



CAPITOL COLLEGE

1927

Master of Science in Electrical Engineering

Our Master of Science in Electrical Engineering (MSEE) degree is one of the few programs in the United States designed for practitioners rather than analysts. It is structured to educate students to design and develop applications from the inception stage through the manufacturing, testing, and delivery of a product. The main objective of the program is to provide traditional engineers with the fundamentals of circuit modeling and design, circuit analysis, circuit construction and testing, government and industry regulations, and the advanced knowledge and skills necessary to design and use modern computer-based design and analysis software. If you're looking for the advanced knowledge and skills needed to use modern computer-based design and analysis software, this degree is for you. Offered entirely online, this design-oriented program teaches what it takes to manufacture a system that meets industry, national, and international standards. As a student, you will learn how to design, manufacture, and deliver a product that meets these standards. A tuition discount is available for IEEE members.

- Online course delivery with audio – using VoIP
- Real-time lectures in the evening – recorded for later playback
- No resident requirement – earn your degree from home or on the road
- Transfer up to 6-credits of equivalent graduate coursework

MSEE CURRICULUM (30 credits)

Required Core Courses (18 credits)

EE-600 Mathematical Modeling and Analysis
EE-601 Modern Circuit Design and Simulation
EE-606 Signal Processing
EE-607 Electromagnetic Interference and Compatibility
EE-710 Designing for Reliability and Manufacturability
EE-720 Designing for Testability

Required Capstone Courses (6 credits)

EE-708 Master's Project Research
EE-758 Master's Project

Electives (6 credits)

Choose any combination of two courses from the elective options posted in the right-hand column.

Electrical Engineering Electives

EE-614 Large Scale Integrated Design
EE-651 Communications Theory
EE-652 Microcontroller System Development
EE-653 Analog and Digital Control Theory
EE-656 Image Processing
EE-665 Microwave Circuit Theory and Design

Information Assurance Electives

IAE-611 Wireless Security
IAE-621 Applied Wireless Network Security

Internet Engineering Electives

IE-701 Principles of Designing and Engineering Computer Networks
IE-707 Network Architecture Convergence Using Wireless Technology
IE-712 Design and Practice of Secure Information Networks

For more information, contact:

Office of Admissions
800-950-1992
gradadmit@capitol-college.edu

Capitol College
11301 Springfield Road, Laurel MD 20708
www.capitol-college.edu

EE-600 Mathematical Modeling and Analysis

(3 credits)

A study of MATLAB and various toolboxes that are used by engineers for modeling, simulation, analysis of systems in control, and signal processing. System modeling including Laplace transforms method, block diagram, signal flow graphs and state-space. System response specifications, system stability, root locus analysis, and frequency response analysis. Dynamic system modeling and simulation using Simulink. Offered in the 16-week fall semester.

EE-601 Modern Circuit Design and Simulation

(3 credits) A study of the various SPICE based software tools used by engineers to design and simulate circuits. Analog, digital and mixed simulation. Component selection and modeling use of libraries and customizing components and models. Students design and calculate theoretical results and compare results to simulations. Students will be required to purchase software. Prerequisite: Normal undergraduate course in circuit modeling. Offered in the 16-week fall semester.

EE-606 Signal Processing (3 credits)

Review of signal and system theory. Sampling and the z-transform. Complex variable theory applied to z-transforms. Digital filter design techniques. Mixed-radix DFTs and FFTs. Quantization theory. Speech processing. Prerequisite: Undergraduate course in signal processing. Offered in the 16-week spring semester.

EE-607 Electromagnetic Interference and Compatibility (3 credits)

Class A and Class B devices. Standards for measuring emissions and acceptable limits. Conducted and radiated emission. Mutual capacitance and inductance. Coupling Paths. Crosstalk. Shielding theory and applications. Modeling of circuits in noise applications. Parasitics and their reduction. Ferrite beads and chokes. Overview of low noise design for printed circuits. Frequency and time domain analysis of noise. Grounding issues and their reduction. Electrostatic discharge, electromagnetic pulses and lightning. Offered in the 16-week spring semester.

The anticipated timing and schedule of course offerings is subject to review and may change.

EE-708 Master's Project Research (3 credits)

This course will cover all aspects of proposing and executing a research and development task for the U.S. government. Case studies on how to identify, interpret, and respond to Broad Agency Announcements. Creating preliminary response, including quad charts and white papers. Techniques for providing a rough order of magnitude (ROM) cost. Preparing the full final proposal, including abstract, statement of work, schedule, milestones, deliverables, risk mitigation, preplanned follow-on efforts, procurement, subcontracts, describing the labor mix, and developing a full cost proposal. Attention will be given to protection of proprietary information, protection of intellectual property, and to compliance with the Federal Acquisition Regulations (FAR). The course will culminate with the execution of a mock project, with final deliverables, and final closeout of the project. Examples from federal R&D projects in public domain will be used throughout the course. Offered in the 16-week fall semester.

EE-710 Designing for Reliability & Manufacturability (3 credits)

Design methodology and standards applied in the construction and assembly of electronic circuits for reliability. Redundancy, parallel structure and majority rule circuits. Materials and component selection. Vibrational analysis, thermal analysis and packaging. Classification of hardware for commercial, military or space applications. MIL-spec and IPC standards discussed. Offered in the 16-week summer semester.

EE-720 Designing for Testability (3 credits)

Design for testability. Types of testing, functional testing, and structural testing. Automatic test pattern generation. Scanning and scan-based design rules. Critical paths. Memory test and diagnostics. Built-in self-testing. ATE equipment, local and remote testing and limitations. Students will have access to on-line test workstations. Offered in the 16-week summer semester.

EE-758 Master's Project (3 credits)

Students integrate prior coursework and personal experiences into a master's project. Students develop a full final proposal, including abstract, statement of work, schedule, milestones, and deliverables as learned in EE-708. Proposal must be delivered to class and approval of project advisor required. Regular progress reports required. Final presentation will be live over the Internet. Prerequisite: EE-708. Offered in the 16-week spring semester.