

I. COURSE DESCRIPTION:

The student will develop an understanding of the hardware and software associated with the Allen Bradley 5 family PLCs. PLC programming techniques using RS logic 5 software will be used to design, document and commission basic to intermediate PLC lab assignments.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Describe the function and basic operation of a PLC and understand the related terminology including numbering systems

Potential Elements of the Performance:

- Describe the function of a PLC and state its applications
- State the major advantages of a typical logic controller (PLC) over conventional hardware relay systems
- Identify the four major components of a typical PLC and describe the function of each
- Identify the two distinct types of memory
- Understand decimal, binary, octal, hexadecimal, binary coded decimal (BCD) numbering systems
- Perform conversions from one system to another

2. Understand the I/O addressing and hardwiring requirements.

Potential Elements of the Performance:

- Define the term discrete and the term analog
- Describe the I/O section of a PLC
- Define the term interposing relay
- Define the term optical isolation
- Relate I/O addressing to physical location
- Describe the proper wiring connections for input/output devices and their corresponding modules
- Describe how basic AC and DC input and output modules work and identify a hard-wiring diagram

3. Develop and demonstrate basic programming techniques for AB 5 PLCs using RS Logic software

Potential Elements of the Performance:

- Describe basic programming techniques
- Understand the Examine ON, OFF, timers, counters, move, limit test, sequencers and Internal Storage instructions
- Describe the Force On and Off features and hazards that could be associated with both
- Program basic PLC functions offline
- Program PLCs to control
- Hard-wire PLCs to field equipment and input/output cards
- Create documentation to add to a PLC program

4. Demonstrate the ability to write basic PLC programs to control various electrical equipment in the lab and run the programs on a PLC.

Potential Elements of the Performance

- Download a program to a PLC attached to a PC
- Download a program to a PLC from a remote PC over ethernet through a gateway server to Data Highway and then to a particular PLC in the Lab
- Edit online programs
- Upload a program to a PC from a PLC
- Program basic PLC functions online
- Program PLCs to control Motors, traffic lights
- Download a program to a local PLC and run a program
- Download a program to a remotely located PLC from room B1035 to room B 1050 over the Ethernet network to a gateway server to the AB data Highway to a particular PLC and run a program

5. Demonstrate the ability to connect PLCs to control various electrical equipment in the lab and run the programs in a PLC in the lab

Potential Elements of the Performance:

- Hard-wire PLCs to field equipment and I/O cards
- Hardwire PLCs to control motors and traffic lights
- Troubleshoot PLC control systems

III. TOPICS:

1. Overview of PLC terminology and principles
2. Overview of industrial controls and automation hardware/software.
3. Overview of RS Logic 5 software
4. Overview of PLC/PC networking.
5. Basic PLC programming and troubleshooting

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Instructor will indicate this in the first theory class

V. EVALUATION PROCESS/GRADING SYSTEM:

Test 1	15 marks	15% overall
Practical Test 1	15 marks	15% overall
Test 2	25 marks	25% overall
Practical Test 2	20 marks	20% overall
Lab demonstrations	5 marks	5% overall
Lab Write-ups and <u>Class Participation & Quizzes</u>	20 marks	20% overall
Total 100 marks		100 %

The following semester grades will be assigned to students in postsecondary courses:

Grade	<u>Definition</u>	<i>Grade Point Equivalent</i>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	

CR (Credit) Credit for diploma requirements has been awarded.

S Satisfactory achievement in field /clinical placement or non-graded subject area.

U Unsatisfactory achievement in field/clinical placement or non-graded subject area.

X A temporary grade limited to situations with extenuating circumstances giving a

	student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI. SPECIAL NOTES:

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1101 or call Extension 703 so that support services can be arranged for you.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:

Students should refer to the definition of "academic dishonesty" in *Student Code of Conduct*. Students who engage in academic dishonesty will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.