

# ELECTRO-MECHANICAL TECHNOLOGY (ELMEC)

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## ELMEC 1101

### ***Survey of Automation***

3 Credit Hours

Automation technology, including robotics, programmable controllers (PLC), process control instrumentation, industrial electricity, plastics, motion controls, vision systems, and automatic guided vehicles. (2 lecture hours, 2 lab hours)

**Course types:** Contemporary Life Skills (A.A., A.S., A.A.S., A.G.S.)

## ELMEC 1106

### ***Power Electricity and Rotating Machines***

4 Credit Hours

This course focuses on electric circuits encountered in industry, and covers the characteristics of the different electrical motors and transformers. (3 lecture hours, 3 lab hours)

## ELMEC 1110

### ***Motor & Generator Fundamentals***

3 Credit Hours

Basic principles for Alternating Current (AC) and Direct Current (DC) motors and generators. Motor and generator theory, operation, ratings, speeds, and enclosures. Analysis of efficiency, power service factors, and frame sizes. Motor control concepts, including ladder and wiring drawings. Control devices, including sensors, control transformers, and starters. (2 lecture hours, 2 lab hours)

## ELMEC 1120

### ***Residential Wiring***

3 Credit Hours

All facets of correct wiring methods and techniques, based on the National Electrical Code (NEC). Room by room, circuit by circuit, installation and inspection with an emphasis on symbols, branch circuits, service drops, ground-fault circuit-interrupters (GFCI), low voltage circuits, and security system circuitry. (2 lecture hours, 2 lab hours)

**Course types:** Contemporary Life Skills (A.A., A.S., A.A.S., A.G.S.)

## ELMEC 1130

### ***Industrial Electricity***

3 Credit Hours

Industrial electricity, circuits, devices, and power. The use of instruments on circuit analysis and test equipment. (2 lecture hour, 2 lab hours)

**Course types:** Contemporary Life Skills (A.A., A.S., A.A.S., A.G.S.)

## ELMEC 1140

### ***Commercial and Industrial Wiring***

3 Credit Hours

Designed to provide the electrician with tips and techniques for wiring in commercial buildings, offices, stores, manufacturing and other industrial environments. High voltage branch feeders, motors, appliance service, special systems and overcurrent protection are covered. Emphasis is on the National Electrical Code (NEC), minimum requirements pertaining to high and medium voltage motors, wiring, switchgear and power distribution. (2 lecture hours, 2 lab hours)

## ELMEC 1141

### ***Hydraulics and Pneumatics***

3 Credit Hours

Principles of fluids at rest and in motion. Hydraulic and pneumatic pumps, motors, cylinders, boosters, valves, regulators, and circuitry to transmit and control power. (2 lecture hours, 2 lab hours)

## ELMEC 1150

### ***National Electrical Code***

3 Credit Hours

An overview of the current national electrical code (NEC) with emphasis on reading, interpretation and revisions. Definitions and terminology are covered. (3 lecture hours)

## ELMEC 1171

### ***Introduction to Robotic Technology***

3 Credit Hours

Introduction to the basic theory and operation of robots in industrial automation. Basic robot and work-place design, safety procedures, and robotic applications are studied. (2 lecture hours, 2 lab hours)

## ELMEC 1190

### ***Intro to Programmable Logic Controllers***

3 Credit Hours

A survey of programmable logic controllers (PLC). Terminology, basic memory structure, I/O's (input/outputs), processors, and programming devices. Basics of programming and applications. (2 lecture hours, 2 lab hours)

## ELMEC 1400

### ***Maintenance Management Systems***

3 Credit Hours

Overview of various computerized maintenance management systems. Topics include storeroom inventory, preventive maintenance procedures and scheduling, predictive maintenance costs, records and tracking, International Standards Organization (ISO) certification; training and vendor records. (3 lecture hours)

## ELMEC 1410

### ***Preventive and Predictive Maintenance***

3 Credit Hours

Fundamentals of preventive and predictive maintenance using vibration analysis, equipment history, repair records and tracking systems. Procedures for identifying and implementing maintenance practices. Scheduled maintenance vs. predictive maintenance, charts and predictive maintenance, analysis of dimension signatures for bearings, motors and pumps, and development of anticipatory failure analysis. (2 lecture hours, 2 lab hours)

## ELMEC 1420

### ***Drive Components***

2 Credit Hours

A hands-on approach to gears and gearing systems, chains and sprockets, belts and sheaves, brakes and clutches, couplings and coupling alignment, bearings and lubrication. (1 lecture hour, 3 lab hours)

## ELMEC 1820

### ***Selected Topics I***

1-4 Credit Hours

Introductory exploration and analysis of selected topics with a specific theme indicated by course title listed in college class schedule. This course may be taken four times for credit as long as different topics are selected. May be taken 3 times for credit. (1 to 3 lecture hours, 2 to 4 lab hours)

**ELMEC 1840**

***Independent Study***

1-4 Credit Hours

Exploration and analysis of topics within the discipline to meet individual student-defined course description, goals, objectives, topical outline, and methods of evaluation in coordination with and approved by the instructor. This course may be taken four times for credit as long as different topics are selected. (8 lab hours)

**Prerequisite:** Consent of instructor is required.

**ELMEC 2410**

***Programmable Controller II (PLC II)***

3 Credit Hours

Data manipulation within programmable controllers (PLC) including data transfer, arithmetic functions, shift registers, and sequencers. Also, Industrial Networks. (2 lecture hours, 2 lab hours)

**Prerequisite:** ELMEC 1190 with a grade of C or better, or equivalent or consent of instructor.

**ELMEC 2420**

***Programmable Controller III***

3 Credit Hours

Advanced topics in programmable controllers (PLCs) such as data highways, programming modules, and on-line programming using manufacturer's advanced software, process conversions to programmable controls and critical areas of process controls. Simulated applications of real-time processes comprise the majority of the course work, such as injection molding machines, and transfer pad printing. (2 lecture hours, 2 lab hours)

**Prerequisite:** ELMEC 2410 with a grade of C or better or consent of instructor.

**ELMEC 2510**

***Process and Automation Controls***

3 Credit Hours

Introduction to process control language, symbols and principles of instrumentation with emphasis on temperature, pressure, level, weight, and flow measurement, including calibration of transmitters, process feedback, and feedforward loops. (2 lecture hours, 2 lab hours)

**Prerequisite:** ELECT 1100 or equivalent.

**ELMEC 2520**

***Industrial Control and Data Acquisition***

3 Credit Hours

An in-depth study of force, stress, strain, linear position, weight and mass measurement. Also included are analytical process measurements such as pH, conductivity, and resistivity. Major emphasis is given to control elements in process loops and electrical, pneumatic, and hydraulic actuators. Introduction to digital process controllers and in-depth study of piping and instrumentation drawings (P&ID). Additionally, a comprehensive study of intrinsic safety and instrument purging are included. (2 lecture hours, 2 lab hours)

**Prerequisite:** ELECT 1100 and ELMEC 2510 are recommended.

**ELMEC 2525**

***Industrial Communication Protocols***

3 Credit Hours

Introduction to the industrial communication protocols of industrial control systems (ICS). (2 lecture hours, 2 lab hours)

**ELMEC 2600**

***Motion Control: Motor Dr Application and Control***

3 Credit Hours

An introduction to motion control, including: servo motors, DC servo drivers with control circuits, alternating current (AC) motors, steppers, actuators, sensors, fundamentals of basic control principles, and industrial and engineering applications of motion control systems. (2 lecture hours, 2 lab hours)

**Prerequisite:** ELECT 1100 with a grade of C or better, or equivalent or concurrent enrollment in ELECT 1100, or consent of instructor.

**ELMEC 2620**

***Critical Thinking in Technical Applications***

2 Credit Hours

Manufacturing processes and parameters that contribute to the system troubleshooting procedures. Through case studies and practical application, a system of thinking is developed to determine fault isolation and failure. (1 lecture hour, 2 lab hours)

**ELMEC 2860**

***Internship (Career & Technical Ed)***

1-4 Credit Hours

Course requires participation in Career and Technical Education work experience with onsite supervision. Internship learning objectives are developed by student and faculty member, with approval of employer, to provide appropriate work-based learning experiences. Credit is earned by working a minimum of 75 clock hours per semester credit hour, up to a maximum of four credits. (5 to 20 lab hours)

**Prerequisite:** Consent of instructor and 2.0 cumulative grade point average; 12 semester credits earned in a related field of study; students work with Career Services staff to obtain approval of the internship by the Dean from the academic discipline where the student is planning to earn credit.

**Course types:** Contemporary Life Skills (A.A., A.S., A.A.S., A.G.S.)

**ELMEC 2863**

***Internship (Career & Technical Ed)***

3 Credit Hours

Course requires participation in Career and Technical Education work experience with onsite supervision. Internship learning objectives are developed by student and faculty member, with approval of employer, to provide appropriate work-based learning experiences. Credit is earned by working a minimum of 225 clock hours for three semester credit hours. (15 lab hours)

**Prerequisite:** Consent of instructor and 2.0 cumulative grade point average; 12 semester credits earned in a related field of study; students work with Career Services staff to obtain approval of the internship by the Dean from the academic discipline where the student is planning to earn credit.

**Course types:** Contemporary Life Skills (A.A., A.S., A.A.S., A.G.S.)

**ELMEC 2864*****Internship (Career & Technical Ed)***

4 Credit Hours

Course requires participation in Career and Technical Education work experience with onsite supervision. Internship learning objectives are developed by student and faculty member, with approval of employer, to provide appropriate work-based learning experiences. Credit is earned by working a minimum of 300 clock hours for four semester credit hours. (20 lab hours)

**Prerequisite:** Consent of instructor and 2.0 cumulative grade point average; 12 semester credits earned in a related field of study; students work with Career Services staff to obtain approval of the internship by the Dean from the academic discipline where the student is planning to earn credit.

**Course types:** Contemporary Life Skills (A.A., A.S., A.A.S., A.G.S.)

**ELMEC 2865*****Internship Advanced (Career & Tech Ed)***

1-4 Credit Hours

Continuation of Internship (Career and Technical Education). Course requires participation in Career & Technical Education work experience with onsite supervision. Internship learning objectives are developed by student and faculty member, with approval of employer, to provide appropriate work-based learning experiences. Credit is earned by working a minimum of 75 clock hours per semester credit hour, up to a maximum of four credits. (5 to 20 lab hours)

**Prerequisite:** Consent of instructor and 2.0 cumulative grade point average; 12 semester credits earned in a related field of study; students work with Career Services staff to obtain approval of the internship by the Dean from the academic discipline where the student is planning to earn credit.

**Course types:** Contemporary Life Skills (A.A., A.S., A.A.S., A.G.S.)