Revised: July 2012

Luna Community College

2012 - 2015 Catalog

Electronics Engineering Technology Program

Program Goals

Electronics Engineering Technology is designed to provide students with technical knowledge and skills necessary for employment in the field of electronics and its related career paths. The curriculum is designed to provide a broad-based education in introductory electronics with an opportunity for directing one's studies toward specific employment as well as continuation of education at a four-year university. The program provides both general education core classes and specific introductory electronics courses. The labs provide hand-on learning experience where students use modern testing and diagnostic equipment as well as modern simulation software.

Upon completion of the program, graduates of the program will be prepared to:

1. demonstrate a theoretical knowledge of circuit analysis and design
2. take a conceptual idea, develop a schematic, and design a functioning circuit
3. read electrical schematics and perform electrical mathematical computations
4. pass industry certification exams
5. enter the workforce as an entry level electronics technician or transfer to a four-year institution to pursue an electronics engineering bachelors degree

ELECTRONICS ENGINEERING TECHNOLOGY
Associate of Applied Science Degree
Minimum of 64 Credit Hours

Electronics Engineering Technology is designed to provide students with technical knowledge and skills necessary for employment in the field of electronics and its related career paths. The curriculum is designed to provide a broad-based education with an opportunity for directing one's studies toward specific employment as well as continuation of education at a four-year university. The labs provide hand-on learning experience where students use modern testing and diagnostic equipment as well as modern simulation software.

Degree Requirements **Credit Hours: 64**

General Education Core ..... (36 hours)

Area I. Communications	(9 hours)
ENG111 Freshman Composition I	3
ENG115 Freshman Composition II	3
SPCH111 Public Speaking -or-	3
SPCH112 Interpersonal Communication	3
Area II. Mathematics	(4 hours)
MATH180 College Algebra	4
Area III. Laboratory Science	(8 hours)
Area IV. Social and Behavioral Sciences	(9 hours)
Area V. Humanities and Fine Arts	(6 hours)

Program Requirements ..... (25 hours)

ELEC101 Electronic Circuits/DC	4
ELEC102 Electronic Circuits/AC	4
ELEC196 Solid State and Active Devices	4
ELEC202 Telecommunications Electronics	3
ELEC204 Digital Electronic Circuits	4
SMET101 Introduction to Science, Math and Engineering Technology	3
SMET105 Computer Use for Technology	3

Approved Electives ..... (3 hours)

ASE101 Introduction to Renewable Energy	3
ASE202 Solar and Wind Energy	4
CS105 Introduction to Computer Science	3
ELEC210 Computer Systems Troubleshooting	3
SMET117 Introduction to Engineering	3

Electronics Engineering Technology – Course Descriptions and Learning Outcomes

SMET101 Intro to Science, Math, & Engineering Technology 3:(3,0)

This course is designed to develop a better understanding of the learning process within the domain of science, math and engineering technology. The course will use flexible learning strategies and creative problem solving techniques to include critical thinking skills. The ultimate goal of the course is to assist students in successfully meeting the demands of the technology field.

Course Objectives: The objectives of this course include introducing students to the various fields within science and engineering along with exploring the potential careers and ethical issues. The course offers strategies for success in the STEM fields at the community college and beyond.

Learning Outcomes: Upon completion of the course with a "C" or better the student will be able to:

- Select from a variety of problem solving strategies and use them to design potential problem solutions.
- Apply collaborative learning and teamwork skills in class assignments and team projects.
- Identify majors and career opportunities in engineering disciplines and be able to explain academic decisions.
- Identify and describe personal and professional strengths, abilities, and goals.
- Develop and initiate an individualized Academic Achievement Plan (AAP).
- Identify and effectively use LCC campus resources and services.

SMET105 Computer Use for Technology 3:(2,2)

This course is the study of the fundamentals of computer technology software used in engineering technology fields. Emphasis will be placed on technical and scientific computer applications. Topics to be covered will include an introduction to computer concepts, Windows, Microsoft Word, Excel, Access, and PowerPoint, and other specific software applications used to interface various engineering technologies fields.

Course Objectives: The objective of the course is to provide students with the computer basics for success in the STEM disciplines. Students will become proficient at basic Microsoft programs and will be introduced to AutoCAD software.

Learning Outcomes: upon completion of the course with a grade of "C" (70%) or better, the student will be able to:

- Demonstrate a knowledge of the course content through quizzes, projects, and exams
- Apply the concepts learned in class to unit projects
- Demonstrate a working knowledge of both Microsoft and AutoCAD software
- Demonstrate a working knowledge of hardware and components

ELEC101 Electronics I/DC Circuits 4:(3,2)

This course is a study of the analysis and design of direct current (DC) circuits. Topics to be covered will include Ohm's Law, Kirchoff's Laws, mesh, and nodal analysis. The physical laws will demonstrate the relationship between voltage, resistance, current, and power while the analytical methods will give the student an in-depth understanding of the behavior of a DC electronic circuit. Hands-on experimentation will be conducted in the laboratory using equipment such as multimeters, DC power supplies, and breadboards. *Prerequisite: MATH105 or equivalent COMPASS/ACT score*

Course Objectives: The course will provide students with the basics in DC electricity as a foundation for continued study. Students will learn basic electronics lab techniques and lab safety.

Learning Outcomes: upon completion of the course with a grade of "C" (70%) or better, the student will be able to:

- Identify and demonstrate the safe and correct use of measurement equipment (voltmeter, ammeters and ohmmeters).
- Demonstrate the use of laboratory equipment such as DC power supplies/sources and breadboards / components.
- Demonstrate the skill of taking a schematic diagram: solve for all required component values; solve for all required voltage, current and power requirements; build the circuit selecting component measure values using skills learned in #1 above and document and explain difference, if any, between calculated and measured results.
- Trouble shoots a circuit supplied by the instructor which will have some programmed problem.

ELEC102 Electronic Circuits/AC Circuits 4:(3,2)

This course is a study of the analysis and design of alternating current (AC) circuits. Topics to be covered include electro-magnetic induction, inductive and capacitive reactance, impedance, series and parallel resonance, and basic transformer characteristics. Experimental AC circuit analysis will be performed using multimeters, oscilloscopes, AC power supplies, and function generators in the laboratory. *Prerequisite: ELEC101.*

Course Objectives: The course will provide students with the basics in AC electricity as a foundation for continued study. Students will learn basic electronics lab techniques and lab safety.

Learning Outcomes: upon completion of the course with a grade of "C" (70%) or better, the student will be able to:

- Identify and demonstrate the safe and correct use of measurement equipment (voltmeter, ammeters and ohmmeters).
- Demonstrate the use of laboratory equipment such as AC power supplies/sources and breadboards / components.

- Demonstrate the skill of taking a schematic diagram: solve for all required component values; solve for all required voltage, current and power requirements; build the circuit selecting component measure values using skills learned in #1 above and document and explain difference, if any, between calculated and measured results.
- Trouble shoots a circuit supplied by the instructor which will have some programmed problem.

ELEC196 Solid State and Active Devices 4:(3,2)

This course is a study of solid-state devices such as the pn junction, semiconductor diodes, and zener diodes. It also examines active devices such as the Bipolar Junction Transistor (BJT), the Field Effect Transistor (FET), operational amplifiers for small signal amplification, oscillators, and Multivibrators for signal generation. This course will also include discussion of signal rectification, wave-shaping circuits, system gain, and discrete semiconductors as related to the analysis of special purpose circuits. System design, analysis, and testing will be performed in the laboratory with the appropriate lab test bench equipment. *Prerequisite: ELEC102.*

Course Objectives: Students will investigate solid state and active electronic devices as a foundation for digital electronics. Hands-on lab experience is an integral part of the course.

Learning Outcomes: upon completion of the course with a grade of "C" (70%) or better, the student will be able to:

- Identify and demonstrate a working knowledge of diodes, transistors, op-amplifiers as used in circuits for signal amplification, oscillators, multi-vibrators, power supplies, and other special purpose circuits.
- Perform system design, analysis and testing in the laboratory with the appropriate test equipment.

ELEC202 Telecommunications Electronics 3:(2,2)

This course is an inclusive comprehensive study of introductory level telecommunications through the discussion of basic telecommunication systems and components. Topics to be covered will include computer and data networks, fiber optic technology, digital communications, telephone networks, satellite systems, wireless and cellular technologies. Various system analyses and testing will be performed in the laboratory using the appropriate lab equipment and software. *Prerequisite: MATH116.*

Course Objectives: Students will be exposed to the ever-changing field of telecommunication electronics as part of the electronics program curriculum. This course involves all areas of electronic communications at an introductory level.

Learning Outcomes: upon completion of the course with a grade of "C" (70%) or better, the student will be able to:

- Describe telephonic communication systems

- Describe wireless communication systems
- Describe satellite communication systems
- Demonstrate an understanding of the electromagnetic spectrum and its application to communications
- Identify communication systems parameters
- Describe copper, coaxial, and fiber optic communications systems

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ELEC204 Digital Electronic Circuits 4:(3,2)

This course is a study of the basic principles of digital electronic circuits. Topics to be covered include the binary and other number systems, logic gates, Boolean algebra and other simplification techniques, and memory devices. The implementation of digital circuits using breadboards, integrated circuits, electronic test equipment, and oscilloscopes will be an integral part of the course. *Prerequisite: MATH116*

Course Objectives: The objective of the course is to give students a foundation in digital electronics, building on the material delivered in DC/AC courses.

Learning Outcomes: upon completion of the course with a grade of "C" (70%) or better, the student will be able to:

- Convert between binary and other number systems
- Determine theoretically and develop experimental truth tables for logic gates
- Apply basic laws and rules of Boolean algebra and combine logic simplification techniques
- Use Karnaugh maps to simplify Boolean expressions
- Define basic memory characteristics – ROM and RAM
- Construct digital circuits using breadboards and integrated circuits

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SMET117 Introduction to Engineering 3:(2,2)

This course introduces the engineering design process using a project-oriented, team-based approach. Students will employ engineering graphics and computational skills using computer applications such as AutoCAD and spreadsheets to solve engineering problems. Lab topics will include design and fabrication of scale models with specific projects addressing sound decision making, the ability to communicate effectively, defining and solving problems and functioning efficiently in a team environment.

Course Objectives: This course introduces the concepts of static and dynamic forces in engineering and explores the engineering fields. The course promotes teamwork and collaboration to problem solve in the field of engineering.

Learning Outcomes: upon completion of the course with a grade of "C" (70%) or better, the student will be able to:

- Demonstrate teamwork skills
- Demonstrate a basic understanding of statics and dynamics in the engineering field

- Fabricate scale models for testing purposes
- Employ AutoCAD and spreadsheet applications to solve problems.

CS105 Introduction to Computer Science 3:(2,2)

This course is an introduction to computer science and computer information systems. The intent of this course is to prepare students and provide them with the terminology and a brief understanding of concepts within the computing field. Topics will include computer history, algorithms, computer architecture, programming languages, applications, social issues and ethics. Students should have an understanding of how to use a computer and basic software such as MS Word and the internet prior to taking this course.

Course Objectives:

- Have students become versed in the terminology of computer science
- Introduce students to programming and applications
- Address social and ethical issues related to the fast and ever-changing field of computers

Learning Outcomes: upon completion of the course with a grade of a 'C' or better the student will be able to:

- Summarize and interpret the history and evolution of computer systems.
- Demonstrate a knowledge of the algorithmic foundation of computer science
- Demonstrate a basic knowledge of introductory programming languages
- Distinguish between the hardware and software of a computer system
- Identify various application as well as social issues involving computers
- Apply a basic understanding of networking, Internet, and Webpage design

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ASE101 Introduction to Renewable Energy 3:(3,0)

This course investigates the recent technological developments and increasing concern over the sustainability and environmental impact of conventional fuel usage and the prospect of producing clean, sustainable power in substantial quantities from renewable energy sources. The course provides a comprehensive overview of the principal types of renewable energy--including solar thermal and photovoltaics, bioenergy, hydro, tidal, wind, wave, and geothermal. In addition, the course investigates the underlying physical and technological principles of renewable energy and examines the environmental impact and prospects of different energy sources. *Prerequisites: ENG 104 and READ 105 or equivalent COMPASS/ACT scores.*

Course Objectives: The course will provide the basics in the various types of renewable energy and their uses. The course is intended to provide a broad background in renewable energy topics as a foundation for continued studies.

Learning Outcomes: upon completion of the course with a grade of "C" (70%) or better, the student will be able to:

- demonstrate an understanding of the various types of renewable energy and their appropriate application.
- articulate the problems with current petroleum based economy, including finite supply of petroleum fuels and the population problem.
- describe the basic science behind the various types of alternative energy systems presented in class.
- Identify the environmental impacts for each type of renewable energy source.
- Identify the future prospects for each type of renewable energy source.

ASE 202 Solar and Wind Energy 4:(3,2)

This course is designed to give the student theoretical and practical knowledge of electrical power generation and will investigate the new trend of distributed, stand alone power generation systems and renewable energy sources in electrical power systems. Students will gain an understanding of basic electricity, the electrical power industry, and the economics of electrical energy distribution. Students will also gain an understanding of the theory, design, applications, and installation of both stand-alone and grid-tied solar and wind energy generation systems with the laboratory providing examples of topics covered in lecture. *Prerequisites: ASE101, ENG 104 and READ 105 or equivalent COMPASS/ACT scores.*

Course Objectives: The course is designed to focus on solar PV and Wind energy systems and their potential uses. The lab provides hands-on learning opportunities allowing students to apply learned skills and develop a hybrid solar/wind system.

Learning Outcomes: upon completion of the course with a grade of "C" (70%) or better, the student will be able to:

- describe the components of a solar, wind, or hybrid energy system.
- describe the process of installing a solar, wind, or hybrid energy system as a stand-alone or grid-tied system.
- demonstrate an understanding of the current electrical power industry and the distribution grid
- explain the net-metering laws of New Mexico
- demonstrate a knowledge of the theory underlying solar and wind power systems.

ELEC210 Computer Systems Troubleshooting 3;(2,2)

This course is a study of troubleshooting skills for the beginner and the non-technical personal computer (PC) user who wants to learn how to repair common PC problems, perform preventative maintenance, install or replace basic PC components (such as chips, expansion boards, power supplies, and disk drives). Students will learn how to improve system performance, use diagnostic tools, install software, and determine when professional help is required to service the PC.

Course Objectives: Systems troubleshooting is designed to give the student the basic knowledge on how to deal with a malfunctioning computer. Students will develop the confidence to assess and repair minor system problems for both hardware and software.

Learning Outcomes: upon completion of the course with a grade of “C” (70%) or better, the student will be able to:

- Determine the nature of minor PC problems and apply corrective measures
- Install memory chips, motherboards, drives and power supplies
- Operate diagnostic tools
- Install software and outboard components and equipment

Assessment
Luna Community College defines assessment as a process that will lead to the improvement of student learning. The process must follow four steps as illustrated below.

LCC Assessment Plan
All course offerings, including degree and certificate programs, at Luna Community College are required to follow the four-step assessment process. They include:
1. A list of expected learning outcomes
2. Assessment tools that directly measure those learning outcomes
3. The results of the data, and
4. How the data will be used to improve student learning

Academic Departments at Luna Community College are required to participate in semester "Improving Student Learning" assessment reporting and Student Learning Outcomes Assessment (SLOA) Committee presentations. Every semester, academic departments focus on specific learning outcomes with a targeted student population.

Faculty are selected to participate in SLOA; selected faculty participate in developing assessment methods and procedures for their particular course or courses. The faculty give oral presentations at the end of the semester and information gathered is disseminated among SLOA members, faculty and staff. The purpose is to provide a baseline for future improvements.

Visit our web site at www.luna.edu to review LCC's Improving Student Learning (ISL) reports. LCC also abides by the New Mexico state competencies for general education.

Appendix "A"

LUNA COMMUNITY COLLEGE
Standard "Minimal" Requirements for Course Syllabus

Course	course title and other course information including meeting times, dates, room number, credits, semester, prerequisites and/or co-requisites
Faculty	information about the instructor and his or her contact information (e.g., phone number and email). List time and day of office hours for full time faculty
Course Description	use catalog description, 2012-2015
Expectations of Students	What do you expect from your students? For example, description of students' responsibilities in the learning process; how you hope the students will approach the course subject/content; take responsibility for their learning; the amount of study time expected in the course, and suggestions on how to succeed in the course.
Course Learning Outcomes (Competencies)	this section will include a list of skills or techniques students will develop from the course. This list will consists of a minimum of four to six quantifiable statements about what students will be able to do after completing the course.
New Mexico CORE Competencies	If teaching a CORE course, the State HED competencies must be stated (e.g., Communications, Mathematics, Laboratory Science, Social & Behavioral Sciences, Humanities & Fine Arts).
Methods of Measuring Learning Outcomes (Competencies)	What tools are used to measure student success based on the learning outcomes?

Evaluation	Indicate how the student will earn a particular grade, such as information about assignments including types of assignments, nature of exams (e.g., take home, open book, in-class) due dates, grading criteria and so forth.
Course Schedule	Add a tentative schedule indicating the course content that will be covered throughout the course (e.g., eight week or sixteen week schedule).
Policies	Include policies such as attendance, academic responsibilities, late assignments, missed exams, cell phones, etc. Add a statement that indicates: for additional student information, refer to the 2012-2015 Student Handbook
Grading Standard	Refer to the LCC 2012-2015 Catalog
Textbook(s)	Name of required textbooks(s) and any recommended materials. Include ISBN number(s)
Important Dates	List important dates such as last day to withdraw from the course, holidays, add/drop, midterm, final exam week, spring break and other important dates.
ADA Statement	Add a statement regarding accommodations for students with disabilities. See Academic Policies & Procedures Manual 2012-2013 for additional information.
Academic Integrity	See Academic Policies and Procedures Manual 2012-2013 for additional information.
Syllabus Revisions or Changes	Add a statement that indicates the syllabus is subject to change
Internet Courses	See Academic Policies & Procedures Manual 2012-2013 for additional information.