Electrical Technology

Utility and Energy Systems Program

Electrical Technology
Associate in Applied Science Degree

Electrical Technology, Construction
Certificate of Achievement

Electrical Utility/Lineworker
Certificate of Completion

Electrical Tech. Control/Maintenance
Certificate of Achievement

Electrical Wiring
Certificate of Completion

Control Panel Wiring
Certificate of Achievement

Electrical Machine Control
Certificate of Completion

For Information:
Contact the Utility & Energy Systems Program located in West Campus Building, Room M127 or by phone at (517) 483-1570. The Electrical Technology Program Main Lab (West Campus, Room U206) can also be reached at 517-483-1360.

Degree descriptions and requirements can be found at www.lcc.edu/utility/electrical

Course Descriptions

ELTA 105 Elect. Industry Orientation 0.5
Prerequisite: Reading Level 3
An overview of laws and standards that apply to the electrical construction industry in the State of Michigan.

ELTA 106 Basic Electrical Calculations 2
Prerequisite: Reading Level 3 and Math Level 3
Reviews mathematical concepts required of the apprentice electrician in his/her study of electrical theory: fractions applied in use of ruler and laying out components on the job; ratio, proportion, power and roots as used in Ohm's and Watt's Laws. Use of scientific calculators will be demonstrated and required in class.

ELTA 120 AC Fundamentals - Electricians 2
Prerequisite: Minimum 2.0 in (ELTE 110 or ELTE 118) and (minimum 3.0 in ELTA 106 or Math Level 4)
A practical approach to calculations of alternating current circuit quantities that an electrician may be required to use in the electrical trade. Impedance and power relationships will be explored for both single and three-phase circuits. (F, Sp)

ELTA 155 Transformer Fundamentals 1
Prerequisite: Minimum 2.0 in (ELTE 121 or (ELTA 120 or concurrently))
This course covers alternating current transformers. Topics include operating principles, transformer calculations, single phase transformers, three phase transformers, autotransformers, and transformer connections. (F, Sp)

ELTA 160 PLC Overview for Electricians 1
Prerequisite: Minimum 2.0 in ELTE 131
This course provides a practical overview of programmable logic controllers with focus on operating principles and installation. Topics include the capabilities, installation, programming, (examine on/off, timers

and counters) and connecting of external devices.

ELTA 180 Introduction to Fire Alarms 1
Prerequisite: Minimum 3.0 in (ELTA 160 or ELTE 260)
This course provides an introduction to the installation and operation of fire alarm systems. Topics covered include: wiring methods, components, circuit types, system types and code rules.

ELTE 102 Industrial/Construction Safety 2
Prerequisites: Reading Level 3 and Writing Level 2
This course covers safety in the industrial workplace and on construction worksites. Included are local, state and federal safety regulations. The focus will be on the prevention of accidents but will teach the correct response if an accident should occur. First aid, CPR/AED certificates will be issued upon successful completion. (F, Sp, Su)

ELTE 108 Practical Electricity I 2
Prerequisite: Minimum 2.0 in (ELTE 102 or DCTM 102 or HVAC 102 or METS 102 or WELD 102 or concurrently) and Reading Level 3 and Writing Level 2 and Math Level 3
A foundational course in Direct Current electrical theory, ELTE 108 is intended for non-Electrical Technology majors in preparation for ELTE 121. Series, parallel and combination circuits are studied in class. Meters are used in lab to measure and confirm the relationships between voltage, current, resistance, and power in studied circuits. (F, Sp, Su)

ELTE 109 Practical Electricity II 2
Prerequisite: Minimum 2.0 in ((ELTE 102 or DCTM 102 or HVAC 102 or METS 102 or WELD 102 or concurrently) and (ELTE 108 or ELTE 118 or concurrently)) and Reading Level 3 and Writing Level 2 and Math Level 3
This course applies the concepts covered in ELTE 108 (formerly ELTE 118), to conductance in gases and liquids; batteries; magnetism and motor operation. Conductor sizing, basic household wiring, electrical service components and the State of Michigan licensing law are addressed. Combined with ELTE 108 or ELTE 118, curricular requirements for ELTE 110 are fulfilled. (F,Sp,Su)

ELTE 111 Introduction to Industrial Automation 4
Provides a hands-on introduction to computer-based manufacturing through experiments and demonstrations. Topics include computer architecture, operating systems, the Internet, text and spreadsheet processing, PLC's, machine vision, programming languages, discrete electronics, computer aided design and statistical process control. Emphasis placed on the integration of these systems and impact on human lifestyle. (F, Sp, Su)

ELTE 112 Basic Wiring Installation 2
Prerequisite: Minimum 2.0 in (ELTE 110 or HVAC 110)
This course covers installation of a variety of wiring systems in wood framed construction. Students will practice installing nonmetallic sheathed cable, electrical metallic tubing and residential services. (F, Sp)

ELTE 118 Electric Circuits Study 2
Prerequisite: Minimum 2.0 in (ELTE 100 or ELTE 102 or HVAC 102 or METS 102 or WELD 102 or concurrently) and Reading Level 3 and Writing Level 2 and Math Level 3
This course introduces the student to electricity on a practical level. The student will learn to use meters to measure electrical quantities, do basic circuit calculations. (F, Sp, Su)

ELTE 121 Electrical Mathematics 5

Prerequisite: Minimum 2.0 in ELTE100 and (ELTE110 or ELTE118) and (minimum 2.0 in MATH107 or MATH114 or Math Level 5) and Reading Level 5

This course utilizes concepts in algebra, vector algebra and trigonometry to solve DC and AC electric circuit problems. Topics will include units, Ohm's Law, network analysis, series parallel and combination DC and AC circuits, inductance, capacitance, AC power relationships and power factor correction. (F,Sp)

ELTE 122 Industrial Control Electronics 5

Prerequisite: Minimum 2.0 in (ELTE111 (previously ELTE105) and ELTE121)

This course introduces the student to solid-state circuitry used in industry. Students will study diodes, transistors, SCRs, triacs, optical isolators, transducers, power circuits, etc. Laboratory will include oscilloscope usage. The course also includes an introduction to Boolean algebra and digital circuits. (Sp)

ELTE 123 Motors and Transformers 5

Prerequisite: Minimum 2.0 in ELTE121

This course begins with three-phase circuits, including three-phase power measurement. Contains practical introduction to single- and three-phase transformers, motors and alternators. Brief coverage of DC machines. (F)

ELTE 131 Machine Controls I 4

Prerequisite: Minimum 2.0 in(ELTE110 or ELTE 118)

Covers relay logic and controls using industrial standards. Use of correct symbols and standard construction of wiring and ladder diagrams is emphasized. Laboratory exercises include wiring three-phase motor control circuits utilizing two- and three-wire control and machine control circuits utilizing limit and proximity switches, timers, relays, etc. (F,Sp)

ELTE 132 Control Panel Assembly 2

Prerequisite: Minimum 2.0 in (ELTE 131 or concurrently) and Reading Level 3 and Writing Level 2 and Math Level 3

This course provides practical experience in the construction of an industrial control panel. The student will layout, assemble, wire, connect, troubleshoot and operate an industrial control panel for an oscillating table drive. (F, Sp)

ELTE 141 National Electrical Code I 4

Prerequisite: Minimum 2.0 in (ELTE110 or HVAC110)

An introductory course designed for individuals with little or no knowledge of the Electrical Code. Students will study the structure and scope of the National Electrical Code, focusing on Chapters 1 through 4. These chapters constitute the general rules and most often used portion of the NEC. (F,Sp)

ELTE 142 National Electrical Code II 4

Prerequisite: Minimum 2.0 in ELTE141

This course builds on ELTE141 by applying the National Electrical Code to situations common to the practicing journey electrician. Extensive practice locating and interpreting sections of the NEC helps prepare students for the State Journey Examination. In addition to the NEC, State of Michigan electrical rules will be reviewed. (F,Sp)

ELTE 143 National Electrical Code III 4

Prerequisite: Minimum 2.0 in ELTE142

For individuals with National Electrical Code experience and practical electrical knowledge. Students will apply the National Electrical Code to problems, discuss interpretation of the NEC, study Michigan electrical and construction code rules and discuss topics appropriate to the Master's Exam and the Contractor's Exam. (F)

ELTE 145 Electrical Prints for Building 4
Prerequisite: Minimum 2.0 in ELTE141
Recommended: Minimum 2.0 in ELTE121 or equivalent
Covers construction prints emphasizing standard and nonstandard symbols and interpretation of prints. Use the National Electrical Code to calculate branch circuit, motor circuit, and feeder sizes. Other topics include industrial loads, uninterruptible power supplies, and signaling systems. (Sp)

ELTE 150 Electric Motor Maintenance 2
Prerequisite: Minimum 2.0 in (ELTE110 or HVAC110)
Students learn to diagnose and test electric motors. Students will learn to identify and repair common problems in motors using meters, test equipment and appropriate tools. An introduction to rewinding and metal working procedures is also included. (F,Sp)

ELTE 232 Machine Controls II 4
Prerequisite: Minimum 2.0 in ELTE131
This course is a continuation of ELTE131, covering more components and larger, more complex machine control diagrams; including automation interlocking and automatic continuous cycling of machinery. Students will be taught to design the control circuits for more complex machines and be introduced to the use of CAD for drawing electrical schematics. (F)

ELTE 240 Electrical Estimating 3
Prerequisite: Minimum 2.0 in (ELTE112 and ELTE145)
Basics of preparing accurate, competitive electrical estimates for the building trades. Topics include take-off procedure using electrical, mechanical and architectural prints; lighting design; labor and materials cost and evaluation techniques and specifications. (F)

ELTE 251 Energy Generation and Controls I 4
Prerequisite: Minimum 2.0 in (ELTE 121 and ELTE 131 and ELTE 150) and (ELTE 123 or concurrently) and Reading Level 5
Provides students with a foundational understanding of electrical power generated by steam turbines, gas turbines, and reciprocating SI and CI engines. Prime movers, generators, governors, regulators and fault protection equipment are covered. Addresses both theory and practice of maintenance, operation, repair and installation of electrical generating systems and related components. (F)

ELTE 252 Energy Generation and Controls II 4
Prerequisite: Minimum 2.0 in (ELTE 123 and ELTE 251) and Reading Level 5
Second in a two-course sequence addressing electrical power generation. Covers advanced concepts of the prime mover and the generator as well as associated governors, regulators and fault protection equipment. Students will learn both theory and practice of maintenance, operation, repair and installation of electrical generating systems and related components. (Sp)

ELTE 255 Power Instrumentation 4
Prerequisite: Minimum 2.0 in ELTE 123 and Reading Level 5
Recommended: ELTE 251 and ELTE 260
An introduction to the instrumentation and control of power generation and distribution. The application, calibration and use of smart meters, electronic power meters, potential and current transformers, switchboard instruments & controls, power equipment measurement/protection, temperature measurement, 4-20ma current loop systems and programmable energy meters are explored and applied. (Sp)

ELTE 260 Programmable Controllers I 4

Prerequisite: Minimum 2.0 in ELTE131

This course covers programmable logic controllers with focus on common operating principles. Topics include the capabilities, similarities and differences among controllers, programming (examine on/off, timers and counters) and connecting external devices to Allen-Bradley, Modicon and Omron. (F)

ELTE 261 Programmable Controllers II 6

Prerequisite: Minimum 2.0 in ELTE260

This course covers programming and connections for Allen-Bradley Control Logix controllers. Focus on math, subroutine, file, block transfer, sequencers, logic and bit manipulation instructions. Students will learn logic for machine control, programming and utilizing intelligent cards, analog input/output and system documentation. (Sp)

ELTE 270 Lineworker Orientation 1

Prerequisite: Department Approval

The purpose of this course is to give prospective lineman apprenticeship candidates a good demonstration of the work they will be required to do as an apprentice and journeyman lineworker. Students will be given an introduction to the physical aspects and mental discipline required to perform the duties of a lineworker with demonstrations and physical tests. (Su)

ELTE 272 Electric Basic Line Climbing 4

Prerequisite: Department Approval

This course is designed to provide students with the basic knowledge and pole climbing skills necessary to progress through the Electric Line Apprentice Program. (Su)

ELTE 274 Ground/Utility Worker 5

Prerequisite: Minimum 3.5 in ELTE 272

This course is designed to provide students with the basic Ground Worker/Utility Worker knowledge and skills necessary to progress through the Electric Line Apprentice Program. (Su)

ELTE 276 Energized Secondary Worker 5

Prerequisite: Minimum 3.5 in ELTE 274

This course addresses the knowledge and skills necessary to progress through the Electric Line Apprentice Program with a focus on the installation and maintenance of secondary lines of 120/240 Volts. Safe work practices on energized conductors and aerial lifts, digger derricks and associated equipment are developed and required. (Su)

ELTE 290 Electrical Internship 2-4

Prerequisite: Department Approval

This course provides Electrical Technology students with practical work experience in industry. Students work for an employer in a supervised environment which provides an opportunity to apply knowledge and skills learned in the classroom and lab to an actual job situation. (F, Sp, Su)