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 275

Course Description: Mechatronics Automated Systems | 4-credit, 6-contact hour course

Date Created: 2014

Faculty Developer(s)/Instructional Designers(s): Roger Kelley

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.

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.

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[ARCHIVED CATALOG]

EL 275 - Mechatronics-Automated Systems

Credits: 4

Contact Hours: 6

Prerequisites: EL 162 (D- or Higher) and EL 163 (D- or Higher) and EL 166 (D- or Higher) and EL 201 (D- or Higher)

Corequisites: None

College Level Prerequisites: None

Description: This course allows students to integrate their knowledge of the principles of controls, electrical and electronic technology, and electro-mechanical systems to design the controls for a machine. Students will apply operation, process, sequencing, and programming skills to individual automation production machines and to complete automation production systems.

Department Consent: No Consent

General Education Distribution Category Met: None

(616) 234-4722

143 Bostwick Avenue NE
Grand Rapids MI 49503-3295

EL 275 –Mechatronics
Course Syllabus
Winter 2017

12/28/2016

General Information

EL 275 Course Description:

This course allows students to integrate their knowledge of the principles of controls, electrical and electronic technology, and electro-mechanical systems to design the controls for a machine. Students apply operation, process, sequencing, and programming skills to individual automation production machines and to complete automation production systems.

This course is a four hour lecture/lab combination (8 hours per week) for eleven weeks. EL 275 is a capstone course for the Controls and Mechatronics degree. We are going to cover a lot of material, you will need to have a plan be able to study 8-10 hours every week outside the classroom and Lab.

Course #8211
Credits: 4
Contacts: 6
Number of Weeks: 11
Dates: 1/09/2017-3/27/2017
Times: Monday & Wednesday 6:00-10:00 PM
Location: ATC 3rd floor
Last Date to drop: 3/3/2017

Instructor Contact Information:

Mr. Roger Kelley – Assistant Professor
Applied Technology
Electrical/Electronics
rkelley@grcc.edu (Best way to communicate.)

Locations: Office Downtown GRCC ATC Building Room 314
Office at Holland MTEC Lab 201
Office Hours: Holland MTEC 5:00-6:00 PM Thursdays
ATC Downtown- 5:00-6:00 PM Monday & Wednesdays
4:30-5:30 PM & 9:30-10:30 Tuesdays
(Always best to make an appointment for office hours.)

Student Learning Outcomes:

- Evaluate information to identify limitations of electrical machines used in Mechatronics.
- Design an electrical control system for a specified production machine.
- Write the sequencing and PLC program for a specified production machine.
- Program a variable speed drive for an application.
- Complete work accurately, with attention to detail. (PR3)
- Develop specific goals and plans to prioritize, organize, and accomplish work. (PR4)

Materials Required:

- Calculator: Scientific
- Some materials will be needed to be printed from blackboard.
- Safety Glasses: Are required while working on "live" equipment over 50 volts
- **16 G min.** memory stick (thumb drive)
- Access to a Computer (outside of the 3rd floor of ATC)
  (Microsoft word and excel)
- Folder for Capstone Project

Materials Recommended not required:

- Programmable Logic Controllers, 5th Edition, 2016, Petruzella, Frank, D.
  McGraw Hill. ISBN # 9781259684739
  OR
  Programmable Logic Controllers, 4th Edition, 2011, Petruzella, Frank, D.
  McGraw Hill. ISBN # 9780073510880

Prerequisites:

Completion of (EL106 & EL107 or EL144) AND EL 162 (D- or Higher) AND EL 163 (D- or Higher) AND EL 166 (D- or Higher) AND EL 201 (D- or Higher)

Section policy

Attendance:

Regular attendance and participation in class is essential. While I recognize that circumstances sometimes prevent students from attending, the college administration sees 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. Points will be deducted for every lecture not attended. Coming late or leaving early will also result in points being deduced from your total. "Attend" means that you are present in the physical classroom or lab during the scheduled time. 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 (although communication with me is appreciated).

For every Class missed twenty points will be deducted from your total regardless of the reason. For arriving late, or leaving early there will be ten points deducted from your total. There will be no Lab/Skills, Homework, or Quiz make-ups.

Assessments: (Estimated)

*Labs/Skills	15 each	16	240	24%
Homework (10 or 20 points each)			200	20
Quizzes	15 each	13	195	19.5
*Capstone Project	150		150	15
*Final Test	120		120	12
Notebook Portfolio	50		50	5
Group Project	45		45	4.5
Attendance (subtracted from Total)			1000	100%

* A minimum of 70% in each category must be obtained to pass this course.

Extra Credit

You should plan on there being NO extra-credit during this course.

Grades:

All grades will be posted on blackboard and will be current within one week.
Grades will not be changed two weeks after they are posted.
Partial and selective grading will be used (not everything is worth the same points).

Blackboard:

This class will use Blackboard® (http://bb.grcc.edu) for grades and master copies of Course documents. See Blackboard for an orientation.

Grading Scale: NOTE: 70% is passing

A = 100-95%
A- = 94.9-93%
B+ = 92.9-91%
B = 90.9-87%
B- = 86.9-85%
C+ = 84.9-83%
C = 82.9-79%
C- = 78.9-77%
D+ = 76.9-75%
D = 74.9-72%
D- = 71.9-70%
E = 69.9 -0%

Expectations/Disabilities:

I have an expectation that you will work hard and engage in learning. If there is any reason you feel you cannot earn an "A" in this course, such as physical or learning disabilities, please email or see me in person during the first week of class.

Homework:

Homework is due by at the start of the next scheduled class or when announced.
No late Homework will be graded.

Final Tests:

Will be given on our last scheduled day March 27 (Monday) at 5:30 PM a maximum of 90 minutes will be given for this Final.

Course Outline:

I. Electrical Controls
II. Electrical Safety and Standards
III. Variable Speed Controls
IV. Sensors for Automation Equipment
V. Robot Controls and Interfacing
VI. Individual Automation Production Machines
VII. Automation Systems (Combination of Individual Machines)

Classroom:

Any storage devices including graphing calculators and cell phones will NOT be allowed for tests or quizzes. The use of cell phones, pagers, etc. continues to be a problem in the classroom. Their use in a classroom environment demonstrates a lack of respect for both the instructor and the rest of the class. In order not to disturb the classroom environment, please turn them off and put them away. If the occasion arises and you need to utilize such devices due to a personal situation, please leave the room. No audio or video electronic devices are to be used during class. Covered drinks will be allowed however no food in the Classroom. The classroom door will be closed during class. If you are late and need in please wait by the door until it is opened for you.

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.

Proposed EL 275 Schedule

1/6/2017

2017	Topics	LAB / LAP	Homework	Quiz	2017
1/9	***Mechatronic Introduction Inputs - sensors***	Sensors Lab	Read Sensor Handouts Running List of Definitions		1/9
1/11	***Sensors***	Sensors Lab	1 Complete Sensor Handouts		1/11
1/16	***VFD Drives (AB 525)***	AB 525 LAB	Review 525 drive Manual 2 Sensor Comparison sheet	Sensors	1/16
1/18	***VFD Drives AB 525***	AB 525 LAB With switches & sensors	3 525 drive questions		1/18
1/23	***RS 5000***	RS 5000 Trainers	Compact Logic Manual 4 Terms #1	Drives-525	1/23
1/25	***RS 5000***	RS 5000 trainers & drives	5 Compact Manual questions 6 500/5000 comparison		1/25
1/30	***Amatrol Lap 1*** Automation Operations	LAP 1 (group) Sensors/Drives/PLC	7 Read Lap 1	RS 5000	1/30
2/1	***Amatrol LAP 2*** Basic Component Adjustments	LAP 2 (group)	8 Read Lap 2	LAP 1	2/1
2/6	****Amatrol LAP 3*** Pick and Place	*3,4,5,6,(7),8.9 rotate	9 *Read Lap 3,4,5,6,7,8,9	LAP 2	2/6
2/8	****Amatrol LAP 4*** Gauging	*3,4,5,6,(7),8.9 rotate	10 *Read Lap 3,4,5,6,7,8,9	LAPs 3-9	2/8
2/13	****Amatrol LAP 5*** Indexing	*3,4,5,6,(7),8.9 rotate	11 *Read Lap 3,4,5,6,7,8,9	LAPs 3-9	2/13
2/15	****Amatrol LAP 6*** Sorting and Queuing	*3,4,5,6,(7),8.9 rotate	12 *Read Lap 3,4,5,6,7,8,9	LAPs 3-9	2/15
2/20	****Amatrol LAP 7*** ROBOT SERVO	*3,4,5,6,(7),8.9 rotate	13 *Read Lap 3,4,5,6,7,8,9	LAPs 3-9	2/20
2/22	****Amatrol LAP 8*** Torquing	*3,4,5,6,(7),8.9 rotate	14 *Read Lap 3,4,5,6,7,8,9	LAPs 3-9	2/22
2/27	****Amatrol LAP 9*** Parts Storage	*3,4,5,6,(7),8.9 rotate	15 *Read Lap 3,4,5,6,7,8,9	LAPs 3-9	2/27
3/1	***Start Individual project make up Laps 3-9***	LAP Make-up & Projects	16 *Read Lap 10 Project Sequence & I/O	LAPs 3-9	3/1
3/13	***Amatrol LAP 10*** Multiple Station Control **And Projects**	LAP 10 (group) & Projects	Project Specifications 17 Terms #2		3/13
3/15	Multiple Station Control ***Run Parts Full line***	Projects	Project Software	LAP 10	3/15
3/20	***Run Parts Full line*** Group Projects improvments	Group Projects	Project Write-up		3/20
3/22	Make up and Projects	Group Projects	Group Projects		3/22
3/27	**Projects and Final**				3/27

This schedule is subject to change as needed.

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 275 - Mechatronics Automated Systems

Subject Matter Expert (SME) Reviewer Information

Name: Ben Smith; Kate Puisis

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:

Good balance of PLC's with lecture

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: Outline looks solid, comprehensive.			

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: Interested to know why students ~~need~~ should get the 2016 + 2011 books - what changed? More curious, not that anything needs changing.			

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: Love that capstone is worth so much - that's the closest experience they have to real world. Is this a group project?			

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: see previous comment			

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: would be interested to know what students are using, which kinds of hard + soft ware			

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.

2nd

Kate Puisis

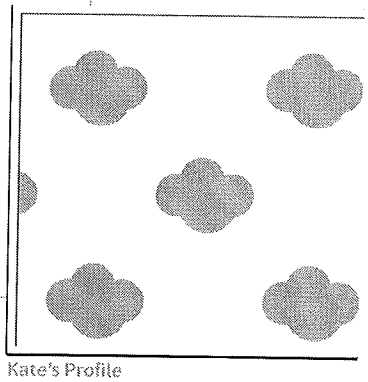
Talent Acquisition Recruiter at JR Automation

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

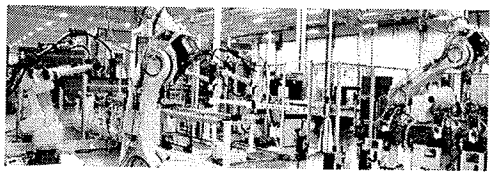
5 Mutual Connections

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

Kate's Articles & Activity

1,948 followers

+ Follow



Opportunities with a Growing Company!

Kate Puisis on LinkedIn

December 8, 2016

See 1 more article

Meijer Leapfrogs Midwest Rivals In Rolling Out Home Delivery

Kate liked

This is a great organization in West Michigan.

Kate liked

Switch opens 'most advanced data campus' in former Steelcase pyramid

Kate liked

See all activity

Experience

Talent Acquisition Recruiter

JR Automation

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

Technical Talent Acquisition and Marketing Specialist

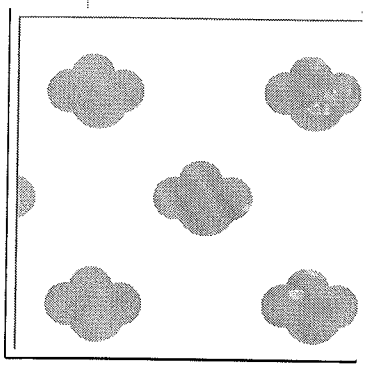
Epoch Robotics

Jan 2014 – Dec 2016 • 3 yrs

Technical Writer

JR Automation

Apr 2012 – Jan 2014 • 1 yr 10 mos



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

View 29 more

Accomplishments

4 **Certifications**
Recruiter

See more certifications

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