



MASTER COURSE OUTLINE

A. ARET 2111 Advanced Programmable Logic Controllers

B. COURSE DESCRIPTION:

This course will focus on Allen-Bradley Programmable Logic Controllers (PLCs) and Human Machine Interfaces (HMIs). Problem solving and troubleshooting factory controls will be stressed throughout this course. This is accomplished using up-to-date Rockwell Software. Students will acquire an advanced knowledge of PLCs, HMIs, logic concepts, programmable controller program development, Input/output (I/O) configuration and translation from hardware to programmed logic. Students will develop, edit and troubleshoot programs employing a large array of instructions found in typical Mechatronic Systems as applied in Manufacturing Systems, including logic flow, timers, counters, sequencers, math, and specialty functions. Prerequisite: ARET 1190
(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:

- Apply memory organization and addressing
- Employ discrete input/output addressing
- Identify the function of a tag
- Create a PLC program utilizing tag-based addressing
- Create an HMI program
- Illustrate the function and use of monitoring devices
- Troubleshoot PLC based system
- Differentiate between program languages
- Create basic PLC machine applications

F. GOAL TYPE, OBJECTIVES, AND OUTCOMES:

<u>GOAL TYPE</u>	<u>OBJECTIVES</u> Students will be able to	<u>OUTCOMES</u> 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. differentiate between program language.
<u>CS</u>	understand memory organization and addressing.	1. employ discrete input/output addressing.
<u>CS</u>	identify the function of a tag.	1. create a PLC program utilizing tag-based addressing.
<u>CS</u>	understand HMI program.	1. create basic HMI machine applications.

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:

AASC Approval date: 02/15/22

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

*These five MnTC Goals have been identified as Riverland Community College Disciplines.

** These five MnTC Goals have been identified as Riverland Community College Core Themes.

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