

## Course Descriptions Continued

quantifying performance and solving problems. Students apply common performance evaluation tools and implement performance evaluation algorithms of their own creation, comparing time and space performance. **Course offered on a rotational basis.**

**ECET 33700 Analog Signal Processing** (Advanced Analysis Selective)—3 Cr. Hrs.

*Prerequisites: ECET 27700, Math-M 119*

This advanced course in analog circuit analysis stresses network theorems and solutions of time and frequency domain problems. Transform circuit and signal analyses, using Laplace and Fourier techniques, are applied in active filter design. Software tools are employed to solve mathematical problems. **Course offered on a rotational basis.**

**ECET 33900 Analog Signal Processing** (Advanced Analysis Selective)—3 Cr. Hrs.

*Prerequisites: ECET 27900, Math-M 120*

The course introduces students to the fundamental principles associated with processing discrete time signals. The architecture, instruction set and hardware and software development tools associated with a fixed point general purpose VLSI digital signal processor are examined. Some common real-time applications are implemented such as digital filters and DFT-based spectral estimation on a typical fixed point digital signal processor. **Course offered on a rotational basis.**

**ECET 34900 Advanced Digital Systems**—3 Cr. Hrs.

*Prerequisites: ECET 17900, ECET 22900*

This course investigates complex digital systems that are implemented with field programmable gate arrays (FPGAs) using concurrent and sequential digital design techniques. Applications will include interfacing with analog signals and memory systems. **Course offered on a rotational basis.**

**ECET 36400 Fundamentals of Electromagnetics**—3 Cr. Hrs.

*Prerequisites: ECET 27700, Math-M 120, Physics II*

This course introduces the fundamentals of electromagnetics in both theory and application. Wave propagation, transmission lines, port parameters, antenna theory, and antenna design are studied. Other topics include Maxwell's equations, propagation losses, RF signal measurement, impedance matching, and Smith chart applications. **Course offered on a rotational basis.**

**ECET 38000 Professional Issues in EET**—1 Cr. Hr.

This course addresses professional ethics, legal issues, professional development, technology transfer, and corporate culture as they relate to EET graduates. Information relating to personal job and career choices, resumes, and interviews are included.

**ECET 38800 Analog IC Applications**—3 Cr. Hrs.

*Prerequisite: ECET 33700.* This course is a study of the applications of analog integrated circuits. Topics include linear amplifiers, IC specifications, linear regulators, waveform generation, linear and switched-capacitor active filters, and nonlinear circuit applications. Computer aided analysis of these circuits is also presented. **Course offered on a rotational basis.**

**ECET 42800 Audio Electronics—Sel. Topics**—3 Cr. Hrs.

*Prerequisites: ECET 33700, ECET 33900*

Define, implement, and evaluate the performance of the electronic elements in a professional audio system such as preamplifiers, signal encoding and transmission, data storage, signal reception and decoding, mixers, post processors, and power amplifiers. Both analog and digital signal processing may be implemented in each of the electronic elements. **Course offered on a rotational basis.**

**ECET 43000 Product/Program Management**—3 Cr. Hrs.

*Prerequisites: ECET 27000, TECH 32000, and 9 cr. hrs. of ECET 300-level or higher courses.*

This course deals with the planning of electrical and electronic products and projects. Research methods are studied to support new product development including customer needs and the development of engineering requirements. Formal techniques such as functional decomposition, top-down and bottom-up design techniques are studied. Planning and design alternatives to meet cost, performance, and user-interface goals are emphasized. Technical topics are revisited with

emphasis on new applications. The various types and levels of new product system tests are studied. New product planning, scheduling, and management techniques are studied, along with the usage of software tools for project scheduling and management. Creativity is stressed, and the different approaches taken by the designers are compared and discussed.

**ECET 44400 Wireless Systems: Design/Measurement**—3 Cr. Hrs.

*Prerequisites: ECET 27400, ECET 36400*

In this course wireless RF signals and microwave circuit designs are studied. Topics include signal analysis, RF signal measurement, microstrip design and analysis, Smith chart applications, RF circuit design, s-parameters, power dividers and couplers, filter design, and advanced RF PCB layout. **Course offered on a rotational basis.**

**ECET 46000 Project Design & Development**—3 Cr. Hrs.

*Prerequisite: ECET 43000.*

An extensive individual or small group design project is carried out with guidance from a faculty advisor. This course includes determining customer requirements, considering design alternatives, prototyping, project integration, and testing. The project is completed as a robust prototype. The course concludes with a formal written report and a presentation of the project to faculty and invited industrial guests.

## COLLEGE OF TECHNOLOGY REQUIRED COURSES

**TECH 12000 Technology & the Individual**—3 Cr. Hrs.

A survey course designed to develop a student's perspective and enhance their skills in living and working in a technological society. The course explores learning skills, oral/written communications, successful lifelong learning, problem solving, data literacy, individual ethics, professionalism, the historical impact of technology, and technology current events.

**TECH 32000 Technology & the Organization** — 3 Cr. Hrs.

*Prerequisite: TECH 12000.*

A course intended to provide students with experiences mirroring what they will encounter in the world of work. Students will participate in interdisciplinary teams to explore technology solutions. Course topics include public policy, regulatory and ethical issues, teaming and leadership, and project management.

**TECH 33000 Technology & the Global Society** — 3 Cr. Hrs.

*Prerequisite: TECH 12000.*

The course examines the interplay of technology, globalization, and ethics. Students will explore concepts and issues related to outsourcing; global competitiveness; communications; contemporary issues; cultural differences such as inequality, security, sustainability, and quality of life; and the ethical dilemmas that often emerge as a result of the impact of technology.

## OTHER REQUIRED COURSES

**CSCI-C 101 Computer Programming I** — 4 Cr. Hrs. *Prerequisite: Math-M*

*14 or math placement exam level 3.* Fundamental concepts of algorithm development, computer programming, and data structuring.

**IT 4500 Production Cost Analysis**—3 Cr. Hrs. *Prerequisite: Math 115 or 125*

*& 126* An introduction to financial statements and to the study of the costs of production in terms of break-even and least-cost alternatives, including present and future costs when related to the time value of money, budgeting, labor and overhead, production, cost control, and the role of the supervisor and the engineering technologist to cost control. Computer applications for determining rate of return for complex problems are introduced.

## Program Strengths

- Graduates are highly regarded by industry for their in-depth technical expertise.
- Course work is applications-oriented. Experience is gained through laboratory activities that are carefully integrated into the courses.
- Strong emphasis is placed on the development of written and oral communication skills.
- Faculty members have industrial experience.
- Graduates are able to offer their employers immediate contributions as team players who have problem solving and project management experience.

## Job Outlook

- The shortage of manpower in the field of electrical and electronic engineering ensures employment opportunities for EET graduates in all areas of industry and business.
- Currently, many employers have jobs that are unfilled due to a severe shortage of EET graduates.
- Annual average starting salaries for graduates with a baccalaureate degree is amongst the highest at the University.

## Job Titles

Applications Engineer  
Computer Support Specialist  
Controls Engineer  
Design Engineer  
Electrical Engineer  
Embedded Systems Engineer  
Instrumentation Engineer  
Manufacturing Engineer  
Process Controls Engineer  
Product Development Engineer  
Software Engineer  
Systems Administrator  
Systems Analyst  
Systems Engineer  
Test Engineer

Electrical Engineering Technology

**PURDUE**  
UNIVERSITY



COLLEGE OF TECHNOLOGY

at South Bend

# Electrical Engineering Technology

The baccalaureate in Electrical Engineering Technology at South Bend is accredited by the Technology Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012—telephone: (410) 347-7700

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An Equal Opportunity/Equal Access University

# Bachelor of Science Degree — EET

Department of Electrical and Computer Engineering Technology							
Semester 1 - Fall	CR	Semester 2 - Spring	CR	Semester 3 - Fall	CR	Semester 4 - Spring	CR
ECET 12000 Gateway to EET	3	ECET 17700 DAQ & Systems Control	3	ECET 22700 DC & Pulse Electronics	3	ECET 27000 Electronics Prototype Dev.	3
CSCI-C 101 Computer Programming I	4	ECET 17900 Introduction to Digital Systems	3	ECET 22900 Concurrent Digital Systems	3	ECET 27300 Modern Energy Systems	3
ENG W131 Elem. Composition	3	SPCH-S 121 Public Speaking	3	ECET 22000 Prof. Career Development	1	ECET 27400 Wireless Communications	3
Math-M 119 Brief Survey of Calculus I	3	MATH-M 120 Brief Survey of Calculus II	3	Business Selective <sup>5</sup>	3	ECET 27700 AC & Power Electronics or ECET 27900 Embedded Digital Systems	3
TECH 12000 Technology & the Individual	3	PHYS-P 221 General Physics I	5	General Education Elective <sup>6</sup>	3	Communication Selective <sup>4</sup>	3
				PHYS P222 General Physics II	5		
<b>Total Credit Hours</b>	16	<b>Total Credit Hours</b>	17	<b>Total Credit Hours</b>	18	<b>Total Credit Hours</b>	15
Semester 5 - Fall	CR	Semester 6 - Spring	CR	Semester 7 - Fall	CR	Semester 8 - Spring	CR
ECET 33X Adv. Analysis Selective <sup>2</sup>	3	ECET 38000 Prof. Issues in EET	1	ECET 43000 Product/Program Mgmt.	3	ECET 46000 Project Design/Development	3
ECET Elective <sup>1</sup>	3	ECET Elective <sup>1</sup>	3	ECET Elective <sup>1</sup>	3	ECET Elective <sup>1</sup>	3
Communication Selective <sup>4</sup>	3	General Education Elective <sup>6</sup>	3	IT 45000 Production Cost Analysis	3	Free Elective	3
Math-K 310 Stat. Techniques	3	Technical Selective <sup>3</sup>	3	General Education Elective <sup>6</sup>	3	General Education Elective <sup>6</sup>	3
TECH 3200 Technology & the Organization	3	TECH 33000 Technology & the Global Society	3	Technical Selective <sup>3</sup>	3	Technical Selective <sup>3</sup>	3
		Technical Selective <sup>3</sup>	3			CAND 99100 <sup>7</sup>	0
<b>Total Credit Hours</b>	15	<b>Total Credit Hours</b>	16	<b>Total Credit Hours</b>	15	<b>Total Credit Hours</b>	15

Degree Code: ECET-BS

BS Total Credit Hours (as listed) 127

Date Plan of Study Effective: Fall 2012

Minimum Required 125

**Departmental Policies:** It is the responsibility of each student to assure that he/she schedules the necessary prerequisites and courses to meet ECET graduation requirements. Questions may be directed to your academic advisor. Any variation from the courses listed on the plan of study requires ECET Departmental approval.

<sup>1</sup>**ECET Elective Courses (12 credits)**—The courses listed below may not all be offered each year and the list of courses may be revised. See advisor for latest listing. Prerequisites are shown in parenthesis.

- ECET 27700 AC & Power Electronics (ECET 17700)
- ECET 27900 Embedded Digital Systems (ECET 17900)
- ECET 32900 Adv. Embedded Digital Syst. (ECET 27900)
- ECET 33500 Computer Arch/Perform Eval. (ECET 27900)
- ECET 33700 Analog Signal Processing (ECET 227)
- ECET 33900 Digital Signal Processing (ECET 27900)
- ECET 34900 Advanced Digital Systems (ECET 17900)
- ECET 36400 Fund. of Electromagnetics (ECET 27700)
- ECET 38800 Analog IC Applications (EET 33700)
- ECET 42800 Audio Electronics-Sel. Topics (ECET 33700, ECET 33900)
- ECET 44400 Wireless Syst. Design/Meas. (ECET 27400, ECET 36400)

<sup>2</sup>**ECET 33X Advanced Analysis Selective (3 credits)**

- ECET 33500 Computer Arch/Perform Eval. (ECET 27900)
- ECET 33700 Analog Signal Processing (ECET 227)
- ECET 33900 Digital Signal Processing (ECET 27900)

<sup>3</sup>**Technical Selectives ( 12 Credits)**

- College of Technology courses (including ECET)
  - Lab-based Science courses in Physics, Chemistry, or Biology
- Limited to 2 courses (6 credits) in any one discipline.*

<sup>4</sup>**Communication Selective (6 Credits—3 from each category below)**

**Written Communications (3 credits)**

- ENGL 42100 Technical Writing
- ENG-W 203 Creative Writing
- ENG-W 231 Prof. Writing Skills
- ENG-W 232 Intro. to Business Writing

<sup>5</sup>**Business Selective (3 Credits)**

- OLS 25200 Human Relations in Orgs
- OLS 27400 Applied Leadership
- OLS 28400 Leadership Principles
- OLS 32500 Meeting Management
- IT 10400 Industrial Organizations
- IT 23000 Industrial Supply Chain Mgmt.
- IT 33000 Industrial Sales & Sales Mgmt.

ENG-W 270 Argumentative Writing

ENG-W 315 Writing for the Web

**Oral Communications (3 credits)**

Communication or Speech course 20000 level or higher

IT 33200 Purchasing, Inventory & Warehouse

ECON-E 103 Microeconomics

ECON-E 104 Macroeconomics

BUS-A 201 Intro. to Financial Accounting

BUS-A 202 Intro. to Managerial Accounting

BUS-L 201 Legal Environment of Business

<sup>6</sup>**General Education Electives (12 Credits)**

Any courses from (*Limited to 2 courses (6 credits) in any one discipline*):

-Foreign Languages (except native language courses)

-Anthropology, English, History, Music, Philosophy, Political Science, Psychology, Religious Studies, Sociology, Theatre, Women’s Studies

<sup>7</sup>**CAND 99100**—Course that students must enroll when enrolling for the last course for graduation of AS and BS degrees. This is the student’s application for graduation. There are no fees assessed for this course. No class attendance is required and no grade will be issued.

## Course Descriptions

**ECET 12000 Gateway to EET**—3 Cr. Hrs.

This course introduces students to the academic and professional field of electrical and computer engineering technology. Familiar applications of technology that impact today’s and tomorrow’s society are blended with foundational electrical and electronics principles. Practical systems are examined to illustrate the diverse knowledge required to design, analyze, and solve problems in multifaceted systems. Skills needed to explore electronic systems using standard laboratory instrumentation and methods of measurement are introduced.

**ECET 17700 DAQ & Systems Control**—3 Cr. Hrs.

*Prerequisite: ECET 12000.* Fundamental electrical parameters and measurement techniques are introduced. These are then applied to implementing power interfaces, actuators and sensors. Modules that provide signal conditioning, data conversion, filtering and controllers are evaluated. A full, closed loop control system is built and evaluated.

**ECET 17900 Circuit Analysis**—3 Cr. Hrs.

*Prerequisites: ECET 12000 & CSCI-C 101*  
This course introduces computing systems and defines the major classes of computing devices. Sequential and concurrent operations, along with logic and control structures, are covered. Knowledge of fundamental computing principles is discovered. Common software tools are used to create, test, and debug systems. Systems are constructed from standard blocks with a focus on subsystem operation and performance, troubleshooting/debugging and testing. Common applications of embedded systems are introduced.

**ECET 22000 Professional Career Development**—1 Cr. Hr. This course expands the student’s knowledge about the EET program.

Included are topics such as: options and electives in the EET curriculum; the EET plan of study; student activities, including professional practice and organizations; international opportunities; employment and career opportunities; plant tours; and guest lectures, featuring EET alumni.

**ECET 22700 DC & Pulse Electronics**—3 Cr. Hrs.

*Prerequisites: ECET 17700 and Math 119*

Capacitors, inductors, oscillators, rectifiers, bipolar and MOSFET power switches, switching power supplies, half-and full-H bridges, switching audio power amplifiers, op amp differential, composite and single supply operation, and linear regulators are studied. Computer-aided analysis of circuits is utilized.

**ECET 22900 Concurrent Digital Systems**— 3 Cr. Hrs

*Prerequisites: ECET 12000*

This course establishes a foundation for concurrent digital systems. Common methods of describing digital circuit operation are studied along with the techniques for translation between any two methods. Basic building blocks of digital systems are defined and applied.

Analysis techniques for combinational and sequential logic circuits or subsystems are covered. Computer-based development tools, programmable logic devices, and technical reference sources are used to build, test, and evaluate digital systems.

**ECET 27000 Electronics Prototype Development**—3 Cr. Hrs.

*Prerequisites: ECET 17900, ECET 22700, ECET 22900*

This course introduces project planning and basic concepts in electronic design automation (EDA). The student develops a portion of an electronic system using EDA, design for testing (DFT), surface mount technology (SMT), design for manufacturability (DFM), and component characteristic selection techniques. New construction and testing techniques are introduced.

**ECET 27300 Modern Energy Systems**—3 Cr. Hrs.

*Prerequisites: ECET 12000 and Physics I*

This course is an introduction to modern energy system technologies. Topics include energy conversion fundamentals, efficiency, and renewable energy technologies such as wind, solar, and geothermal. Other topics include central and distributed generation, and power plant fundamentals.

**ECET 27400 Wireless Communication**—3 Cr. Hrs.

*Prerequisites: ECET 22700, ECET 27000, Physics I*

The theory and techniques of wirelessly sending information (voice, music, data) from one location to another is studied from a systems point of view. This includes a signal analysis, modulation techniques, transmitters, receivers, low noise amplifiers, and filters in the RF frequency spectrum. In addition, special topics of current interest are introduced. This course incorporated a student-based communication design and analysis laboratory.

**ECET 27700 AC & Power Electronics**—3 Cr. Hrs.

*Prerequisite: ECET 17700*

AC Circuits including the j operator, phasors, reactance and impedance are studied. Circuit laws, network theorems, and the application of circuit analysis techniques to amplifiers used in power electronics, including power MOS devices, thyristors, and other appropriate applications. Computer-aided analysis of circuits is used. **Course offered on a rotational basis.**

**ECET 27900 Embedded Digital Systems**—3 Cr. Hrs.

*Prerequisite: ECET 17900*

A course emphasizing the advanced applications of embedded digital systems. Topics include embedded system architecture, use of advanced programmable counter/timer arrays, analog interfaces, serial communication, and interrupts. **Course offered on a rotational basis.**

**ECET 32900 Adv. Embedded Digital Systems**—3 Cr. Hrs.

*Prerequisite: ECET 27900*

A course emphasizing the use of embedded real-time operating systems (RTOS). Students complete systems-level projects using an RTOS. **Course offered on a rotational basis.**

**ECET 33500 Computer Arch/Perform Eval (Advanced Analysis Selective)**—3 Cr. Hrs.

*Prerequisites: ECET 27900, Math-M 119, Math-K 310*

The course focuses on the evaluation, implementation and application of computers and embedded systems. The architecture of modern computer CPUs and their peripheral subsystems are presented at the block level, with emphasis on the memory hierarchy, techniques for performance improvement, and the instruction set. Analytic performance evaluation techniques, including probability and stochastic processes, are introduced and developed, as well as common benchmarking tools for