

Grand Rapids Community College

Course Cover Sheet



M-CAM Training Area:

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

Program(s): Electrical Controls/Mechatronics Certificate

Course: EL 166

Course Description: Advanced PLC Systems | 2-credit, 3-contact hour course

Date Created: 2014

Faculty Developer(s)/Instructional Designers(s): Roger Kelley, Jonathan Larson

Employer/Industry Partner: The Right Place, Talent 2025, Kellogg's, Roscam, JR Automation, Kent ISD

College Contact: David Lovell

Phone: 616-234-3168

Email: davidlovell@grcc.edu

Additional Information/Comments:

The Mechatronics one-year certification was developed as a result of 1) The Right Place (GRCC's economic developer) who identified need for this training program to attract advanced Manufacturers to the West Michigan area, 2) Data from Talent 2025 identifying a growing need for Industrial Maintenance employees, and 3) a collaboration with Kent Intermediate School District who was also developing a Mechatronics program from local 11th and 12th graders and wanted to develop a transfer pathway. Employer involved with developing the program were members of the Mechatronics advisory board, including Kellogg's, Roscam Baking, and JR Automation.

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Course Codes and Descriptions

Catalogs (2011-2015)

General Education Courses

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Continuing Education / Workforce Training


Job Training

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2015-2016 Catalog Modifications

My Catalog

[ARCHIVED CATALOG] 



EL 166 - Advanced PLC Systems

Credits: 2

Contact Hours: 3

Prerequisites: EL 164

Corequisites: None

College Level Prerequisites: None

Description: A continuation of EL 164. Students learn advanced concepts of programmable logic controllers (PLCs). Memory organization, block moves, documentation, math instructions, analog I/O, program development, and communication. Hands-on PLC projects are emphasized. Completion of EL 164 is recommended before taking this course. Three hours lecture/lab combination.

Department Consent: No Consent

General Education Distribution Category Met: None





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143 Bostwick Avenue NE
Grand Rapids MI 49503-3265

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Advanced PLC Systems, EL166, Section 3289

Syllabus

General Information

Instructor Name

Jonathan Larson, Assistant Professor

Contact Information and Availability

Preferred method of contact: Email

Office Location: ATC 314

Office Hours: **(Tuesday, Thursday (1:00pm to 2:30pm) Monday (3:15pm to 5:15pm))**

Phone: 616-234-3722

GRCC E-mail Address jlarson@grcc.edu

Course Information

Course description:

This course is a continuation of EL 164. Students learn advanced concepts of programmable logic controllers (PLCs). Topics include, PLC troubleshooting, PLC wiring, HMI programming, Automatic and Manual operation, and Analog I/O. Hands-on PLC projects are emphasized.

Student Learning Outcomes:

1. Wire inputs and outputs to a PLC.
2. Demonstrate the ability to program an HMI.
3. Design a PLC program from scratch.
4. Analyze errors in PLC logic.
5. Determine the proper methods to debug a PLC program.
6. Complete work accurately, with attention to detail. (PR3)
7. Work well in teams and with others. (PR10)

Required Materials

Programmable Logic Controllers, 4th Edition, 2011, Russell Meade, (3rd or 5th edition is fine) Frank D. Petruzella, McGraw Hill. ISBN # 9780073510880

Course-Specific Requirements

Safety Glass: Are required in all Labs where voltage exceeds 50V

LogixPro® 500 PLC Simulator CD/Key Edition: available at

<http://thelearningpit.com/> (\$46)

Section Policies

Attendance Policy

Regular attendance and participation in class is essential. While I recognize that circumstances sometimes prevent students from attending, the college administration sees excessive absenteeism as a very serious matter. The College makes no distinction between "excused" and "unexcused" absences and neither do I. If students are not present in a class in which they are enrolled they are simply absent, regardless of the reason. A phone call, e-mail, office visit, access to Blackboard, assignment submission, or any other attempt to contact or communicate shall not be considered attendance. Students must sign-in for every class in the "Sign-In Sheet".

Grading Procedure

A	=	1000 - 930 points	100-93%
A-	=	929 - 900 points	92-90%
B+	=	899 - 880 points	89-88%
B	=	879 - 820 points	87-82%
B-	=	819 - 800 points	81-80%
C+	=	799 - 780 points	79-78%
C	=	779 - 720 points	77-72%
C-	=	719 - 700 points	71-70%
D+	=	699 - 680 points	69-68%
D	=	679 - 620 points	67-62%
D-	=	619 - 600 points	61-60%
E	=	599 - 000 points	59 -0%

Grading Policy

Lab Reports	500	50%	(10 Labs x 50pts)
Unit Tests	300	30%	(3 Unit Tests x 100pts)
Final Exam	100	10%	(1 Exam x 100pts)
Assignments	100	10%	(1 pt per question)

Total **1000 100%**

Assessments

Homework is required. It must be completed in blackboard according to the course schedule. All homework is due by 8:00pm the night before the last day of class.

Late Work: There will be no credit given for assignments or activities that are late.

Unit tests will cover any material in that unit including textbook, lecture, or Lab material. Tests not taken during the scheduled time will receive a 10% reduction in grade. Contact me to arrange a time and place. Students will only be able to make-up one test per semester. No credit will be given for subsequent late tests. No Unit test make-up will be given after one week. A five page essay may be used as a unit test make-up.

Lab Reports: During the Lab session you will need to complete the required work in the lab classroom. If you do not finish the lab you are required to complete the lab at home and turn in the lab for credit. PLC programs must be demonstrated before the end of the next lab session. Labs that are not fully working by the end of the next lab session will be considered late and receive a 10% deduction per week until the lab is fully functioning. All challenges are due by the 8:00PM the night before the last day of class.

College Policies

GRCC Email and Course Communications

You are responsible for all communications sent via Blackboard and to your GRCC email account. You are required to use your GRCC provided email account for all email communications at the College. You may access your GRCC student email account through Student Email (<http://email.grcc.edu>) and your Blackboard account through Blackboard (<http://bb.grcc.edu>).

Disability Support Services

If you need an accommodation for a disability, contact Disability Support Services (www.grcc.edu/dss) in Room 368 of the Student Center or at (616) 234-4140 to discuss disability documentation and how to register. You will be assigned a DSS counselor/advisor who will create an Accommodations Agreement that you will present to me and we will work together to provide you the appropriate accommodations. If you believe that you have a disability but do not have documentation, contact DSS to discuss options.

Student Code of Conduct

You are held accountable to the Student Code of Conduct (www.grcc.edu/studentconduct/studentcodeofconduct), which outlines expectations pertaining to academic honesty (including cheating and plagiarism), classroom conduct, and general conduct.

Title IX Reporting Policy

If you or another student are the victim of any form of sexual misconduct (including dating/domestic violence, stalking, sexual harassment), or any form of gender discrimination, GRCC can assist you. You can report a violation of our sexual misconduct policy (www.grcc.edu/sexualmisconduct) directly to our Title IX Coordinator at (616) 234-3169. You may also report the issue to a faculty member, who is required to notify the Coordinator, or you may make an appointment to speak confidentially to our Counseling and Career Center by calling (616) 234-3900.

Campus Police/Emergency Resources

You may review emergency services and resources at the GRCC Campus Police website (www.grcc.edu/campuspolice). Campus Police can be reached using the 'Code 2' button on any campus phone or by dialing x4911 on campus or (616) 234-4911 off campus. Dial 911 for off campus emergencies.

Changes to the Syllabus

I reserve the right to change the contents of this syllabus due to unforeseen circumstances. You will be given notice of relevant changes in class, through a Blackboard Announcement, or through GRCC e-mail.

EL 166 Planned Schedule (subject to change):

Sept 1 – Session 1

Lecture 1 – Review from EL164 and Intro to HMI's
Chapter 5 – Basics of PLC Programming
Chapter 7 – Programming Timers
Human Machine Interfaces (HMI's)
Lab 1 – Motor start/stop circuit with HMI

Sept 8 – Session 2

Lecture 2 – Counters and HMI programming
Chapter 8 – Programming Counters
Lab 2 – Programming a press lube system and interfacing to HMI

Sept 15 – Session 3

Lecture 3 – Review of program control, data manipulation and math instructions
Chapter 9 – Program Control Instructions
Chapter 10 – Data manipulation instructions
Chapter 11 – Math Instructions
Lab 3 – Garage door opener (LogixPro)

Sept 22 – Session 4

Unit 1 Test, Basic Programming
Lecture 4 – Introduction to the Auto cycle
Lab 4 – Auto sequencing garage door program

Sept 29 – Session 5

Lecture 5 – Designing a program to create a reliable repeating process
Lab 5 – Silo program

Oct 6 – Session 6

Lecture 6 – Review program and design from Lab 5, Introduce Lab 6
Lab 6 – Batch mixing program

Oct 13 – Session 7

Unit 2 Test, Debugging a PLC program with errors
Lab 7 – Traffic Light

Oct 20 – Session 8

Lecture 8 – Bit shift programming
Chapter 12 – Bit shifts only
Lab 8 – Bottle assembly programming

Oct 27 – Session 9

Lecture 9 – SCP and PLC troubleshooting
Lab 9 – Analog Inputs

Nov 3 – Session 10

Unit 3 Test
Lab 10 – Analog Outputs

Nov 10 – Session 11

All Homework, November 9th at 8:00PM
Final Exam



Subject Matter Expert (SME) Course Review Summary

College: Grand Rapids Community College

M-CAM Training Area: CNC/Machining Multi-Skilled/Mechatronics Production Operation Welding/Fabrication

Degree Program Name: Electrical Controls / Mechatronics Certificate

Title of Course: EL 166 Advanced PLC Systems

Subject Matter Expert (SME) Reviewer Information

Name: Ben Smith, Kate Puiis's

Title: Controls Tech manager; Talent Recruiter

Phone: 616-337-9797

Email: bsmith@jrauto.com; kpuis@s@jrauto.com

Organization/Affiliation: JR Automation

Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content):

Synopsis of Findings:

What kind of PLC's & HMI's are being used?

Reviewers Signature

Date: 3/13/17



**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: <i>Didn't see any pre-reqs.</i>			
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 - see below
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 - see below
Comments or recommendations: <i>Need to know what the HMI are being used</i>			
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: <i>Lab reports are the hands-on portion, I assume?</i>			

**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.			
Supports the course learning objectives.		X	X-see below
Provides students with easy access to the technologies required in the course/module.			
Comments and recommendations: <i>Course good, need to make sure that equipment (PLC + HMI) is up to date</i>			X-see below

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2nd

Kate Puisis

Talent Acquisition Recruiter at JR Automation

JR Automation • Grand Valley State University
Holland, Michigan • 500+ &

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I am an in-house Talent Acquisition Recruiter for JR Automation Technologies in Holland, MI, Stevensville, MI, and Pickens, SC. As JR continues to expand our automation expertise, multi-industry experience, and interna... See more

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Highlights



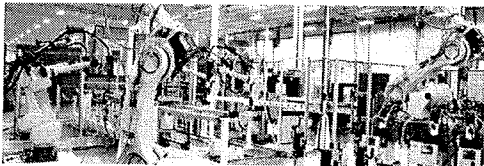
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Experience



Talent Acquisition Recruiter

JR Automation

Jan 2014 – Present • 3 yrs 3 mos • Holland, MI



Technical Talent Acquisition and Marketing Specialist

Epoch Robotics

Jan 2014 – Dec 2016 • 3 yrs



Technical Writer

JR Automation

Apr 2012 – Jan 2014 • 1 yr 10 mos



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Grand Valley State University

Bachelor of Arts (B.A.), Professional Writing & American Popular Culture
2009 – 2010

Michigan State University

Bachelor's Degree, Rhetoric and Composition/Writing Studies
2005 – 2008

Featured Skills & Endorsements

Technical Writing · 39

Endorsed by 16 of Kate's colleagues at JR Automation

Customer Service · 36

Endorsed by 13 of Kate's colleagues at JR Automation

Editing · 32

Endorsed by 13 of Kate's colleagues at JR Automation

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Accomplishments

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