

MESABI RANGE COLLEGE

Course Outline

Course Title: Advanced Programmable Logic Controllers **Submitted By:** Robert Stevens
Semester Course Prefix and Number: ECM 2252 **Approval Date:**
Old Quarter Course Prefix and Number: **Revision Date:** 9/6/16

Number of Credits: 4 **Number of Lecture Credits:** 1
Semester(s) Offered: Fall **Number of Lab Credits:** 3 **Number of Lab Hours:** 6
Class Size: 24 **Number of Studio/Demonstration/Internship Credits:**
Negotiated by AASC on:
(date)

Course Purpose Code:

- 0 – Developmental Courses
- 1 – Non-transferable
- 2 – Technical course related to career programs
- 3 – College course which has the primary goal of applying certain concepts (e.g. vocal ensemble)
- 4 – Other college course not considered a part of MNTC (e.g. computer science, health, physical education)
- 5 – Course which is intended to fulfill the Minnesota Transfer Curriculum (MNTC) requirements or intended for transfer.
- 9 – Continuing Education/Customized Training specialized credit course (not occurring in 0-5)

Catalog Description:

The course is a "Hybrid" or "Blended" course with the majority of the learning environment traditional in-class lectures and hands-on lab work which also includes Web-based learning activities to complement face-to-face work. This course is an advanced PLC course designed for students who have previous PLC programming experience or have completed the ECM 1251 Programmable Logic Controls course. The course covers advanced programming instructions such as sequencers, analog I/O, and PID control. The course develops a student's understanding of the PLC's file structure and organization of user programs. In addition, the course introduces the student to programming languages, communication protocols, terminology, and standards set by the IEC (International Electrotechnical Commission) Standard IEC1131-3. Lab exercises provide hands-on activities demonstrating the practical application of plant wide control systems.

Prerequisites and/or recommended entry skills/knowledge:

Course Prerequisite(s): ECM 1253, ECM 1233, ECM 1243, ECM 1295, ECM 1244
Reading Prerequisite: None
Composition Prerequisite: None
Mathematics Prerequisite: None

Career Programs and Transfer Majors Accessing this Course:

Electrical Controls and Maintenance Diploma
Electrical Controls and Maintenance AAS

Minnesota Transfer Curriculum Goal(s) partially met by this course if applicable:

(Notes: No more than two goals may be met by any one course. AASC review and the Chief Academic Officer's approval are required.)

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| 0. <input checked="" type="checkbox"/> None | 6. <input type="checkbox"/> The Humanities and Fine Arts |
| 1. <input type="checkbox"/> Communications | 7. <input type="checkbox"/> Human Diversity |
| 2. <input type="checkbox"/> Critical Thinking | 8. <input type="checkbox"/> Global Perspectives |
| 3. <input type="checkbox"/> Natural Sciences | 9. <input type="checkbox"/> Ethical and Civic Responsibility |
| 4. <input type="checkbox"/> Mathematical/Logical Reasoning | 10. <input type="checkbox"/> People and the Environment |
| 5. <input type="checkbox"/> History and the Social and Behavioral Sciences | |

Learning Outcomes: (including any relevant competencies listed in the Minnesota Transfer Curriculum)

Upon completion of this course, the student will be able to:

1. Demonstrate a comprehensive knowledge International Standards that apply to the configuration and programming of PLCs
2. Apply proper safety rules when working PLCs and associated electrical equipment.
3. Resource technical data from manufacturers and control equipment associations (IEC, NEMA).
4. Interpret technical O/M manuals for the installation, configuration, operation, and maintenance of PLCs and associated equipment
5. Demonstrate professionalism and high standards of workmanship in the completion of the course objectives.

Student Assessment Methods:

Assessment made of lab assignments, worksheets, and papers using rubrics and check lists. Tests and quizzes of technical knowledge to be given at regular intervals during semester.

Use of Instructional Technology: (includes software, interactive video and other instructional technologies):

ECM Laptop Computer Lease with Industrial Software

Additional Special Information: (special fees, directives on hazardous materials, etc.)

Laptop Computer Lease and Required Tool List

Transfer Information: (Please list colleges/majors that accept this course in transfer.)

None

Affiliated Mesabi Range College Courses and Programs:

Approvals:

Body	Representative Signatures	Date
Faculty Association		
Academic Affairs Standards Committee		
Chief Academic Officer		

Distribution: Original – Instructional Services
Copies: Transfer Specialist, Originating Faculty Member, Records
Revised: December 2012