



MASTER COURSE OUTLINE

A. ARET 1190 Programmable Logic Controllers

B. COURSE DESCRIPTION:

This course will introduce the student to Programmable Logic Controllers (PLCs). This course will utilize software and introduce the student to logic and machine control common in Mechatronics Systems. Topics include hardware and software composition of control systems, input/output interfacing, basic logic commands and common programming instructions. Knowledge of relay logic, ladder programming and input/output devices is needed to understand and maintain all types of common packaging equipment. This course is aimed at entry level technicians who may be involved in the assembly, test, start-up, troubleshooting, maintenance, repair or upgrade of basic packaging machinery modules. **(3 Cr – 2 lect, 1 lab)**

C. *Core Theme: Critical Thinking

D. RIVERLAND INSTITUTIONAL LEARNING OUTCOMES:

This course addresses the following Riverland Institutional Learning Outcome(s):

- ILO 1: critical thinking (*Core Theme Goal 2*)
- ILO 2: awareness of the larger global community (*Core Theme Goal 7 or 8*)
- ILO 3: ethical, engaged citizenship (*Core Theme Goal 9 or Goal 10*)
- ILO 4: communication and collaboration (*Discipline Goal 1 and by any learning outcome(s) involving communication or collaboration*)

E. MAJOR CONTENT AREAS:

- Programmable logic controllers
- Communication drivers to controllers
- Examine If Open (XIO) and Examine If Closed (XIC)
- Timer instruction
- Counter instructions
- Event-driven sequencing
- PLC program design
- PLC system components
- PLC program execution
- Decimal, binary, hexadecimal numbering systems

F. GOAL TYPE, OBJECTIVES, AND OUTCOMES:

<u>GOAL TYPE</u>	<u>OBJECTIVES</u>	<u>OUTCOMES</u>
	Students will be able to	The student will successfully
<u>*Critical Thinking</u>	gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.	1. demonstrate an understanding of what a programmable logic controller (PLC) is, how it operates, along with the installation and applications of where they are used.
<u>CS</u>	understand the components and operation of a programmable logic controller.	1. demonstrate an understanding of PLC components. 2. execute a PLC program.
<u>CS</u>	understand ladder logic diagrams.	1. create and develop ladder logic programs.
<u>CS</u>	compare the operation of Examine If Open (XIO) and Examine If Closed (XIC) input instructions.	1. describe the operation of a timer instruction. 2. describe the functions of counter instructions.

G. SPECIAL INFORMATION:

This course may require use of the Internet, the submission of electronically prepared documents and the use of a course management software program. Students who have a disability and need accommodations should contact Accessibility Services at the beginning of the semester. This information will be made available in alternative format, such as Braille, large print, or current media, upon request.

H. COURSE CODING INFORMATION:

Course Code S/Class Maximum 24; Letter Grade

Revision date: 04/02/26

AASC Approval date: 02/15/22; 05/12/26

*These five MnTC Goals have been identified as Riverland Community College Core Themes. Every course in the Riverland Community College curriculum shall meet outcomes from one of these themes.

**These five MnTC Goals have been identified as Riverland Community College Disciplines. Riverland's MnTC courses also shall meet outcomes from a Discipline Area.

NOTE: The Minnesota Transfer Curriculum "10 Goal Areas of Emphasis" are reflected in the five required discipline areas and five core themes noted in the Riverland Community College program of study guide and/or college catalog.

*Riverland Community College Core Themes	MnTC Goal Number
Critical Thinking (CT)	2
Human Diversity (HD)	7A, 7B, 7A/B
Global Perspective (GP)	8
Ethical and Civic Responsibility (EC)	9
People and the Environment (PE)	10

**Riverland Community College Discipline Areas	MnTC Goal Number
Communication (CM)	1
Natural Sciences (NS)	3
Mathematics/Logical Reasoning (MA)	4
History and the Social & Behavioral Sciences (SS)	5
Humanities and Fine Arts (HU)	6

Riverland