

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 162

Course Description: Basic Control 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@gbcc.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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GRCC Campus Map

My Catalog

[ARCHIVED CATALOG] 



EL 162 - Control Systems

(2/3)

An introduction to industrial control systems, including principles of control, diagrams, input sensors, output devices, and programmable controller theory. Emphasis will be given to basic theory, programming skills, and application of programmable logic controllers.

Recommended Skills: EL 144 OR EL 106 AND EL 132 OR MA 107 AND MA 108 OR MA 110 OR TE 103 AND TE 104 Three hours lecture/ lab combination.





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Basic Control Systems, EL162, Section 1306

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 jl Larson@gccc.edu

Course Information

Course description:

This course is an introduction to industrial control systems, including principles of control, diagrams, input sensors, output devices, and programmable controller theory. Emphasis is placed on basic theory, programming skills, and the application of programmable logic controllers.

Student Learning Outcomes:

1. Identify various types of switches, relays and pilot devices.
2. Define open loop and closed loop control systems.
3. Identify the symbols and state the characteristics of the basic digital logic components.
4. Describe the basic principles of industrial control systems.
5. Diagnose problems in a programmable logic controller system.
6. Implement an application of a control system using a programmable logic controller.
7. Complete work accurately, with attention to detail. (PR3)
8. Work well in teams and with others. (PR10)

Required Materials

Industrial Automated Systems: Instrumentation and Control –
1st Edition by Terry Bartelt ISBN 978-1-4354-8888-5

Scientific (EE function), TI-30XA Recommended

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

Course-Specific Requirements

None

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". Any dishonesty associated with the sign-in sheet will be subject the student or students for disciplinary action.

Grading Procedure

Assessment breakdown, including Assignments, Point Values, Percentage of Total Grade

Example: 25% Quizzes, 75% Papers

Grading Policy

Lab Reports	200	20%	(10 Labs x 20pts)
Lab Quizzes	90	9%	(9 Lab Quizzes x 10pts)
Unit Tests	300	30%	(3 Unit Tests x 100pts)
Final Exam	220	22%	(1 Exam x 250pts)
Assignments	190	19%	(1 pt per question)

Total **1000 100%**

Grading Scale

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%

Homework and Late Work

Homework is required. It must be completed in blackboard according to the course schedule. Homework is due by 8:00pm on the due date.

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.

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 162 Planned Schedule (subject to change):

Class Session	Class Date	Agenda	Homework
1	1/9	<p><u>In Class</u> A. Introductions B. Lecture 1: Mechatronics Systems C. Lab 1: Basic 3 Lab</p> <p><u>Out of Class</u> A. Read Chapter 1.1-1.4</p>	
2	1/16	<p><u>In Class</u> A. Lecture 2: Controllers Overview and Input Devices B. Lab 2: Controllers and Input Devices for Mechatronics</p> <p><u>Out of Class</u> A. Read Chapter 2.4, 2.5, 2.6,</p>	Unit 1-1 Homework
3	1/23	<p><u>In Class</u> A. Lecture 3: Analog and Digital B. Lab 3: D/A and A/D Converters, Discrete Inputs.</p> <p><u>Out of Class</u> C. Read Chapter 19.1-19.7, 19.12</p>	Unit 1-2 Homework
4	1/30	<p><u>In Class</u> A. Unit 1 Test B. Lecture 4: Relays, Switches and Power Semiconductors C. Lab 4: Introduction to Relays</p> <p><u>Out of Class</u> No Reading</p>	Unit 1 Homework Due 1/29 @ 8:00PM Unit 2-1 Homework
5	2/6	<p><u>In Class</u> A. Lecture 5: Motor and Motor Starters B. Lab 5: Motor Starters Lab</p> <p><u>Out of Class</u> No Reading</p>	Unit 2-2 Homework

6	2/13	<u>In Class</u> A. Unit 2 Test B. Lecture 6: PLC Basics C. Lab 6: PLC Basics <u>Out of Class</u> D. Read Chapter 21	Unit 2 Homework Due 2/12 @ 8:00PM Unit 3-1 Homework
7	2/20	<u>In Class</u> A. Lecture 7: PLC Programming and Interfacing B. Lab 7: PLC Programming and HMI <u>Out of Class</u> C. Read Chapter 22	Unit 3-2 Homework
8	2/27	<u>In Class</u> A. Unit 3 Test B. Lecture 8: Heating and Cooling Control C. Lab 8: Heating and Cooling Control <u>Out of Class</u> D. Read Chapter 11.1, 11.2, 11.3, 11.4, 11.5	Unit 3 Homework Due 2/26 @ 8:00PM Unit 4-1 Homework
	3/6	No Class Mid Semester Break	
9	3/13	<u>In Class</u> A. Lecture 9: Process Controllers B. Lab 9: Process Controllers 1 <u>Out of Class</u> C. Read Chapter 17.1-17.6	Unit 4-2 Homework
10	3/20	<u>In Class</u> A. Lecture 10: PID tuning B. Lab 10: Process Controllers 2 <u>Out of Class</u> No Reading	
11	3/20	<u>In Class</u> A. <u>Final Exam</u>	Unit 4 Homework Due 3/19 @ 8:00PM



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/Mechanics Certificate

Title of Course: EL 16A, Basic Control Systems

Subject Matter Expert (SME) Reviewer Information

Name: Ben Smith, Kate Puiasis

Title: Controls Tech manager & Talent Recruiter

Phone: 616 337 9747

Email: bsmith@jrauto.com, kpuisis@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:

PLC experience is critical, many university engineering programs are missing this core area. I would say that a detail portion of the grade should be based on project work w/in a team. Know what type of PLC is 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.			
Learning objectives are specific and well-defined.		Y	
Learning objectives describe outcomes that are measurable.		X	
Outcomes align to occupational focus (industry skills and standards).			
Comments or recommendations: <i>Assuming measurable are: does (X) work or not work?</i>	X		
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>Don't see details, but happy PLCs that will be used are latest & greatest. Controls techs/engines are expected to learn from hands-on work, happy instructional style mirrors that.</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>Industry practice & standards are heavy cross functional team-based.</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: <i>lab reports? Are those hands on projects?</i>			
5. Equipment/Technology	Exceptional	Satisfactory	Ineffective
Meets industry standards and needs.			X - see below
Supports the course learning objectives.			X - see below
Provides students with easy access to the technologies required in the course/module.			X - see below
Comments and recommendations: <i>would like to see an egyptian list...</i>			

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2nd

Kate Puisis

Talent Acquisition Recruiter at JR Automation

JR Automation • Grand Valley State University

Holland, Michigan • 500+ &

Send InMail

Connect

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](#)

Kate's Profile

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Highlights



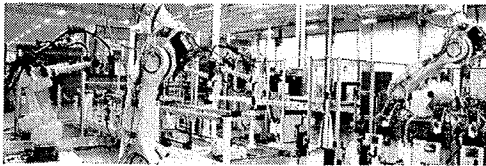
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You and Kate both know Cindy Clark, Daniel Mac Naughton, MISI, and 3 others

Kate's Articles & Activity

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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



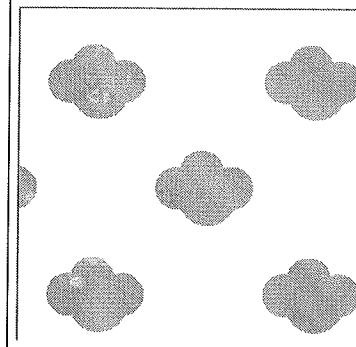
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Grand Valley State University

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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Recruiter

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