

Minnesota State College Southeast

ELEC 2221: Programmable Controllers

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 2

Lab Hours/Week: 2

OJT Hours/Week: *.*

Prerequisites: None

Corequisites: None

MnTC Goals: None

This course covers the operation of programmable logic controllers. The hardware and software aspects of the controllers will be explored in the lab. The basic ladder diagram, timer, counter and sequencer instructions will be covered. Additionally, advanced operation and programming of programmable logic controllers, including greater depth of programming, HMI development, and I/O through laboratory instruction will also be covered. Communication between the PLC and Human Machine Interface will also be covered in depth. The master control, data manipulation and control instructions will also be explored. NOTE: This course is equivalent to the combined ELEC 2218 and ELEC 2219 course series.

(Prerequisites: ELEC1202, ELEC1204, and ELEC1212 or permission of instructor) (3 credits: 2 lecture/1 lab)

B. COURSE EFFECTIVE DATES: 01/24/2018 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Analyze ladder diagrams
2. Write programs
3. Edit programs
4. Program timer functions
5. Utilize advanced control and interface functions
6. Program word instructions

D. LEARNING OUTCOMES (General)

1. Describe programmable controller
2. Identify AC/DC input modules
3. Identify AC/DC output modules
4. Identify logic input/output modules
5. Identify analog input/output modules
6. Identify relay output modules
7. Describe wiring/shielding practices
8. Identify PLC memory structure
9. Define I/O devices
10. Apply addresses to I/O to external devices
11. Analyze ladder diagrams
12. Identify programming devices
13. Design PLC programs to meet a system specification, including: a) Comparison & Boolean ladder logic to optimize circuits, b) Timers, c) Counters
14. Edit PLC programs including: a) Program relay functions, b) Program latching relay functions, c) Program timer function, d) Program counter function, e) Program sequencer functions
15. Develop Human-Machine Interfaces (HMI) for PLC systems
16. Describe troubleshooting procedures
17. Identify various types PLC communication interfaces
18. Write programs
19. Identify master control relay function
20. Utilize Comparison and Flow control instructions
21. Utilize data handling instructions
22. Program shift register function
23. Interpret data manipulation functions
24. Utilize word instructions functions
25. Utilize troubleshooting procedures
26. Identify industry safety and wiring standards
27. HMI development and implementation
28. Exhibit safe work practices

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted