Washtenaw Community College Comprehensive Report

MEC 224 Mechatronics Capstone
Effective Term: Fall 2022

Course Cover

College: Advanced Technologies and Public Service Careers
Division: Advanced Technologies and Public Service Careers
Department: Advanced Manufacturing
Discipline: Mechatronics
Course Number: 224
Org Number: 14430
Full Course Title: Mechatronics Capstone
Transcript Title: Mechatronics Capstone
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Three Year Review / Assessment Report
Change Information:
    Consultation with all departments affected by this course is required.
    Course title
    Course description
    Pre-requisite, co-requisite, or enrollment restrictions
    Outcomes/Assessment
    Objectives/Evaluation
Rationale: We are updating the master syllabus with newer content so that we can assess it.
Proposed Start Semester: Fall 2022
Course Description: In this course, students will demonstrate the knowledge accumulated from the entire Mechatronics program. Students will be working around industrial equipment safely and integrating automated systems. Students will integrate industrial automated systems as well as design and document a simple robotic workcell. The title of this course was previously Robotics IV.

Course Credit Hours

Variable hours: No
Credits: 4
Lecture Hours: Instructor: 30 **Student:** 30
Lab: Instructor: 60 **Student:** 60
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 90 **Student:** 90
Repeatable for Credit: NO
Grading Methods: Letter Grades
Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

Requisites

Prerequisite
ELE 224 minimum grade "C"
and
Prerequisite
NCT 120 minimum grade "C"
and
Prerequisite
ROB 221 minimum grade "C"

General Education

Request Course Transfer
Proposed For:

Student Learning Outcomes

1. Work with a robotic workcell in accordance with industry safety standards
   Assessment 1
   Assessment Tool: Outcome-related practical lab
   Assessment Date: Fall 2023
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Departmentally-developed check sheet with rubric
   Standard of success to be used for this assessment: 75% of students will score 75% or higher.
   Who will score and analyze the data: Departmental faculty
   Assessment 2
   Assessment Tool: Outcome-related questions on the final exam
   Assessment Date: Fall 2023
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Answer key
   Standard of success to be used for this assessment: 75% of students will score 75% or higher.
   Who will score and analyze the data: Departmental faculty

2. Document a robotic workcell.
   Assessment 1
   Assessment Tool: Outcome-related questions on the final exam
   Assessment Date: Fall 2023
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Answer key
   Standard of success to be used for this assessment: 75% of students will score 75% or higher.
   Who will score and analyze the data: Departmental faculty
   Assessment 2
   Assessment Tool: Outcome-related practical lab
   Assessment Date: Fall 2023
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Departmentally-developed check sheet with rubric
   Standard of success to be used for this assessment: 75% of students will score 75% or higher.

Who will score and analyze the data: Departmental faculty

3. Integrate an industrial robot with other automated systems.
   Assessment 1
   Assessment Tool: Outcome-related questions on the final exam
   Assessment Date: Fall 2023
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Answer key
   Standard of success to be used for this assessment: 75% of students will score 75% or higher.
   Who will score and analyze the data: Departmental faculty
   Assessment 2
   Assessment Tool: Outcome-related practical lab
   Assessment Date: Fall 2023
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Departmentally-developed check sheet with rubric
   Standard of success to be used for this assessment: 75% of students will score 75% or higher.
   Who will score and analyze the data: Departmental faculty

Course Objectives
1. Safely and correctly perform electrical wiring.
2. Safely and correctly work around an industrial robot.
3. Safely and correctly work around other automated systems.
4. Read and create flowcharts.
5. Read and create electrical diagrams.
6. Comment and document robot and programmable logic controller (PLC) programs.
7. Integrate an industrial robot with a PLC.
8. Interface an industrial robot with surrounding equipment.
9. Interface a PLC with surrounding equipment.

New Resources for Course

Course Textbooks/Resources
Textbooks
Manuals
Periodicals
Software

Equipment/Facilities

Reviewer	Action	Date
Faculty Preparer:		
Sean Martin	Faculty Preparer	Feb 08, 2022
Department Chair/Area Director:		
Allan Coleman	Recommend Approval	Feb 08, 2022
Dean:		
Jimmie Baber	Recommend Approval	Feb 09, 2022
Curriculum Committee Chair:		
Randy Van Wagnen	Recommend Approval	Mar 01, 2022

Assessment Committee Chair:

Shawn Deron   *Recommend Approval*   *Mar 03, 2022*

Vice President for Instruction:

Kimberly Hurns   *Approve*   *Mar 04, 2022*

Washtenaw Community College Comprehensive Report

MEC 224 Robotics IV
Effective Term: Fall 2014

Course Cover
Division: Advanced Technologies and Public Service Careers
Department: Industrial Technology
Discipline: Mechatronics
Course Number: 224
Org Number: 14430
Full Course Title: Robotics IV
Transcript Title: Robotics IV
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: New Course
Change Information:
    Consultation with all departments affected by this course is required.
    Course discipline code & number
    Outcomes/Assessment
Rationale: Conditionally-approved course seeking full approval.
Proposed Start Semester: Fall 2014
Course Description: In this course, students will learn about advanced programming of robots and programmable controllers in an integrated work cell. Problems related to maintenance and trouble-shooting constitute a major segment of the course. A group project involving the design and construction of a work cell that simulates some industrial process is an enjoyable conclusion to this course. This course contains materials previously taught in ROB 224.

Course Credit Hours
Variable hours: No
Credits: 4
Lecture Hours: Instructor: 30 **Student:** 30
Lab: Instructor: 60 **Student:** 60
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 90 **Student:** 90
Repeatable for Credit: NO
Grading Methods: Letter Grades
Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing
College-level Reading & Writing

College-Level Math
Requisites
Prerequisite
ROB 223 minimum grade "C"

General Education
Request Course Transfer

Proposed For:

Student Learning Outcomes

1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
   Assessment 1
   Assessment Tool: Capstone project
   Assessment Date: Winter 2015
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: Departmentally-developed rubric
   Standard of success to be used for this assessment: 75% of the students will score 75% or higher.
   Who will score and analyze the data: Departmental faculty

Course Objectives

1. Correctly use at least one industrial robot.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
2. Perform effective and efficient robot programming.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
3. Document robot programming.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
4. Safely and correctly perform electrical wiring.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
5. Document electrical wiring.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
6. Perform effective and efficient PLC programming.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
7. Document PLC programming.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
8. Interface robot with surrounding equipment.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
9. Demonstrate effective use of teamwork.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
10. Demonstrate creativity in design.
    Matched Outcomes
       1. Design and construct a work cell (robotic device and process) in accordance with

industry and safety standards.
11. Demonstrate effective troubleshooting.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.
12. Recognize and apply safety standards.
   Matched Outcomes
      1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.

New Resources for Course
Course Textbooks/Resources
   Textbooks
   Manuals
   Periodicals
   Software
   ## Equipment/Facilities

Reviewer	Action	Date
Faculty Preparer:		
Thomas Penird	*Faculty Preparer*	*Mar 21, 2014*
Department Chair/Area Director:		
Thomas Penird	*Recommend Approval*	*Mar 21, 2014*
Dean:		
Marilyn Donham	*Recommend Approval*	*Apr 03, 2014*
Vice President for Instruction:		
Bill Abernethy	*Approve*	*Apr 25, 2014*

MASTER SYLLABUS

Course Discipline Code & No: ROB 224   Title: Robotics IV   Effective Term Fall 2009

Division Code: HAT   Department Code: _____INDT_____   Org #: __14400__

Don't publish: ☐College Catalog   ☐Time Schedule   ☐Web Page

Reason for Submission. Check all that apply.
☐New course approval
☒Three-year syllabus review/Assessment report
☐Course change

☐Reactivation of inactive course
☐Inactivation (Submit this page only.)

Change information: Note all changes that are being made. Form applies only to changes noted.

☐Consultation with all departments affected by this course is required.
☐Course discipline code & number (was _____)*
   *Must submit inactivation form for previous course.
☐Course title (was _____)
☐Course description
☐Course objectives (minor changes)
☐Credit hours (credits were: ____)

☐Total Contact Hours (total contact hours were: _____)
☐Distribution of contact hours (contact hours were:
   lecture: ____ lab _____ clinical _____ other ____)
☒Pre-requisite, co-requisite, or enrollment restrictions
☐Change in Grading Method
☒Outcomes/Assessment
☒Objectives/Evaluation
☐Other _____

Rationale for course or course change. Attach course assessment report for existing courses that are being changed.

Approvals Department and divisional signatures indicate that all departments affected by the course have been consulted.

Department Review by Chairperson   ☐ New resources needed   ☐ All relevant departments consulted

Print: ___Jim Popovich___   Signature _____   Date: 11/13/08
            Faculty/Preparer

Print: ___Gary Schultz___   Signature _____   Date: 11/13/08
            Department Chair

Division Review by Dean
☐ Request for conditional approval

Recommendation ☒Yes ☐No   _____   11/13/08
            Dean's/Administrator's Signature   Date

Curriculum Committee Review
Recommendation _____
☐ Tabled   ☒Yes ☐No   _____   1/7/09
            Curriculum Committee Chair's Signature   Date

Vice President for Instruction Approval   _____   1/9/09
            Vice President's Signature   Date

Approval ☒ Yes ☐ No ☐ Conditional

Please return completed form to the Office of Curriculum & Assessment and email an electronic copy to sjohn@wccnet.edu for posting on the website.

Office of Curriculum & Assessment
Approved by Assessment Committee 10/06

http://www.wccnet.edu/departments/curriculum/

MASTER SYLLABUS

*Complete ALL sections which apply to the course, even if changes are not being made.

Course:	Course title:
ROB 224	Robotics IV

Credit hours: __4__	Contact hours per semester:	Are lectures, labs, or clinicals offered as separate sections?	Grading options:

Credit hours: __4__

If variable credit, give range:

_____ _ to _____ credits

Contact hours per semester:

	Student	Instructor
Lecture:	_30_	_30_
Lab:	_60_	_60_
Clinical:	___	___
Practicum:	___	___
Other:	___	___
Totals:	_90_	_90_

Are lectures, labs, or clinicals offered as separate sections?

☐ Yes - lectures, labs, or clinicals are offered in separate sections

X No - lectures, labs, or clinicals are offered in the same section

Grading options:

☐ P/NP (limited to clinical & practica)

☐ S/U (for courses numbered below 100)

X Letter grades

Prerequisites. Select one:

☒ College-level Reading & Writing   ☐ Reduced Reading/Writing Scores
(Add information at Level I prerequisite)

☐ No Basic Skills Prerequisite
(College-level Reading and Writing is not required.)

In addition to Basic Skills in Reading/Writing:

Level I (enforced in Banner)

	Course	Grade	Test	Min. Score	Concurrent Enrollment Can be taken together)	Corequisites Must be enrolled in this class also during the same semester)
	ROB 223	C			☐	
☐ and ☐ or					☐	
☐ and ☐ or					☐	
☐ and ☐ or					☐	

Level II (enforced by instructor on first day of class)

	Course	Grade	Test	Min. Score
☐ and ☐ or				
☐ and ☐ or				

Enrollment restrictions (In addition to prerequisites, if applicable.)

☐ and ☐ or Consent required   ☐ and ☐ or Admission to program required   ☐ and ☐ or Other (please specify):

Program: _____

Please send syllabus for transfer evaluation to:
Conditionally approved courses are not sent for evaluation.
Insert course number and title you wish the course to transfer as.

☐ E.M.U. as _____   ☐ _____ as _____

☐ U of M as _____   ☐ _____ as _____

☐ _____ as _____ ____   ☐ _____ as _____

MASTER SYLLABUS

Course	Course title
ROB 224	Robotics IV

Course description State the purpose and content of the course. Please limit to 500 characters.	This course involves advanced programming of robots and programmable controllers in an integrated work cell. Problems related to maintenance and trouble-shooting consitute a major segment of the course. A group project, involving the design and construction of a workcell that simulates some industrial process, is an enjoyable conclusion to this program.	
	Outcomes (applicable in all sections)	**Assessment** Methods for determining course effectiveness
	Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.	Work cell project
Course Objectives Indicate the objectives that support the course outcomes given above. **Course Evaluations** Indicate how instructors will determine the degree to which each objective is met for each student.	**Objectives** (applicable in all sections)	**Evaluation** Methods for determining level of student performance of objectives
	Correctly uses at least 1 industrial robot.	Work cell project
	Effective and efficient robot programming	Work cell project
	Document robot programming	Work cell project
	Safely and correctly perform electrical wiring	Work cell project
	Document electrical wiring	Work cell project
	Effective and efficient PLC programming	Work cell project
	Document PLC programming	Work cell project
	Interface robot with surrounding equipment	Work cell project
	Effective use of teamwork	Work cell project
	Demonstrate creativity in design	Work cell project
	Demonstrate effective troubleshooting	Classroom and lab participation
	Recognize and apply safety standards	Classroom and lab participation

List all new resources needed for course, including library materials.

Student Materials:
List examples of types
   Texts
   Supplemental reading
   Supplies
   Uniforms
   Equipment
   Tools
   Software
		Estimated costs
		$

MASTER SYLLABUS

Equipment/Facilities: Check all that apply. (All classrooms have overhead projectors and permanent screens.)

Check level <u>only</u> if the specified equipment is needed for <u>all</u> sections of a course.	
☐ Level I classroom 　　Permanent screen & overhead projector	☐ Off-Campus Sites ☐ Testing Center ☐ Computer workstations/lab ☐ ITV
☐ Level II classroom 　　Level I equipment plus TV/VCR	☐ TV/VCR ☐ Data projector/computer
☒ Level III classroom 　　Level II equipment plus data projector, computer, faculty workstation	☐ Other _____

Assessment plan:

Learning outcomes to be assessed	Assessment tool	When assessment will take place	Describe population to be assessed	Number of students to be assessed
1. Design and construct a work cell (robotic device and process) in accordance with industry and safety standards.	Work Cell project	Winter 2009 and every three years thereafter.	Students who complete ROB 224 Robotics IV, the program's capstone course.	All students

Scoring and analysis of assessment:

1. Indicate how the above assessment(s) will be scored and evaluated (e.g. departmentally developed rubric, external evaluation, other). Attach the rubric/scoring guide.

   The work cell project will be assessed using a departmentally developed rubric

2. Indicate the standard of success to be used for this assessment.

   75% of the projects will score an overall average of 2.75 or higher

3. Indicate who will score and analyze the data (data must be blind-scored).

   Faculty, who are not teaching the course, will blind-score the data.

4. Explain the process for using assessment data to improve the program.

   Industrial Technology faculty will review the assessment data to identify areas of weakness in the program and modify the program, course or instruction as needed.