

## FREQUENTLY ASKED QUESTIONS

### WHAT ARE THE PREREQUISITES?

- Acceptance by the ECE Department. Process requires a sufficient background in mathematics and technical undergraduate studies. Applicants with a BSEE degree will usually satisfy the requirements.
- Command/Company Endorsement.

### IS THERE A SERVICE COMMITMENT?

Students participating in a program at The Naval Postgraduate School may incur service and/or employment obligations.

### WHO IS ELIGIBLE?

Applicants with a US government affiliation, government laboratory engineers, active military personnel, Navy civilians, current NPS resident students, and a limited number of contractors sponsored by Department of Defense (DOD) organizations.

### WHEN DOES THE PROGRAM START?

Three times annually with the Fall, Winter, and Spring quarters.

### HOW LONG DOES IT TAKE TO COMPLETE?

Usually four quarters (1 course per quarter).

*Communicating via satellite by using a PRC-117 aboard the amphibious assault ship USS Nassau (LHA 4).*



## CONTACT INFORMATION

### Roberto Cristi, Ph.D.

ECE Department  
DL Business Manager  
(831) 656-2223  
rcristi@nps.edu

### Monique P. Fargues, Ph.D.

ECE Department  
Assoc. Chair for Student Programs  
(831) 656-2859  
fargues@nps.edu

For more information on the  
ECE department, go to:

**[www.nps.edu/ece](http://www.nps.edu/ece)**

For more information on other  
NPS DL programs, go to:

**[www.nps.edu/dl](http://www.nps.edu/dl)**

Produced by  
**Naval Postgraduate School**



Center for Educational  
Design, Development, and Distribution  
411 Dyer Rd., Knox 120, Monterey, CA 93943



DEPARTMENT OF  
**ELECTRICAL and COMPUTER ENGINEERING**

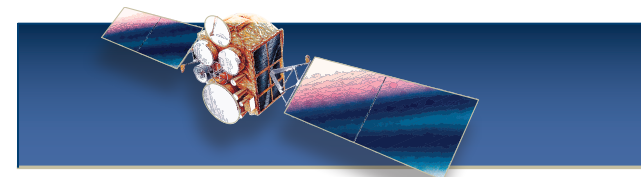
**GRADUATE CERTIFICATE  
PROGRAM  
DIGITAL  
COMMUNICATIONS  
ENGINEER**

A DISTRIBUTED LEARNING PROGRAM

NAVAL POSTGRADUATE SCHOOL

A collage of images related to electrical and computer engineering. It includes a person working on a circuit board, a soldier using a radio, and a ship. The background is dark blue with binary code (0s and 1s) and a large, stylized 'X' shape.

# DIGITAL COMMUNICATIONS ENGINEER GRADUATE CERTIFICATE



## THE PROGRAM

The Naval Postgraduate School (NPS) offers the Digital Communications Engineer (DCE) Certificate, a 4-graduate-course program.

### THE DCE CERTIFICATE PROGRAM:

- Provides the core knowledge necessary for any advanced work in digital communications engineering, including advanced signal analysis, modulation, and forward error correction coding.
- Includes the study of analysis and design of advanced communications systems via a mixture of instruction and computer-based laboratory experiences.

Credits from courses completed through the DCE Certificate Program can be applied towards a Masters Degree in the ECE Department at NPS.

## THE CURRICULUM

### EC3500 Analysis of Random Signals

Introduction into concepts and tools useful in the study of stochastic signals including correlation functions, energy and spectral densities, matched filters, mean square estimation, noise models, and special processes.

### EC3510 Communications Engineering

Study of the design and performance of digital communications systems. Topics include link budgets, binary modulations, receiver bit error ratio performance for various digital modulation techniques, and bandwidth and signal power trade-offs.

### EC4550 Digital Communications

An advanced study of digital communications systems including sophisticated modulations, symbol error ratio performance, coherent and noncoherent receivers, carrier and symbol synchronization, diversity combining, and fading channels.

### EC4580 Error Correction Coding

A study of error control coding as used in communications systems to mitigate the effects of noise, jamming, and fading. Topics include convolutional, block, concatenated, and turbo codes, the Shannon-Hartley theorem, and trellis-coded modulation.

## THE OUTCOMES

Students will develop skills in:

- The design and performance analysis of terrestrial and satellite communications systems.
- The analysis of digital radio communications modulation schemes including phase shift keying, frequency shift keying, continuous phase modulation, quadrature amplitude modulation, direct sequence spread spectrum, and orthogonal frequency division multiplexing.
- The analysis of multiple access methods including time division multiple access, frequency division multiple access, and code division multiple access.
- The analysis of error control coding including state of the art coding methods, encoding and decoding operation and circuits, and symbol error ratio performance improvement.
- The analysis of multipath and signal fading including large scale fading, small-scale fading, fast and slow fading, flat and frequency selective fading, Doppler effects, Rayleigh fading, Ricean fading, and channel models.
- The design and performance analysis of digital communications systems corrupted by multipath channels, and digital communications systems designed to mitigate the effects of fading including error control coding, rake receivers, orthogonal frequency division multiplexing, and multiple antenna systems.

**Military communications systems are used to illustrate throughout the certificate course sequence.**

[www.nps.edu/ece](http://www.nps.edu/ece)

