edu/corporate) or call (949) 824-1847 for information.

## Electrical Engineering Programs



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