Department of Electrical & Computer Engineering

The baccalaureate program in electrical engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone (410) 347-7700.

FACULTY  Professors Anakwa, Schertz, Shastry, Stewart; Associate Professors Ahn, Dempsey, Huggins (chair), Irwin, Malinowski, V. Prasad; Instructors Gutschlag, Sanchez.

The department offers degree programs in electrical engineering (B.S.E.E. and M.S.E.E.), and electrical engineering with computer option (B.S.E.E.). It takes special pride in the particularly close student-faculty relationships it has developed over the years. Entrance requirements can be obtained by contacting the chair of the ECE department.

Educational Objectives and Department Mission

Society has been transformed dramatically by the widespread use of electrical and electronic devices and systems and it is certain that even more dramatic changes are in store. These changes are fast paced and are driven by electrical and computer engineers working in many different areas including communications, computers, controls, electronics, microprocessors, integrated circuits, signal and information processing, wireless components and systems, and software development. The engineering process is complex and practitioners perform many roles such as research, design, development, product application, manufacturing, and system integration as well as marketing, sales and management. Bradley electrical engineering graduates have been involved in all of these endeavors, and it is the goal of the Bradley ECE program to continue to educate the next generation of electrical and computer engineers to meet the challenges of the future.

In this dynamic profession, the Bradley ECE faculty recognize that each career path is unique, based on the individual's particular ambitions, capabilities and interests. By coupling the focus on undergraduate education and depth of faculty expertise with the small student-to-faculty ratio and design project sequence, the ECE faculty can respond to the needs and interest of each student in the electrical engineering program. However, the ECE faculty also recognize that there are common elements to success in the profession. These are the ability to acquire, generate, and use new knowledge; the ability to complete complex electrical engineering projects; and the experience, knowledge, skills and capabilities to progress professionally. These common elements for success in the electrical engineering profession are the basis for the educational objectives of the program. These objectives are as follows.

1. Each graduate from the program will demonstrate the ability to acquire, apply, and synthesize new knowledge as required for success.
2. Each graduate from the program will be productive, demonstrate professional growth, and assume increasing responsibility or obtain an advanced degree in the first several years after graduating from the program.
3. A significant number of graduates will contribute to the profession or obtain leadership positions.

In order to meet these objectives, students graduating from Bradley’s electrical engineering program will achieve the following outcomes.

i) A graduate from the program will demonstrate knowledge of the mathematical and scientific foundation of electrical engineering.
ii) A graduate from the program will demonstrate knowledge of and the ability to apply techniques and technology of electrical engineering.
iii) A graduate from the program will complete a design project sequence, culminating in a capstone project at or near the professional level.
iv) A graduate from the program will demonstrate the ability to acquire new knowledge as needed for success in the electrical engineering profession.
v) A graduate from the program will meet Bradley’s general education requirements, which are based on the principles of liberal education.
vi) A graduate from the program will have experience in communicating technical information and working on teams.
vii) A graduate from the program will understand the importance of professional and ethical behavior.

It is the mission of the ECE Department to provide the intellectual and physical environment in which students achieve these outcomes. The intellectual component of this environment is supplied by the ECE faculty members, in their roles as mentors, advisors, and engineering professionals, as well as by the curriculum they establish for the programs. The physical component consists of quality facilities equipped with modern instrumentation, components, computers, and software.

**Curriculum**

The electrical engineering program, including the computer option, consists of several curricular components that give the student the opportunity to build a solid foundation of basic physical principles and obtain experience in design as well as insight into the profession and practice of electrical engineering. The lecture sequence consists mostly of required core courses through which the student learns about and acquires problem solving and/or design skills in circuit analysis, structured programming in C++, analog and digital electronics, microprocessors, signals and systems, and electromagnetic fields. Furthermore, through elective courses in the last two semesters, the student can specialize in areas such as applied electromagnetics, communications, controls, digital signal processing, digital and computer systems, electromechanical systems, embedded systems, wireless components and systems, VHD, and VLSI design. For a student in the computer option, the electives must be in the digital area (see computer option in Programs of Study section.)

The student must also take Thermodynamics I (ME 301) as well as a three-hour course with business content related to the engineering process. This requirement is normally fulfilled by Engineering Economy I (IME 301), but can be fulfilled by an appropriate business course with academic advisor approval.

Though many design techniques are taught in the lecture courses, the student learns the practice of electrical engineering design primarily through the 15-hour laboratory and project sequence.

The lab courses integrate material from the lecture courses and are taught by experienced faculty members. In addition, small numbers of students allow for close interaction with the instructor. Furthermore, the laboratory facilities and equipment are modern and readily accessible. Many of the lecture courses and all of the lab courses require the use of computers as well as the oral and/or written presentation of technical material.

Several aspects of design are taught in the sophomore and junior labs (EE 206, EE 331, and EE 332). The student's design experience in these courses includes synthesis to meet specifications, analysis, construction, testing, and evaluation with respect to specifications. Furthermore, the sophomore and junior design projects associated with these courses are particularly valuable and establish the foundation of the design project sequence. In addition to the implementation steps described above, the projects also require the formulation of design problem statements and criteria, the consideration of alternative solutions, and system descriptions.

The design project sequence culminates in the fourth year with the senior microprocessor project and the senior capstone project. The senior microprocessor project is done in the first half of the fall semester. The student works with a partner to design a microprocessor based system, meeting particular specifications, requiring hardware design, software development, and laboratory work. The student then builds on this experience in EE 402 during the spring semester. In this course, the student works with a team to prepare a proposal delineating the design and development of a microprocessor based product. The student also explores other aspects of engineering in EE 402 and, through the process, gains a broader view of the engineering profession.

Work on the senior capstone project begins at the start of the fall semester and the primary deliverables for the semester are to:

- choose a senior project and ECE faculty advisor,
- develop a detailed functional description of the project,
- develop a detailed system block diagram of the project and description of its operation,
- present a proposal covering a design and an implementation plan for the project, and
- establish a web page for the project.

In addition to the effort on the capstone project, the seniors work on teams to review and analyze the deliverables for other senior projects. Lab work associated with the capstone senior project starts in the last half of the fall semester in EE 451 and is completed in EE 452 the following semester.

The senior capstone project is a major educational component of the program. It involves the student in design at or near the professional level and requires the formulation of design specifications, consideration
of alternative solutions, feasibility considerations, time
management, allocation of design responsibilities, and
detailed system documentation. Project advising is done on
a distributed basis with the student choosing his/her project
advisor from among the members of the ECE faculty.

In addition to the technical part of the program
described above, the student must also meet the University
General Education requirements (see “Academic
Regulations” in this catalog.) As part of the General
Education requirement, the student gains effective
communication skills via introductory and advanced
English composition and a speech course. The General
Education requirements also provide the foundation for
a liberal education, which helps the student understand
and participate in society as a responsible human being.
Courses include Western Civilization (CIV 100, CIV 101,
or CIV 102), Introduction to Economics (ECO 100), as well
as selections from non-western civilization, social forces,
human values, and fine arts. For these last four categories,
the student chooses from a list of approved courses.

A wide range of career opportunities is available to the
electrical engineering graduate in many different technical
areas and industries. For those who wish to continue their
professional studies, details of the M.S.E.E. program are
given in the Bradley University Graduate Catalog.

Programs of Study

Electrical Engineering

Credit in the following courses must be obtained to meet
degree requirements in electrical engineering, leading to
the Bachelor of Science in Electrical Engineering.

Freshman Year
First Semester
EE 101 Intro. Electrical Engineering ....................... 1
EE 102 Computer and Programming in EE ................ 2
MTH 121 Calculus I ............................................. 4
CHM 110 General Chemistry I .............................. 3
CHM 111 General Chemistry I Lab ........................... 1
ENG 101 English Composition ............................. 3
Gen. Ed. – CIV 100, 101, or 102 Western Civilization
or ECO 100 Intro. to Economics ......................... 3

Second Semester
COM 103 Oral Communication Process .................... 3
MTH 122 Calculus II ........................................... 4
PHY 110 University Physics I .................................. 4
Gen. Ed. – Fine Arts ........................................... 3
Gen. Ed. – ECO 100 Intro. to Economics
or CIV 100, 101, or 102 Western Civilization ........ 3

Second Semester
EE 201 Digital Hardware Organization .................. 2
EE 205 Fundamentals of Circuit Analysis .................. 4
EE 221 Data Structures and OOP ............................ 3
MTH 223 Calculus III .......................................... 4
PHY 201 University Physics II ............................... 4

Second Semester
EE 206 Sophomore Laboratory............................. 2
MTH 207 Elementary Linear Algebra with Applications . 3
MTH 224 Differential Equations ............................ 4
PHY 202 Applied Quantum Physics ........................ 3
Gen. Ed. – Social Forces ...................................... 3

Junior Year
First Semester
EE 301 Signals & Systems I .................................. 3
EE 303 Principles of Electronics I ........................... 3
EE 365 Microprocessors ....................................... 3
EE 331 Junior Laboratory I .................................... 3
ENG 300, 301, 305, or 306 Advanced Writing .......... 3

Second Semester
EE 302 Signals and Systems II .............................. 3
EE 304 Principles of Electronics II ........................ 3
EE 332 Junior Laboratory II ................................ 2
EE 381 Electromagnetic Fields ............................ 3
IME 301 Engineering Economy ............................ 3
Gen. Ed. – Human Values ................................... 3

Senior Year
First Semester
EE 450 Electronic Product Design ....................... 1
EE 451 Senior Capstone Project I ......................... 3
*Approved EE Electives ..................................... 6
Approved EE or Technical Elective ....................... 3
ME 301 Thermodynamics ................................. 3

Second Semester
EE 452 Senior Capstone Project II ....................... 3
*Approved EE Electives ..................................... 6
Approved EE or Technical Elective ....................... 3
Gen. Ed. – Non-Western Civilization ..................... 3

Total Hours 130

Electrical Engineering with
Computer Option

The demand for and continuing advances in computers
digital technologies have created opportunities for
professionals capable of not only designing computer
systems but also applying these systems to a broad
range of applications. Such fields as communications,
automatic control, robotics, and signal processing have
benefited greatly from developments in the digital area.
Additionally, the development of modern computers
requires a thorough understanding of the methodologies
of software and hardware design.

The department offers an option to students desiring
to specialize in this branch of electrical engineering and
it requires students to take 23 semester hours of course
work in the digital area. The required courses are digital
hardware organization (EE 101 and EE 201), computational
techniques for electrical engineering (EE 102), structured
programming (EE 221), and microprocessors (EE 365). Four
EE electives must also be taken in the digital area which
includes courses such as digital image processing (EE 533),
digital signal processing (EE 534), neural networks (EE 535),
logic design (EE 561), computer structures (EE 562), VLSI
design (EE 563), microprocessor and PC architecture (EE
565), memory and interfacing (EE 566), advanced VLSI (EE
567), and VHDL (EE 568). Also special topic courses are
frequently offered that are EE digital electives. Finally, one of
the EE digital electives must include coverage of computer
architecture (EE 562, EE 565, or EE 566). See your advisor
for a current list of approved EE digital electives. Students
in the option are also required to take two approved EE or
technical electives. These courses must be at the 300 level
or above and can be from various departments such as CE,
EE, IE, ME, MFE, CS, or MTH. The courses do not have to be
in the digital area and should be chosen with career goals in
mind. For example, students interested in the application
digital systems to communications or controls should
consider course pairs EE 531 and EE 532 or EE 431 and EE
432, respectively, as electives.

The computer option of electrical engineering differs
from the regular program in that it requires four EE
digital electives. It is also expected that the students in
the option focus their project work in the digital area.
Credit in the following courses must be obtained to meet
degree requirements in the computer option of electrical
engineering, leading to the Bachelor of Science in Electrical Engineering.

Freshman Year

First Semester
EE 101 Intro. Electrical Engineering .......................... 1
EE 102 Computational Techniques for EE ..................... 2
MTH 121 Calculus I ............................................. 4
CHM 110 General Chemistry I ................................ 3
CHM 111 General Chemistry Lab. .............................. 1
ENG 101 English Composition .................................. 3
Gen. Ed. - CIV 100, 101, or 102 Western Civ. or
   ECO 100 Intro to Economics ............................... 3
   17
Second Semester
COM 103 Oral Communication Process .......................... 3
MTH 122 Calculus II ........................................... 4
PHY 110 University Physics I ................................ 4
Gen. Ed. — Fine Arts ......................................... 4
Gen. Ed. — ECO 100 Intro. to Economics
   or CIV 100, 101, or 102 Western Civilization ............ 3
   17

Sophomore Year

First Semester
EE 201 Digital Hardware Organization ........................ 2
EE 205 Fundamentals of Circuit Analysis ........................ 4
EE 221 Data Structures and Object-Oriented
   Programming .................................................. 3
MTH 223 Calculus III ......................................... 4
PHY 201 University Physics II ................................ 4
   17
Second Semester
EE 206 Sophomore Laboratory .................................. 2
MTH 207 Elementary Linear Algebra with Applications ... 3
MTH 224 Differential Equations ............................... 4
PHY 202 Applied Quantum Physics ............................ 3
Gen. Ed. — Social Forces ................................. 3
   15

Junior Year

First Semester
EE 301 Signals & Systems I .................................... 3
EE 303 Principles of Electronics I ........................... 3
EE 365 Microprocessors ...................................... 3
EE 331 Junior Laboratory I .................................. 3
ENG 300, 301, 305, or 306 Advanced Writing ............. 3
   15
Second Semester
EE 302 Signals and Systems II ................................. 3
EE 304 Principles of Electronics II ........................... 3
EE 332 Junior Laboratory II ................................ 2
EE 381 Electromagnetic Fields ............................... 3
IME 301 Engineering Economy ............................... 3
Gen. Ed. — Human Values .................................... 3
   17
Senior Year

First Semester
EE 450 Electronic Product ...................................... 1
EE 451 Senior Capstone Project I ......................... 3
*EE Digital Electives ......................................... 6
*Approved EE or Technical Elective ....................... 3
ME 301 Thermodynamics I .................................. 3
   16
Second Semester
EE 402 Senior Design Seminar ................................. 1
EE 452 Senior Capstone Project II .......................... 3
*EE Digital Electives ......................................... 6
Approved EE or Technical Elective ....................... 3
Gen. Ed. — Non-Western Civilization ....................... 3
   16
Total Hours 130

Elective Descriptions

EE electives are available in the areas of applied
electromagnetics, communications, controls, digital signal
processing, digital and computer systems, embedded
systems, wireless components and systems and VLSI
design. Approved EE electives include all 400- and 500-
level EE courses except for EE 450, EE 451, and EE 452.
Special topic courses are often available. See your advisor
for the most current list of approved electives.

EE digital electives include:

- EE 533 Digital Image Processing
- EE 534 Digital Signal Processing
- EE 535 Engineering Applications of Neural Networks
- EE 561 Digital Systems: Logic Design
- EE 562 Digital Systems: Computer Structures
- EE 563 Advanced Electronics VLSI System Design

1 General education courses must be selected from an approved
list for each category. They may be taken in any sequence, not
necessarily in the semester indicated. Other university general
education requirements are satisfied by specific courses required
above.

*Four EE electives are required and one must be from the control
stem (EE 430, 431, or 432). A list of approved courses is available
from your academic advisor.

* Four EE digital electives are required and one must include
coverage of computer architecture (EE 562, 565, or 566). A list of
approved courses is available from your academic advisor.
Course Descriptions

EE 101  Introductory Electrical Engineering  1 hr.
Introductory course focusing on logic design on the
following topics: fundamentals of Boolean algebra and
minimization techniques, combinational logic realizations
of SOP and POS functions, multiple function synthesis
using PLDs. In addition, students view various presentations
of significant historical electrical engineers and topics.

EE 102  Computers and Programming in Electrical Engineering  2 hrs.
Introduction to computers and operating systems;
textbook to programming in a high level language
appropriate to electrical engineering.

EE 200  Engineering Co-op  0 hrs.
Full-time cooperative education assignment for electrical
engineering students who alternate periods of full-time
school with periods of full-time academic or career-
related work in industry. Satisfactory/Unsatisfactory.
Prerequisites: Sophomore standing in the College of
Engineering and Technology, 2.0 overall grade point
average at Bradley, approval of engineering and
Co-op director and Co-op faculty advisor.

EE 201  Digital Hardware Organization  2 hrs.
Continuation of EE 101 focusing on the following topics:
sequential circuit elements, flip flops, counters and
shift-registers, clock generation circuits, algorithmic state
machine method of designing sequential circuits, and
VHDL design and synthesis. Prerequisite: EE 101.

EE 205  Fundamentals of Circuit Analysis  4 hrs.
Analysis of electric circuits. Transistors and steady-state
phenomena. General analysis techniques: loop and
nodal equations, network theorems, and matrix methods.
Corequisites: MTH 223, PHY 211.

EE 206  Sophomore Laboratory  2 hrs.
The student is introduced to experimental implementation of
analysis techniques developed in EE 205 and EE
201/311 in order to verify circuit theory. In addition the
student is introduced to the design of analog and digital
circuitry focusing on top-down design methodology culminating in a student-chosen sequential digital design
project. Prerequisites: EE 205, with a minimum grade of
C. Corequisites: EE 201 or 311.

EE 221  Data Structures and Object-Oriented Programming  3 hrs.
Introduction to data structures, object-oriented
programming and abstract data types for programmers;
data structures: arrays, vectors, lists, stacks, and queues;
dynamic memory allocation; problems of efficiency and
complexity of algorithms; searching and sorting; standard
libraries dedicated to data structures and algorithms.
Prerequisite: EE 102 or CS 106 with minimum grade of C.

EE 301  Signals and Systems I  3 hrs.
Time and frequency domain analysis of linear systems.
Lumped, distributed, time-varying, and discrete-time
systems; network topology, state variable techniques;
stability. Prerequisite: EE 206; EE or EEC major.

EE 302  Signals and Systems II  3 hrs.
Sampling theorem, digital filters, probability theory,
statistics, random variables, probability density functions,
auto- and cross-correlation functions, power spectral
density of random processes, analysis of linear time
invariant systems with random inputs in time domain and
in frequency domain, simulation of random experiments.
Prerequisite: EE 301.

EE 303  Principles of Electronics I  3 hrs.
Circuit analysis and design of macro-electronic circuits
using operational amplifiers, diodes, and logic gates.
Design process covering top-down methods and software
simulation. Prerequisites: EE 206; EE or EEC major.

EE 304  Principles of Electronics II  3 hrs.
Modeling of discrete bipolar and field effect transistors.
Circuit analysis and design of macro-electronic circuits
using discrete bipolar and field effect transistors. Design
process covering top-down methods and software
simulation. Prerequisite: EE 303 with minimum grade of C.

EE 311  Digital Hardware Organization  3 hrs.
Introduction to logic design with focus on the
following topics: fundamentals of Boolean algebra and
minimization techniques, logic realizations of SOP and
POS functions, multiple function synthesis using PLDs,
combinational circuit design as it applies to computers,
sequential circuit elements, flip flops, counters and
shift-registers, clock generation circuits, algorithmic state
machine method of designing sequential circuits, and
VHDL design and synthesis. Not open to students with
credit in EE 101 or EE 201.

EE 327  Fundamentals of Electrical Engineering I  3 hrs.
Analysis of circuits; transient and steady state phenomena;
genral analysis techniques. Open to non-electrical
engineering students only. Prerequisite: MTH 224.

EE 328  Fundamentals of Electrical Engineering II  3 hrs.
Electronics; magnetic fields and circuits; magnetic coupling;
energy conversion; electromagnetics; rotating devices;
digital techniques; control systems. Prerequisite: EE 327.

EE 331  Junior Laboratory I  3 hrs.
The student performs top-down design and analysis of
analog and digital electronic circuits. Integral to the
design work is the use of software programs, and software
simulation packages are used to verify their design.
In addition, students develop hardware and software
troubleshooting and testing. The design experience culminates in a multi-week task that requires the students
to integrate information from EE 205, EE 206, and EE 303
to synthesize a multi-faceted, specification-driven project.
Prerequisites: EE 206 with a minimum grade of C; EE or
EE 332  Junior Laboratory II  2 hrs.
Junior Laboratory II is a continuation of EE 331. In addition to the usual design efforts, a directed, microcomputer-based, multi-week task challenges the students to use a microcontroller in a project. The students' experience culminates in a multi-week, student-chosen project that showcases their design abilities. Prerequisites: EE 301, EE 303, EE 331, EE 365 each with a minimum grade of C.
Corequisites: EE 302, EE 304, EE 381.

EE 365  Microprocessors  3 hrs.
Design of microprocessor-based systems applied to real situations; control and data acquisition. Programming practice on commercial microprocessors. Prerequisite: EE 201 or EE 311; EE 221 with a minimum grade of C.

EE 381  Electromagnetic Fields  3 hrs.
Static electric fields; steady current; static magnetic fields of electric currents and ferromagnetic materials; charged particles in electric and magnetic fields. Prerequisite: EE 206.

EE 402  Senior Design Seminar  1 hr.
Students work in teams on a large-scale electrical engineering project, considering technical and non-technical factors in seeking an optimal solution. Prerequisite: senior standing in EE or ECE.

EE 409, 410  Special Topics  1-6 hrs. each
Topics of special interest which may vary each time course is offered. Topic stated in current Schedule of Classes. Prerequisite: consent of instructor.

EE 430  Electromechanical Systems  3 hrs.
Introduction to dynamic systems analysis with emphasis on mathematical modeling of sensors and electromechanical devices for control system applications. Fundamentals of power and industrial electronics. Prerequisites: EE 301, EE 303

EE 431, 432  Control System Theory  3 hrs. each
Linear, non-linear, and discrete automatic control systems; classical and modern control theory; computer-aided design and simulation. Prerequisite: senior standing in EE.

EE 450  Electronic Product Design  1 hr.
Students work in teams to design, implement, test, and demonstrate an electronic product. The electronic product has stringent specifications emulating design in industry. The design process requires extensive documentation and a formal report. Prerequisites: EE 332 with a minimum grade of C.

EE 451  Senior Capstone Project I  3 hrs.
First of two courses devoted to the Senior Design Project. The primary goal of this course is to have the student (and partner) choose a senior project and use a top-down design approach prior to implementation in senior lab. In addition, the student will serve on a Design Review Team (DRT) that will analyze other senior projects. Prerequisites: credit in EE 301, 302, 303, 304, 331, 332, 365, and 381 with a grade of C or better in six of the courses; credit or concurrent enrollment in EE 450 and two EE or technical electives.

EE 452  Senior Capstone Project II  3 hrs.
Second of two courses devoted to the Senior Design Project. Requires an oral project presentation and a written report. Prerequisites: EE 450, 451.

EE 530  Random Variables and Signals  3 hrs.
Correlation functions; power-density spectra; transmission of random signals through linear and non-linear systems; linear mean square estimation. Prerequisite: EE 302 or graduate standing.

EE 531  Communication Theory  3 hrs.
Optimum filtering; analogue and digital communication; detection theory. Prerequisite: EE 530.

EE 532  Information Theory  3 hrs.
Coding theory; memory and memoryless systems. Prerequisite: EE 530.

EE 533  Digital Image Processing  3 hrs.
Design of computer-based imaging systems; multidimensional filtering and quantization methods for image enhancement, restoration, and pattern recognition. Prerequisite: EE 302 or MTH 325.

EE 534  Digital Signal Processing  3 hrs.
Representation and analysis of discrete time signals and systems. Finite and infinite impulse response filter design; computer-aided-design; Fast Fourier Transform; implementation of digital filters. Prerequisite: EE 302.

EE 535  Engineering Applications of Neural Networks  3 hrs.
Provides a working knowledge of the theory, design, and engineering applications of artificial neural networks. Emphasis will be directed to low-level implementation such as embedded microcontrollers and integrated circuits. Specific architectures such as correlation matrix memory, perceptron, adaline, multilayer networks, radial-basis function networks, and Hopfield networks will be examined as well as their corresponding learning rules. Prerequisite: EE 302 or graduate standing.

EE 540  Dynamic Systems Analysis  3 hrs.
Advanced techniques for analysis of electrical, mechanical and electromechanical systems. State function concepts are emphasized with applications for determining state equations, system stability, and control. Prerequisite: EE 302 or graduate standing.

EE 550  Electromagnetic Theory  3 hrs.
Time-varying electric and magnetic fields; Maxwell's equations; plane waves in conducting and dielectric media; transmission lines; wave guides; antennas. Prerequisite: EE 381.

EE 551  Radio Frequency Circuits and Systems  3 hrs.
Review of transmission lines, impedance matching and transformations, S-parameters, passive R.F. junctions, R.F. amplifier design, R.F. systems, and front end design. Prerequisites: EE 205, 206.

EE 555  Optical Fiber Communication  3 hrs.
EM wave propagation in silica glass and step index optical fibers, LP modes, multimode and singlemode fibers, optical transmitters and receivers, design of optical fiber communication systems meeting industry standards. Prerequisite: EE 381 or consent of instructor.

EE 561  Digital Systems: Logic Design  3 hrs.
Boolean algebra; logical design; storing and switching phenomena. Prerequisite: EE 304 or graduate standing.

EE 562  Digital Systems: Computer Structures  3 hrs.
Use of hardware programming language to design a small computer or other digital system: busing; control units; interfacing; transfer design. Prerequisite: EE 201.
EE 563  Advanced Electronics —  
VLSI System Design  
Design and implementation of very-large-scale-integrated systems (VLSI). Integrated circuit devices, subsystems, and architecture. Computer-aided-design (CAD) and design testing. Prerequisite: EE 304 or graduate standing.

EE 565  Digital Systems: Microprocessor and PC Architecture  
Architecture of PC-compatible computers; 32-bit processor architecture and assembly language programming; standard buses. Design of peripheral cards to interface with the standard PC bus architectures. Prerequisites: EE 365 or consent of instructor.

EE 566  Digital Systems: Memory & Interfacing  
Design of single-board computers using 32-bit processors; processor architecture and assembly language programming. Introduction to RISC processors. Prerequisites: EE 365 or consent of instructor.

EE 567  Advanced VLSI Design  
Addresses the testability of integrated systems, using very large scale integration or VLSI, which includes topics on devices, circuits, and digital subsystems in CMOS technology. Includes the concept and methodology for the design for testability of digital integrated systems. Prerequisite: EE 563

EE 568  VHDL: Digital System Design  
A structured guide to the modeling of the design of digital systems, using VHDL, a hardware description language. VHDL is designed to fill a number of needs in the design process. It allows description of the structure of a system, and the specification of the function using familiar programming language forms. As a result it allows the design of a system to be simulated and synthesized.

EE 575  Power Systems I  
Analysis of electric power systems: fault studies; load flow; economic loading; stability; relaying; high voltage DC transmission; lightning and switching transients. Prerequisite: senior or graduate standing in EE.

EE 582  Medical Imaging  
Introduction to the common methods and devices employed for medical imaging, including conventional x-ray imaging, x-ray computed tomography (CT), nuclear medicine (single photon planar imaging), single photon emission computed tomography (SPECT), and positron emission tomography (PET), magnetic resonance imaging (MRI), and ultra-sound imaging. The physics and design of systems, typical clinical applications, medical image processing, and tomographic reconstruction. Cross-listed as ME 582. Prerequisites: senior standing in engineering or consent of instructor.

Electrical Engineering Technology

EET 320  Electricity and Power  
Fundamentals of direct current and alternating circuits, transformers, rotating machinery, electrical and electronic control, and electrical energy. Not open to EET majors. Prerequisites: IMT 214; PHY 108 or equivalent.