Bay College

Course Cover Sheet

M-CAM Training Area:

CNC/Machining Multi-Skilled/Mechatronics Production Operation Welding/Fabrications

Program(s): Mechatronics and Robotics Systems, AAS

Course: ELEC 290 Intro to Programmable Logic Controllers

Course Description: An introduction to industrial computer applications for hardware control of manufacturing equipment. Students will learn the concepts and principles of Programmable Logic Controllers, including timed events, counting control, sequencing control, and input/output control.

Date Modified: Dec 2014

Faculty Developer(s)/Instructional Designers(s): Mark Highum

Employer/Industry Partner: Engineered Machine Products (EMP), Stewart Manufacturing, Cal Grinding

College Contact: Mark Highum

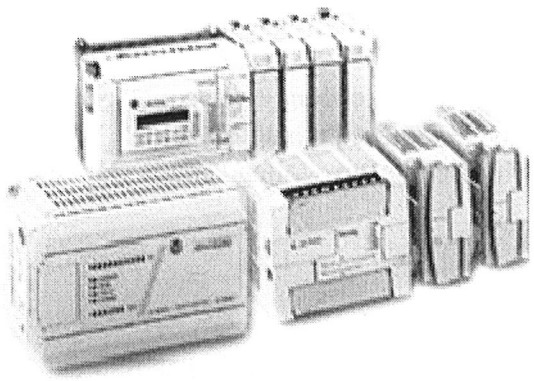
Phone: 906.217.4083

Email: highumm@baycollege.edu

Additional Information/Comments:

Textbook used: Programmable Logic Controllers by Frank Petruzella (4th Edition) ISBN 978-0073510880
Labs performed using LogixProPLC Simulator sold by thelearningpit.com

This workforce solution was funded by a grant awarded by the U.S. Department ofl.abor·s Employment and Training Administration. The solution was created by the grantee and docs not necessarily reflect the official position of the l' .S. Department or l.abor. The Department of Labor makes no guarantees. warrantecs. or assurances of any kind. express or implied. with respect to such information. including any information on linked sites and including. but not limited to. accuracy of the information or its completeness. timeliness. usefulness. adequacy. continued availability. or ownership.



COURSE SYLLABUS Winter 2016

ELEC 290 Introduction to Programmable Logic Controllers

Mechatronics
Bay College

LEAD INSTRUCTOR: MARK HIGHUM

I. COURSE INFORMATION:

Title:..... *Introduction to Programmable Logic Controllers*
Number:.....ELEC290 01 10
Credit/contact hours:.....4/4
Prerequisites:.....None
Classroom number:.....402E
Class Hours:.....T/R 9 – 10:50 AM

II. INSTRUCTOR INFORMATION:

Name:.....Mark Highum
Office location:.....RM 402D
Office Hours:..... Mon. & Wed –11AM - Noon
Tues & Thurs– 11AM-Noon, 2 - 3 PM
E-Mail:..... highumm@baycollege.edu
Office Phone:.....906-217-4083

III. COURSE MATERIALS:

Required Text:
Programmable Logic Controllers 4th Edition by Frank D. Petruzella
Lab Manual for Programmable Logic Controllers 4th Edition by Frank D. Petruzella

Additional Materials Required for the course:

A. Notebook
B. USB storage device (Optional)

IV. ONLINE COURSE COMPONENT

There is no required online component to this class. The instructor will make some course materials available through the MyBay portal. Additionally, the student may be required to submit some classwork and lab reports via the MyBay portal. The instructor will use the Bay College email system for any needed communication to students.

V. CATALOG DESCRIPTION:

An introduction to industrial computer applications for hardware control of manufacturing equipment. Students will learn the concepts and principles of Programmable Logic Controllers, including timed events, counting control, sequencing control, and input/output control.

VI. STUDENT ASSESSMENT:

All Bay College students will be expected to participate in assessment activities during their course of study at the college. These activities will include participating in assessment of General Education Outcomes, classroom assessment for specific course lessons, or assessment of skills needed for a specific program. These assessments will help instructors and the college make decisions to improve instruction and student learning.

VII. STUDENT LEARNING OUTCOMES:

Course Objectives	Course Outcomes	Assessment Method
Understand the concepts of a Programmable Logic Controller	State and define basic terms associated with Programmable Logic Controllers	**Homework, Lab, Exam**
Demonstrate the ability to write program code for a PLC	Design, Write and Execute programs for PLC control.	**Homework, Lab, Exam**
Demonstrate the ability to properly load programs to a PLC	Demonstrate the ability to upload programs from a PC to a PLC.	**Homework, Lab, Exam**
Demonstrate the proper usage of a PLC in a control system	Design an automated control system for a given situation.	**Homework, Lab, Exam**
Demonstrate the ability to configure an automated circuit.	Demonstrate the ability to connect a PLC to provide control of a simple automation control circuit.	**Homework, Lab, Exam**

VIII. STUDENT EVALUATION/GRADING: % of Grade

Unit Exams:	30%
Quizzes/Chapter Review Questions:	20%
Labs	30%
Final exam :	20%
Total:	**100%**

Grade Scale

≥90%	=	A
80-90%	=	B
70-80%	=	C
60-70%	=	D
<60%	=	F

IX. COLLEGE POLICIES

Academic Integrity
It shall be the policy of Bay de Noc Community College Board of Trustees that the college provides opportunities for students to gain the knowledge, skills, judgment and wisdom they need to function in society as responsible citizens. Plagiarism, falsifying data, and other forms of academic dishonesty are inconsistent with the college's goals and mission; Students are expected to pursue their education at Bay College with honor and integrity. In line with this college policy, any student found cheating, copying, or otherwise misrepresenting his/her performance, or any way gaining an unfair advantage over other students will be subject to disciplinary actions according to the Bay College Academic Integrity Procedures.

Student Academic Assistance

The **Student Success Office** assists students with a variety of services for classroom success and is located in room 819 of the LRC at the Escanaba Campus, (906) 217-4017. Services include peer tutoring, and assistance for students with a disability.

The **Math-Science Center** assists students enrolled in Math and Science courses and is located in room 123 at the Escanaba Campus, (906) 217-4111.

The **TRiO** Student Support Services program provides many services to students, including tutoring in math, writing, and reading comprehension.
The TRiO office is located in room 826 of the Learning Resources Center at the Escanaba Campus, (906) 217-4133.

Bay College ADA Statement

Disability-related accommodations and services are provided through the Student Success Office at the Escanaba campus, room LRC 819, (906) 217-4017, SSO@baycollege.edu, and through Academic Support Services at Bay College West, room 211, (906) 302-3004, academicsupportwest@baycollege.edu. If you are a student with a disability and think you may require disability-related accommodations or services, please contact the appropriate office. Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation in accordance with federal, state, and Bay de Noc Community College guidelines. Our online accessibility policy can be viewed at http://www.baycollege.edu/Academics/Online-Learning/Accessibility-Policy.aspx.

Technical Support for Online Learning
Students can receive live support for technical issues they encounter related to online learning.
Hours: 8:30 a.m. to 4:30 p.m. EST, Mon-Fri
Phone: 1.906.217.4276
Email: onlinehelp@baycollege.edu

Course Withdrawal
It is the student's responsibility to withdraw/drop from the class if he or she chooses to do so. You may drop this class within the first two weeks with reimbursement for the tuition. **(Jan 22)** You may withdraw within the third through tenth week **(Mar 25)** and receive a WP or WF, after the tenth week students are required to request an Administrative Appeal. All students who do not follow the drop/withdrawal procedure will receive an "F" for the class. Please refer to the college catalog for more specific details on this issue.

Class Cancellation/College Closing/Notification of Emergency Situations

Weather concerns: As stated in Bay College's Student Handbook, A reasonable effort to be present is expected. Therefore, students may exercise their own judgment as to whether or not travel to campus is warranted during adverse weather. If you decide not to travel to campus, or determine that you need to leave campus because of threatening weather, you will be expected to contact me via phone as soon as possible to let me know why you will be absent and to discuss options for completing the missed work. Students are reminded of the opportunity to receive weather related and other emergency messages from the College through a cell phone text messaging option, called e2campus. Enrollment into the emergency notification process can be completed by visiting Bay's website, navigating to the Campus Safety tab and following the instructions for emergency text messaging.

Should the instructor need to cancel a class session, every effort will be made to provide at least a one week notice of this cancellation. In the event of illness or other unforeseen conditions, the instructor will contact the students via the college email system as early as possible.

X. Guidelines for Success

Attendance: Students are expected to attend all class sessions. Should a student not be able to attend a class session, he/she is expected to talk to the instructor about material that was missed. Absences that are expected by the student should be discussed with the instructor prior to missing the class.

Missed Assignments: Assignments (and exams) are not normally accepted late. If the instructor allows a missed assignment (or exam) to be made up, it will be due within one week of the original due date. Any late assignment after one week will be counted as half credit.

Participation: Students are expected to participate in class discussions. Taking notes is not required, but is encouraged. Students are expected to read the assigned text prior to the class session. The instructor retains the right to use the book, handed out material and lecture notes for the exams.

Acceptable Use Policies: apply to all workstations and servers in CNSS classrooms and labs. Any student found to be violating acceptable use policies will be referred to the Dean of Business and Technology for discipline.

Incomplete: An incomplete grade is given only in extenuating circumstances, and only with prior arrangement with the instructor.

XI. **TENTATIVE COURSE SCHEDULE: (This schedule is provided as a guide and is not to be construed as a contract)(Assignment/grade section is for student record keeping)**

DAY	DATE	SUBJECT/TOPIC	Preparation
Tues	1/12/16	Class Introduction	
Thurs	1/14/16	PLC Overview	Read Ch 1
Tues	1/19/16	PLC Hardware Components	Read Ch 2
Thurs	1/21/16	Number Systems and Codes	Read Ch 3
Tues	1/26/16	Number Systems and Codes	Read Ch 3
Thurs	1/28/16	Fundamentals of Logic	Read Ch 4
Tues	2/02/16	Fundamentals of Logic	Read Ch 4
Thurs	2/04/16	**EXAM ONE**	
Tues	2/09/16	Basics of PLC Programming	Read Ch 5
Thurs	2/11/16	Basics of PLC Programming	Read Ch 5
Tues	2/16/16	Developing Diagrams and Programs	Read Ch 6
Thurs	2/18/16	Developing Diagrams and Programs	Read Ch 6
Tues	2/23/16	Developing Diagrams and Programs	Read Ch 6
Thurs	2/25/16	**EXAM TWO**	
Tues	3/01/16	Programming Timers	Read Ch 7
Thurs	3/03/16	Programming Timers	Read Ch 7
Tues	3/08/16	**Spring Break No Classes**	
Thurs	3/10/16	**Spring Break No Classes**	
Tues	3/15/16	Programming Counters	Read Ch 8
Thurs	3/17/16	Programming Counters	Read Ch 8
Tues	3/22/16	Program Control Instructions	Read Ch 9
Thurs	3/24/16	Program Control Instructions	Read Ch 9
Tues	3/29/16	Program Control Instructions	Read Ch 9
Thurs	3/31/16	Data Manipulation Instructions	Read Ch 10
Tues	4/05/16	Data Manipulation Instructions	Read Ch 10
Thurs	4/07/16	**EXAM THREE**	
Tues	4/12/16	Math Instructions	Read ch 11
Thurs	4/14/16	Math Instructions	Read Ch 11
Tues	4/19/16	Sequencer Instructions	Read Ch 12
Thurs	4/21/16	Sequencer Instructions	Read Ch 12
Tues	4/26/16	PLC Installation and Troubleshooting	Read Ch 13
Thurs	4/28/16	PLC Installation and Troubleshooting	Read Ch 1311975
	5/02/16	**Finals Week - Final Exam**	

Subject Matter Expert (SME) Course Review Summary
College: Bay College
M-CAM Training Area: ☐CNC/Machining **X Multi-Skilled/Mechatronics** ☐Production Operation ☐Welding/Fabrication
Degree Program Name: Mechatronics
Title of Course: ELEC290 Intro to Programmable Logic Controllers
Subject Matter Expert (SME) Reviewer Information **Name: Casey Calouette** **Title: Engineer** **Phone: 9062413582** **Email: ccalouette@calvalves.com** **Organization/Affiliation: Cal Grinding, Inc.**
Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content): **AAS : Electrical Engineering Technology – Bay College, 2003** **BS : Electrical Engineering Technology – Michigan Technological University, 2005** **Ross's Manufacturing – Design Engineer, Frozen Custard Machine Electrical&Controls Design 2006** **Cal Grinding, Inc. – Electrical & Manufacturing Engineer, Automation and Manufacturing Environment, 2006-Present**
Synopsis of Findings: Course covers the basics of PLC's from the foundations of data structures all the way up to mathematical operations. Of interest is to see a section on PLC installation and troubleshooting. This is a good opportunity to apply what has been learned in a novel way.

Reviewers Signature _____ Date: 3/28/17

Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review

1. Course Overview and Objectives	Exceptional	Satisfactory	Ineffective
The goals and purpose of the course is clearly stated.		X	
Prerequisites and/or any required competencies are clearly stated.		X	
Learning objectives are specific and well-defined.		X	
Learning objectives describe outcomes that are measurable.	X		
Outcomes align to occupational focus (industry skills and standards).	X		
Comments or recommendations			

2. Material and Resources	Exceptional	Satisfactory	Ineffective
The instructional materials contribute to the achievement of the course learning objectives.	x		
The materials and resources meet/reflect current industry practices and standards.	x		
The instructional materials provide options for a variety of learning styles.	x		
Resources and materials are cited appropriately. If applicable, license information is provided.		X	
Comments or recommendations:			

3. Learning Activities	Exceptional	Satisfactory	Ineffective
Provide opportunities for interaction and active learning.	x		
Help understand fundamental concepts, and build skills useful outside of the learning object.	X		
Activities are linked to current industry practices and standards.	X		
Comments or recommendations:			

Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review

4. Assessment Tools/Criteria for Evaluation	Exceptional	Satisfactory	Ineffective
The course evaluation criteria/course grading policy is stated clearly on syllabus.	**X**		
Measure stated learning objectives and link to industry standards.	X		
Align with course activities and resources.	X		
Include specific criteria for evaluation of student work and participation.		x	
Comments and recommendations:			

5. Equipment/Technology	Exceptional	Satisfactory	Ineffective
Meets industry standards and needs.	**x**		
Supports the course learning objectives.	X		
Provides students with easy access to the technologies required in the course/module.	x		
Comments and recommendations:			

This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warrantees, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.