
Course Prefix/No.: EEM 145
Course Title: Control Circuits
Lecture Hours/Week: 2.0
Lab Hours/Week: 3.0
Credit Hours/Semester: 3.0

[Distance Learning Attendance/VA Statement](#)
[Textbook Information](#)

COURSE DESCRIPTION

This course covers the principles and applications of components, circuits, and methods of motor controls.

COURSE COMPETENCIES

Upon successful completion of this course, the student should be able to:

Module 1 – Input/Output Devices

- Define the following:
 - Pushbutton
 - N.C. and N.O. contacts
 - Rotary/Selector switch
 - Limit switch
 - Proximity switch
 - Photo-electric switch
 - Relay
 - Contactor
 - Motor starter
 - Annunciator/Pilot light

Module 2 – Electrical Symbols and Drawings

- Interpret electrical symbols as they appear in an electrical drawing or diagram.
- Discuss each of the four basic drawings that are used to convey electrical information.
 - Single-line drawing
 - Pictorial diagram
 - Schematic diagram
 - Ladder diagram
- Create a working ladder diagram when given a set of parameters.

Module 3 – Two-wire and Three-wire Controls

- Explain the difference between two-wire controls and three-wire controls.
- Draw a basic two-wire control diagram, and wire the circuit using the drawing.
- Draw a basic three-wire control diagram, and wire the circuit using the drawing.

- Draw a ladder diagram containing multiple start/stop stations, and wire the circuit using the diagram.
- Draw a ladder diagram containing forward and reversing motor starters, and wire the circuit using the diagram.

Module 4 – Jog Circuits and Hand-Off-Automatic (HOA) Controls

- Draw a ladder diagram containing a start/stop station and a jog pushbutton, and wire the circuit using the diagram.
- Draw a ladder diagram containing a start/stop station and a jog selector switch, and wire the circuit using the diagram.
- Draw a ladder diagram containing a start/stop station and a jog pushbutton with a run relay, and wire the circuit using the diagram.
- Draw a ladder diagram containing hand-off-automatic control, and wire the circuit using the diagram.

Module 5 – Timers

- Draw a ladder diagram containing an on-delay timer or multiple timers, and wire the circuit using the diagram.
- Draw a ladder diagram containing an off-delay timer or multiple timers, and wire the circuit using the diagram.
- Draw a ladder diagram containing a pulse timer or multiple timers, and wire the circuit using the diagram.

Module 6 – Sequential Controls

- Draw a ladder diagram containing sequential starting, and wire the circuit using the diagram.
 - Basic two motor sequence
 - Cascading three or more
 - Cascading three or more with timers
- Draw a ladder diagram containing sequential stopping, and wire the circuit using the diagram.
 - Basic two motor sequence
 - Cascading three or more
 - Cascading three or more with timers
- Draw a ladder diagram containing sequential starting and stopping, and wire the circuit using the diagram.
 - Basic two motor sequence
 - Cascading three or more
 - Cascading three or more with timers

Module 7 – Speed Controls

- Draw a ladder diagram containing slow-to-fast controls, and wire the circuit using the diagram.
- Draw and interpret a ladder diagram containing primary resistor starting.
- Draw a ladder diagram containing wye-delta starting, and wire the circuit using the diagram.
- Draw and interpret a ladder diagram containing auto-transformer starting.
- Draw and interpret a ladder diagram containing braking controls.

MINIMAL STANDARDS

Assignments and attendance must be completed as designated in “Evaluation Strategies/Grading.” Criteria for minimal acceptable performance will be provided by the instructor.

REQUIREMENTS

Attendance Policy

The college attendance policy, stated in the college handbook, will be honored. The instructor will provide specific requirements for the course.

Academic Honesty

Students are expected to adhere to the college policy regarding student conduct as stated in the college handbook.

Assignments

Students are expected to complete all assignments and any supplementary exercises designated by the instructor.

EVALUATION STRATEGIES/GRADING

Students must complete all modules, including assignments, projects, labs, and tests. Students must earn at least a “C” in order for the course to serve as a prerequisite and for the course to apply towards a certificate.

Grading Scale

A = 90.0 – 100
B = 80.0 – 89.9
C = 70.0 – 79.9
D = 60.0 – 69.9
F = 00.0 – 59.9

Evaluation Method

Tests/Projects (minimum of four total)	50% of each module
Lab Work	25% of each module
Work Attitude	25% of each module
Each module counts	14.29% of final grade

Work Attitude is defined as:

Participation	Responsibility
Cooperation	Professionalism
Appearance	Attendance
Effort	Self Motivation
Safety	Works independently

ENTRY LEVEL SKILLS

The student must be able to demonstrate a basic understanding of electricity.

PREREQUISITES: EEM 117

CO-REQUISITES: None

Disabilities Statement: Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Special Resources Offices (SR) at 803-327-8007 in the 300 area of Student Services. The SRO coordinates reasonable accommodations for students with documented disabilities.

Effective: 2007FA