



## MASTER COURSE OUTLINE

A. ARET 1155 Automation Controls

B. COURSE DESCRIPTION:

This course will expose the students in the field of Mechatronics to common motor control equipment utilized in industrial maintenance occupations. Students will construct and troubleshoot motor control circuits utilizing ladder logic. Students will utilize manual starters, 2-wire control circuits, and 3-wire control circuits. This basic knowledge of automation control equipment is expected of an entry-level technician working in facilities maintenance or assisting in the assembly, test, startup, troubleshooting, maintenance, repair or upgrade of basic manufacturing 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:

- Manual, 2 wire, and 3 wire motor controls
- Motor starters, fuses and overload
- Basic control systems
- Control functions
- Industrial electrical control components testing
- Troubleshooting systems of industrial automation components
- AC Frequency Drives
- Overcurrent protection and disconnect devices in 3-phase circuits
- Control relays
- Circuits based on symbology in ladder diagrams
- Testing and troubleshooting processes

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.	<ol style="list-style-type: none"> <li>critique troubleshooting systems of industrial automation components.</li> <li>explain the function of a control relay.</li> </ol>
<u>CS</u>	construct open and closed loop position controls.	<ol style="list-style-type: none"> <li>describe the structure and organization of a basic control system.</li> <li>apply inputs, outputs and logic to perform control functions.</li> </ol>
<u>CS</u>	recognize basic control systems.	<ol style="list-style-type: none"> <li>describe the structure and organization of a basic control system.</li> <li>compare the operation of manual, 2 wire, and 3 wire motor controls.</li> </ol>
<u>CS</u>	recognize methods of testing various industrial electrical control components.	<ol style="list-style-type: none"> <li>identify various testing methods and applications to electrical components.</li> <li>differentiate the protective functions of motor starters, fuses, and overloads.</li> </ol>

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: 02/03/26

AASC Approval date: 02/15/22; 03/17/26

\*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.

<b>*Riverland Community College Core Themes</b>	<b>MnTC Goal Number</b>
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

<b>**Riverland Community College Discipline Areas</b>	<b>MnTC Goal Number</b>
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