

DEKALB TECHNICAL COLLEGE
Clarkston Campus

**ELECTRONICS TECHNOLOGY
DIPLOMA**

The Electronics Technology program is a sequence of courses designed to prepare students for careers in electronics technology professions. Learning opportunities develop academic, technical, and professional knowledge and skills required for job acquisition, retention, and advancement. Program graduates are to be competent in the general areas of communications, mathematics, computer literacy, and interpersonal relations. The program emphasizes a combination of electronics technology theory and practical application necessary for successful employment using both manual and computerized electronics systems. Program graduates receive an Electronics Technology diploma, which qualifies them as electronics technicians with a specialization in communications electronics, general electronics, industrial electronics, or telecommunications electronics.

Course Number	Course	Class Hours	Lab Hours	Total Hours	Credit Hours	Prerequisites/Corequisites
FIRST QUARTER						
IFC 100	Industrial Safety Procedures	20	10	30	2	
IFC 101	Direct Current Circuits I	30	20	50	4	*, **
ELC 104	Soldering Technology	10	20	30	2	
ELC 108	Direct Current Circuits II	30	20	50	4	IFC 101, MAT 103*** or MAT 191
SCT 100	Introduction to Microcomputers	10	40	50	3	
MAT 103	Algebraic Concepts	<u>50</u>	<u>0</u>	<u>50</u>	<u>5</u>	**
	TOTAL	150	110	260	20	
SECOND QUARTER						
IFC 102	Alternating Current I	30	20	50	4	IFC 101, MAT 103***, MAT 104, or MAT 194
ELC 110	Alternating Current II	30	20	50	4	IFC 102
ENG 101	English	50	0	50	5	** , See catalog for pre-reqs
MAT 104	Geometry and Trigonometry	<u>50</u>	<u>0</u>	<u>50</u>	<u>5</u>	MAT 103 with C or better
	TOTAL	160	40	200	18	
THIRD QUARTER						
IFC 103	Solid State Devices I	30	20	50	4	IFC 102
ELC 115	Solid State Devices II	30	20	50	4	IFC 103
ELC 117	Linear Electronics I	<u>30</u>	<u>20</u>	<u>50</u>	<u>4</u>	ELC 115
	TOTAL	90	60	150	12	
FOURTH QUARTER						
ELC 118	Digital Electronics I	30	20	50	4	ELC 115
ELC 119	Digital Electronics II	10	90	100	4	ELC 118
ELC 120	Microprocessors Fundamentals	<u>30</u>	<u>20</u>	<u>50</u>	<u>4</u>	ELC 119
	TOTAL	70	130	200	12	

*MAT 101 for out-of-program students, MAT 103 for in-program students.

**Approved admission level English, reading, and/or math competency required.

***MAT 103 with a minimum grade of "C"

CIP CODE: 47.0101A4

MAJOR CODE: EFA4

REQUIRED CREDIT HOURS: 90

10/07

The curriculum is subject to change to meet changing conditions. As set forth in its student catalog, DeKalb Technical College does not discriminate on the basis of race, color, creed, national or ethnic origin, gender, religion, disability, age, veteran status, or citizenship status (except in those special circumstances permitted or mandated by law).

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Students must select one of the following options:

COMMUNICATIONS ELECTRONICS TECHNOLOGY SPECIALIST

FIFTH QUARTER						
ELC 220	AM and SSB Circuit Analysis	30	20	50	4	ELC 119
ELC 221	FM Circuit Analysis	30	20	50	4	ELC 220
ELC 222	Advanced Modulation Techniques	<u>30</u>	<u>20</u>	<u>50</u>	<u>4</u>	ELC 220, ELC 221
	TOTAL	90	60	150	12	
SIXTH QUARTER						
ELC 223	Antennas and Transmission Lines	30	20	50	4	ELC 220
ELC 224	Microwave Communications and Radar	50	0	50	5	ELC 220
ELC 225	Optical Communications Techniques	30	20	50	4	ELC 220
EMP100	Interpersonal Relations and Professional Development	<u>30</u>	<u>0</u>	<u>30</u>	<u>3</u>	
	TOTAL	150	40	180	16	

GENERAL ELECTRONICS TECHNOLOGY SPECIALIST

FIFTH QUARTER						
ELC 123	Communications Electronics Survey	50	50	100	7	ELC 115
XXX XXX	Technical/Technically-Related Elective	<u> </u>	<u> </u>	<u> </u>	<u> </u>	
	TOTAL	50+	50+	100+	14	
SIXTH QUARTER						
ELC 124	Industrial Electronics Survey	30	20	50	4	ELC 120
EMP100	Interpersonal Relations and Professional Development	30	0	30	3	
XXX XXX	Technical/Technically-Related Elective	<u> </u>	<u> </u>	<u> </u>	<u> </u>	
	TOTAL	50+	30+	80+	14	

Electives must be approved by program advisor

TELECOMMUNICATIONS ELECTRONICS TECHNOLOGY SPECIALIST

FIFTH QUARTER						
ELC 259	Fiber Optics Systems	30	20	50	4	ELC 119
ELC 260	Telecommunications & Data Cabling	30	20	50	4	ELC 119
ELC 261	Telecommunications Systems Installation & Programming	20	30	50	3	ELC 260
ELC 262	Telecommunications & Data Transmission Concepts	<u>20</u>	<u>30</u>	<u>50</u>	<u>3</u>	ELC 261
	TOTAL	100	100	200	14	
SIXTH QUARTER						
ELC 217	Computer Hardware	40	60	100	7	ELC 120
ELC 219	Networking I	30	30	60	4	ELC 120
EMP100	Interpersonal Relations and Professional Development	<u>30</u>	<u>0</u>	<u>30</u>	<u>3</u>	
	TOTAL	100	90	190	14	

*MAT 101 for out-of-program students, MAT 103 for in-program students.

**Approved admission level English, reading, and/or math competency required.

***MAT 103 with a minimum grade of "C"

CIP CODE: 47.0101A4

MAJOR CODE: EFA4

REQUIRED CREDIT HOURS: 90

10/07

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ELECTRONICS COURSE DESCRIPTIONS

ELC 104 - SOLDERING TECHNOLOGY (2)

Develops the ability to solder and desolder connectors, components, and printed circuit boards using industry standards. Topics include: safety practices, soldering, desoldering, anti-static grounding, and surface mount techniques.

ELC 108 - DIRECT CURRENT CIRCUITS II (4)

Prerequisite/Corequisite: IFC 101, MAT 103 with minimum grade of "C" or MAT 191, or Advisor Approval
Continues direct current (DC) concepts and applications. Topics include: complex series/parallel circuits and DC theorems.

ELC 110 - ALTERNATING CURRENT II (4)

Prerequisite/Corequisite: IFC 102, or Advisor Approval
Continues development of AC concepts with emphasis on constructing, verifying, and troubleshooting reactive circuits using RLC theory and oscilloscopes. Topics include: simple RLC circuits, AC circuit resonance, passive filters, and non-sinusoidal waveforms.

ELC 115 - SOLID STATE DEVICES II (4)

Prerequisite/Corequisite: IFC 103
Continues the exploration of the physical characteristics and applications of solid-state devices. Topics include: PN diodes, power supplies, voltage regulation, special applications, and bipolar junction theory and application.

ELC 117 - LINEAR ELECTRONICS I (4)

Prerequisite/Corequisite: ELC 115
Provides in-depth instruction on the characteristics and applications of linear integrated circuits. Topics include: operational amplifiers, timers, and three-terminal voltage regulators.

ELC 118 - DIGITAL ELECTRONICS I (4)

Prerequisites: ELC 114 or IFC 103
Introduces the basic building blocks of digital circuits. Topics include: binary arithmetic, logic gates and truth tables, Boolean algebra and minimization techniques, logic families, and digital test equipment.

ELC 119 - DIGITAL ELECTRONICS II (4)

Prerequisite/Corequisite: ELC 118
Uses the concepts developed in Digital Electronics I as a foundation for the study of more advanced devices and circuits. Topics include: flip-flops, counters, multiplexers and demultiplexers, encoding and decoding, display drivers, and analog to digital and digital to analog conversions.

ELC 120 - MICROPROCESSORS FUNDAMENTALS (4)

Prerequisite/Corequisite: ELC 119
This course is designed to provide the student with a basic understanding of microprocessor and microcontroller operation, programming, interfacing, interrupts, and troubleshooting. The choice of microprocessor and microcontroller used in the lab experiences and illustration of basic operation is not important. The main objective of the course is to give the student a basic understanding of microprocessor operation and applications.

ELC 123 – COMMUNICATIONS ELEC. SURVEY (7)

Prerequisite/Corequisite: ELC 115
Introduces the fundamental concepts and devices used in electronics communications. Topics include: transmission, modulation and detection, receivers, transmitters, propagation, antennas, and deterioration.

ELC 124 - INDUSTRIAL ELECTRONICS SURVEY (4)

Prerequisite/Corequisite: ELC 120
Introduces the fundamental concepts and technologies utilized in industrial electronics applications. Topics include: process controls, sensors, motor controls, programmed controls, mechanical devices, fluid power, and robotics.

ELC 140 - ELECTRONIC SYSTEMS TROUBLESHOOTING(6)

Prerequisite: ELC 117, ELC 156
Introduces fundamental electronic systems troubleshooting techniques and procedures. Emphasis is placed on developing a logical problem solving progression from the determination of the overall system operation, through the consideration of problem symptoms, to the use of various diagnostic procedures and equipment in completing the final repair. Topics include: safety for troubleshooting, identifying defective units, isolating the defective section, locating the defective stage, locating a defective component, replacing defective components, and final checks.

ELC 156 - DC CIRCUITS III TROUBLESHOOTING (4)

Prerequisite: ELC 108
Analyzes direct current circuits using troubleshooting techniques, DC fundamental concepts, and principles of electronics. Emphasis is placed on proper use of test equipment in fault isolation and testing of circuit components, and developing a logical analytical approach to solving the problem. Topics include: safety, identification of defect causes, and analysis of direct current circuits.

ELC 157 - AC III:TROUBLESHOOTING (4)

Prerequisite: ELC 110
Analyzes alternating current circuits using troubleshooting techniques, AC fundamental concepts, and principles of electronics. Emphasis is placed on proper use of test equipment in fault isolation and testing of circuit components, and developing a logical analytical approach to solving the problem. Topics include: safety, identification of defect causes, and analysis of alternating current circuits.

ELC 158 - DIGITAL ELECTRONICS III: TROUBLESHOOTING CONCEPTS (4)

Prerequisite: ELC 119
Analyzes digital circuits using troubleshooting and fault isolation techniques, digital circuit concepts, and the principles of electronics. Emphasis is placed on proper use of test equipment in fault isolation and testing of circuit components from the system level to gate level, and developing a logical analytical approach to solving the problem. Topics include: safety, identification of defect causes, and analysis of digital circuits.

ELC 162 - FUNDAMENTALS OF WIRELESS LANS (6)

Prerequisites: CIS 2321 and CIS 2322 with a minimum grade of "C" in each class; or Advisor Approval
This introductory course to Wireless LANs focuses on the design, planning, implementation, operation and troubleshooting of Wireless LANs. It covers a comprehensive overview of technologies, security, and design best practices with particular emphasis on hands on skills in the following areas: Wireless LAN setup and troubleshooting; 802.11a and 802.11b technologies, products and solutions; Site Surveys; Resilient WLAN design, installation and configuration; WLAN Security - 802.1x, EAP, LEAP, WEP, SSID; and Vendor interoperability strategies.

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ELECTRONICS COURSE DESCRIPTIONS

- ELC 211 – PROCESS CONTROL (6)**
Prerequisite/Corequisite: ELC 120
Introduces industrial process control applications with an emphasis on sensors and signal conditioning. Topics include: symbology and drawing standards, control techniques, sensors and signal conditioning, and ISA and other relevant standards.
- ELC 212 – MOTOR CONTROLS (6)**
Prerequisites/Corequisites: ELC 115
Introduces the application of motor controls in the industrial environment. Topics include: AC/DC motors, AC/DC drives, MCC and contactors, NEC and NEMA standards, ladder diagrams, and power sources.
- ELC 213 – PROGRAMMABLE CONTROLLERS (5)**
Prerequisite/Corequisite: ELC 120
Provides the basic skills and techniques used in industrial application of programmable controls. Topics include: controller hardware, programming, PC applications, and troubleshooting.
- ELC 214 – MECHANICAL DEVICES (3)**
Prerequisite/Corequisite: MAT 104 (diploma); MAT 194 (degree)
Develops knowledge and skills necessary to transmit mechanical power using common industrial linkage types. Emphasis is placed on use of mechanical devices in combination with electronic controls. Topics include: linkages, motion analysis, gear drives, and preventative maintenance.
- ELC 215 – FLUID POWER (3)**
Prerequisite/Corequisite: MAT 104 (diploma); MAT 194 (degree)
Provides an overview of fluid power operation as applied to industrial electronics. Emphasis is placed on the interfacing of electronic and fluid systems. Topics include: safety, fluid dynamics, hydraulics, pneumatics, air logic, and electrical interfacing.
- ELC 216 – ROBOTICS (2)**
Prerequisites/Corequisites: ELC 213, ELC 214, ELC 215
Explores robotic concepts, terminology, and basic applications. Emphasis is placed on programming in robotic languages and robot/human interfacing safety practices. Topics include: safety, terminology, languages, and programming.
- ELC 217 – COMPUTER HARDWARE (7)**
Prerequisite: ELC 120
Provides an introduction to the fundamentals of installing, configuring, upgrading, troubleshooting, and repairing microcomputer systems. Topics include installation, configuration, upgrading, diagnosing, troubleshooting, preventive maintenance, basic hardware, printers, and basic networking.
- ELC 218 – OPERATING SYSTEMS TECHNOLOGIES (7)**
Prerequisite: ELC 217
Provides an introduction to the fundamentals of Command Line Prompt, Windows 9x, Windows 2000, and future operating systems. Topics include Operating system fundamentals; installing, configuration, and upgrading; diagnosing and troubleshooting; and networks.
- ELC 219 – NETWORKING I (4)**
Prerequisite: ELC 120
Provides an introduction to networking technologies. Cover a wide range of material about networking, from careers in networking to local area networks, wide area networks, protocols, topologies, transmission media, and security. Focuses on operating network management systems and implementing the installation of networks. The course reviews cabling, connection schemes, the fundamentals of LAN and Wan technologies, TCP/IP configuration and troubleshooting, remote connectivity, and network maintenance and troubleshooting. Topics include: media and topologies, protocols and standards, network implementation, and network support.
- ELC 220 - AM AND SSB CIRCUIT ANALYSIS (4)**
Prerequisite/Corequisite: ELC 119
Reviews communication system concepts, emphasizes an in-depth analysis of amplitude modulation and detection methods. Topics include: a study of communication concepts, AM / SSB modulation, AM / SSB detection, AM/SSB transmitters, AM / SSB receivers, noise / bandwidth considerations, and multiplexing / demultiplexing.
- ELC 221 - FM CIRCUIT ANALYSIS (4)**
Prerequisite: ELC 220
Provides in-depth analysis of frequency modulation and detection methods. Topics include: frequency modulation, frequency detection, FM transmitters, FM receivers, basic telemetry concepts, and FM multiplexing / demultiplexing.
- ELC 222 – ADV. MODULATION TECHNIQUES (4)**
Prerequisites: ELC 220, ELC 221
Continues the study of modulation and detection techniques. Topics include: digital modulation techniques, pulse modulation techniques, and sampling techniques.
- ELC 223 – ANTENNAS/TRANSMISSION LINES (4)**
Prerequisite/Corequisite: ELC 220
Provides an understanding of antennas and transmission lines used in communications. Topics include: transmission lines, wave guides, antenna types, antenna applications, and telephone transmission lines.
- ELC 224 - MICROWAVE COMMUNICATIONS AND RADAR (5)**
Prerequisite/Corequisite: ELC 220
Provides the student with a basic understanding of microwave communications and radar. Topics include: microwave and radar fundamentals, microwave devices, wave guides, specialized antennas, radar systems, and communications systems.
- ELC 225 - OPTICAL COMMUNICATIONS TECHNIQUES (4)**
Prerequisite/Corequisite: ELC 220
Surveys the major optical devices used for communications. Topics include: light sources, fiber optic cable, coupling and fusing, light modulation and detection techniques, and system application of light devices.

ELECTRONICS COURSE DESCRIPTIONS

ELC 229 -- SECURITY SYSTEMS (4)

Prerequisite: ELC 260 or Advisor Approval

Provides an in-depth study of electronic devices designed to detect environmental changes that indicate a threat to property security. Topics include: sensor theory, low-voltage license regulations, system components, and system installation and service.

ELC 256 - CERTIFIED ELECTRONIC TECHNICIAN (CET) LICENSE PREPARATION (5)

Prerequisites: ELC 117, ELC 120, ELC 123

This course prepares the student for taking a certifying examination developed by Iowa State University and administered by the Electronic Technician's Association. Topics include: mathematics; electrical properties; series and parallel circuits; oscillators, detectors, comparators, and demodulators; test equipment and measurement; electronic components and nomenclature; semiconductors; digital concepts; computer basics; communications electronics; safety precautions and checks; television and video; antennas and signal distribution; consumer electronics; and block diagrams and troubleshooting.

ELC 259 – FIBER OPTIC SYSTEMS (4)

Prerequisite: ELC 119

Introduces the fundamentals of fiber optics and explores the applications of fiber optic transmission systems. Laboratory exercises give students hands-on experience with fiber optic devices and test equipment. Topics include: fundamentals of fiber optics, types of optical fibers, fiber materials and manufacture, cabling, light sources/transmitters/receivers, connectors, splicing, test measurement, and fiber optic system design.

ELC 260 – TELECOMMUNICATIONS & DATA CABLING (4)

Prerequisite: ELC 119

Introduces the basic of cable installation from the initial site survey to splicing cable and making connections. Through laboratory activities, students perform the basic tasks of a cable installer. Topics include: basic standards and practices, cable rating and performance, cable installation and management, testing and troubleshooting, industry standards, pulling cable, and understanding blueprints.

ELC 261 – TELECOMMUNICATIONS SYSTEMS INSTALLATION & PROGRAMMING (3)

Prerequisite: ELC 260

Teaches the installation, programming, testing, and repair of simple and complex telephone systems. Laboratory activities give practical hands-on experience with various telephone systems. Topics include multi-line system installation, system programming, peripheral devices, and customer relations.

ELC 262 – TELECOMMUNICATIONS AND DATA TRANSMISSION CONCEPTS (3)

Prerequisite/Corequisite: ELC 261

Provides an introduction to basic concepts on telecommunication and data transmission. Topics include introduction to frequency and bandwidth, delineation of signal types and characteristics, methods of modulation and detection, transmission modes, characteristics of transmission media, measuring transmission signals, noise and distortion levels, multiplexing and emerging technologies.

ELC 265 -- HOME AUTOMATION SYSTEMS (7)

Prerequisite: ELC 261

Provides the student with a basic knowledge of all the major home automation technologies and develops the necessary skills to install and configure these technologies so that they function as a unified system.

ELC 270 -- HTI+ CERTIFICATION PREPARATION (5)

Prerequisite: ELC 265

Prepares the student for taking the CompTIA HTI+ examination by reviewing the Residential Systems and Systems Infrastructure and Integration Objectives. Topics include Residential Systems and Systems Infrastructure and Integration.

ELC 286 – COMP TIA A+ CERTIFICATION (5)

Prerequisite: ELC 217 and ELC 218 or CIS 122 and CIS 1140

Prepares the student for taking the CompTIA A+ examination by reviewing the A+ CORE and A+ Operating Systems Objectives. Topics include A+ Core Hardware and A+ Operating System Technologies.

IFC 100 - INDUSTRIAL SAFETY PROCEDURES (2)

Provides an in-depth study of the health and safety practices required for maintenance of industrial, commercial, and home electrically operated equipment. Topics include: introduction to OSHA regulations; safety tools, equipment, and procedures; and first aid and cardiopulmonary resuscitation.

IFC 101 - DIRECT CURRENT CIRCUITS I (4)

Prerequisites/Corequisites: Program admission level English, reading, and math scores, MAT 101 or MAT 103 or MAT 191

Introduces direct current (DC) concepts and applications. Topics include: electrical principles and laws; batteries; DC test equipment; series, parallel, and simple combination circuits; and laboratory procedures and safety practices.

IFC 102 - ALTERNATING CURRENT I (4)

Prerequisites/Corequisites: IFC 101, MAT 103 with minimum grade of "C", MAT 104, or MAT 193

Introduces the theory and application of varying sine wave voltages and current. Topics include: AC wave generation, oscilloscope operation, inductance, capacitance, and basic transformers.

IFC 103 - SOLID STATE DEVICES I (4)

Prerequisite/Corequisite: IFC 102

Introduces the physical characteristics and applications of solid state devices. Topics include: introduction to semiconductor fundamentals, diode applications, basic transistor fundamentals, basic amplifiers, and semiconductor switching devices.

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**ELECTRONICS TECHNOLOGY
DIPLOMA
ESTIMATED PROGRAM COSTS**

First Quarter

Tuition/Fees.....	\$544.00
Books.....	290.00
Supplies.....	50.00
Total	\$884.00

Second Quarter

Tuition/Fees.....	\$544.00
Books.....	215.00
Total	\$759.00

Third Quarter

Tuition/Fees.....	\$544.00
Books.....	220.00
Total	\$764.00

Fourth Quarter

Tuition/Fees.....	\$544.00
Books.....	180.00
Total	\$724.00

Students must select one of the following options:

**COMMUNICATIONS ELECTRONICS
TECHNOLOGY SPECIALIST**

Fifth Quarter

Tuition/Fees.....	\$544.00
Books.....	190.00
Total	\$734.00

Sixth Quarter

Tuition/Fees	\$544.00
Books.....	180.00
Total	\$724.00

Total Cost **\$4,589.00**

**TELECOMMUNICATIONS ELECTRONICS
TECHNOLOGY SPECIALIST**

Fifth Quarter

Tuition/Fees.....	\$544.00
Books.....	260.00
Total	\$804.00

Sixth Quarter

Tuition/Fees.....	\$544.00
Books.....	210.00
Total	\$754.00

Total Cost **\$4,689.00**

**GENERAL ELECTRONICS
TECHNOLOGY SPECIALIST**

Fifth Quarter

Tuition/Fees.....	\$544.00
Books.....	240.00
Total	\$709.00

Sixth Quarter

Tuition/Fees.....	\$544.00
Books.....	240.00
Supplies.....	40.00
Total	\$749.00

Total Cost **\$4,589.00**

Tuition/fees and cost of books/supplies are estimates only and are subject to change without notice. Tuition is based on Georgia residency.
10/07