

Washtenaw Community College Comprehensive Report

FLP 214 Hydraulic Circuits and Controls Effective Term: Fall 2023

Course Cover

College: Advanced Technologies and Public Service Careers

Division: Advanced Technologies and Public Service Careers

Department: Advanced Manufacturing

Discipline: Fluid Power

Course Number: 214

Org Number: 14410

Full Course Title: Hydraulic Circuits and Controls

Transcript Title: Hydraulic Circuits & Controls

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission: Inactivation

Change Information:

Consultation with all departments affected by this course is required.

Rationale: Program discontinued

Proposed Start Semester: Fall 2023

Course Description: In this course, students will explore the advanced concepts of directional, pressure and flow controls covered in the introductory courses. Special attention will be placed on reading and troubleshooting hydraulic diagrams and blueprints. Areas of study will also include circuits containing conventional valving, modular sandwich valving as well as screw-in and slip-in cartridge valves. Students will also be introduced to proportional valves, servo valves and electrical ladder control diagrams. Lab exercises are especially critical to student success in this course.

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

MEC 105 minimum grade "C"

General Education

Request Course Transfer

Proposed For:

Student Learning Outcomes

1. Build a hydraulic circuit on the fluid power trainer.

Assessment 1

Assessment Tool: Outcome-related lab project

Assessment Date: Winter 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 rubric

Standard of success to be used for this assessment: 70% of the students will score 70% or higher

Who will score and analyze the data: Departmental faculty

2. Interpret hydraulic circuit diagrams to solve problems.

Assessment 1

Assessment Tool: Outcome-related exam questions

Assessment Date: Winter 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 rubric

Standard of success to be used for this assessment: 70% of the students will score 70% or higher

Who will score and analyze the data: Departmental faculty

3. Identify faulty components through logical troubleshooting methods.

Assessment 1

Assessment Tool: Outcome-related exam questions

Assessment Date: Winter 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 rubric

Standard of success to be used for this assessment: 70% of the students will score 70% or higher

Who will score and analyze the data: Departmental faculty

Course Objectives

1. Recognize safety risks associated with equipment having hydraulic components.
2. Identify symbols of hydraulic components used in circuits.
3. Interpret symbols of hydraulic components used in circuit diagrams.
4. Convert measurements for speed/force/pressure/area into metric and non-metric units of measurement, and calculate results of formulated problems using these conversions.
5. Identify and build regenerative circuits.
6. Describe the advantages/disadvantages of regenerative circuits as compared with conventional cylinder circuits.
7. Describe the operation of both direct-acting and pilot-operative relief valves with application of using the vent connection of the two-stage relief.

8. Identify the symbols for pressure control valves, such as sequence valves, unloading valves, and counterbalance valves.
9. Describe the component application for pressure control valves.
10. Identify meter-in, meter-out and bleed-off flow control circuits and the characteristics of each.
11. Build flow control circuits as needed for different applications.

New Resources for Course

Course Textbooks/Resources

Textbooks
Manuals
Periodicals
Software

Equipment/Facilities

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
Faculty Preparer: <i>Allan Coleman</i>	<i>Faculty Preparer</i>	<i>Jan 06, 2023</i>
Department Chair/Area Director: <i>Allan Coleman</i>	<i>Recommend Approval</i>	<i>Jan 06, 2023</i>
Dean: <i>Jimmie Baber</i>	<i>Recommend Approval</i>	<i>Jan 09, 2023</i>
Curriculum Committee Chair: <i>Randy Van Wagnen</i>	<i>Reviewed</i>	<i>Feb 08, 2023</i>
Assessment Committee Chair:		
Vice President for Instruction: <i>Victor Vega</i>	<i>Approve</i>	<i>Feb 09, 2023</i>

Washtenaw Community College Comprehensive Report

FLP 214 Hydraulic Circuits and Controls Effective Term: Winter 2023

Course Cover

College: Advanced Technologies and Public Service Careers

Division: Advanced Technologies and Public Service Careers

Department: Advanced Manufacturing

Discipline: Fluid Power

Course Number: 214

Org Number: 14410

Full Course Title: Hydraulic Circuits and Controls

Transcript Title: Hydraulic Circuits & Controls

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission: Course Change

Change Information:

Consultation with all departments affected by this course is required.

Pre-requisite, co-requisite, or enrollment restrictions

Outcomes/Assessment

Rationale: The course prerequisite needs to be changed due to the inactivation of FLP 101 and FLP 110.

Proposed Start Semester: Fall 2022

Course Description: In this course, students will explore the advanced concepts of directional, pressure and flow controls covered in the introductory courses. Special attention will be placed on reading and troubleshooting hydraulic diagrams and blueprints. Areas of study will also include circuits containing conventional valving, modular sandwich valving as well as screw-in and slip-in cartridge valves. Students will also be introduced to proportional valves, servo valves and electrical ladder control diagrams. Lab exercises are especially critical to student success in this course.

Course Credit Hours

Variable hours: No

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Lecture Hours: Instructor: 30 **Student:** 30

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Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 90 **Student:** 90

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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

MEC 105 minimum grade "C"

General Education**Request Course Transfer**

Proposed For:

Student Learning Outcomes

1. Build a hydraulic circuit on the fluid power trainer.

Assessment 1

Assessment Tool: Outcome-related lab project

Assessment Date: Winter 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 rubric

Standard of success to be used for this assessment: 70% of the students will score 70% or higher

Who will score and analyze the data: Departmental faculty

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2. Identify symbols of hydraulic components used in circuits.
3. Interpret symbols of hydraulic components used in circuit diagrams.
4. Convert measurements for speed/force/pressure/area into metric and non-metric units of measurement, and calculate results of formulated problems using these conversions.
5. Identify and build regenerative circuits.
6. Describe the advantages/disadvantages of regenerative circuits as compared with conventional cylinder circuits.

7. Describe the operation of both direct-acting and pilot-operative relief valves with application of using the vent connection of the two-stage relief.
8. Identify the symbols for pressure control valves, such as sequence valves, unloading valves, and counterbalance valves.
9. Describe the component application for pressure control valves.
10. Identify meter-in, meter-out and bleed-off flow control circuits and the characteristics of each.
11. Build flow control circuits as needed for different applications.

New Resources for Course

Course Textbooks/Resources

Textbooks
Manuals
Periodicals
Software

Equipment/Facilities

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
Faculty Preparer: <i>Jim Popovich</i>	<i>Faculty Preparer</i>	<i>Mar 15, 2022</i>
Department Chair/Area Director: <i>Allan Coleman</i>	<i>Recommend Approval</i>	<i>Mar 23, 2022</i>
Dean: <i>Jimmie Baber</i>	<i>Recommend Approval</i>	<i>Mar 30, 2022</i>
Curriculum Committee Chair: <i>Randy Van Wagnen</i>	<i>Recommend Approval</i>	<i>May 23, 2022</i>
Assessment Committee Chair: <i>Shawn Deron</i>	<i>Recommend Approval</i>	<i>May 27, 2022</i>
Vice President for Instruction: <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Jun 01, 2022</i>

Syllabus Cover Sheet

Course Discipline Code & No: FLP 214 Title: Hydraulic Circuits and Controls Effective Term Fall
'04

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 Minor change (Corrections, editing, clarification)
 Five-year syllabus review (Attach assessment results.) Reactivation of inactive course
 Major change Inactivation (Submit this page only.)

Change information:

Minor changes

Course discipline code & number (was _____) (when changing course number, select "inactivation" to discontinue the old course.)
 Course title (was Basic Hydraulic Circuits)
 Course description
 Course objectives (minor changes)

Major changes (reviewed by Curriculum Committee.)

Credit hours (credits were: 3)
 Total Contact Hours (total contact hours were: 60)
 Distribution of contact hours (contact hours were: lecture: _____ lab _____ clinical _____ other _____)
 Pre or co-requisites
 Distance Learning section approval
 General Education Distribution Course: Add Remove
 Honors section approval
 Change in Grading Method
 Objectives
 Other _____

For major changes, consultation with all departments affected by this course is required. Attach "course use in programs" report from Curriculum Database for Faculty.

Rationale for course or course change

1. **Assessment-based:**

2. **Non-assessment-based:** To streamline the Fluid Power Certificate and better align with the changes in the Automation Technology Associate degree program. FLP 213 and FLP 214 were co-requisites, 3 credits each and 60 contact hours each. FLP 213 is being discontinued and the content condensed and merged with that of FLP 214.

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 Faculty/Preparer Signature [Signature] Date: 3/22/2004

Print: Gary Schultz Department Chair Signature [Signature] Date: 3/22/2004

Division Review by Dean Request for conditional approval

Recommendation Yes No Dean's/Administrator's Signature [Signature] Date 3/28/04

Curriculum Committee Review

Recommendation Tabled Yes No Curriculum Committee Chair's Signature [Signature] Date 4.1.04

Vice President of Instruction Approval

Approval Yes No Vice President's Signature [Signature] Date 4/14/04

Do not write in shaded area.

ACS Code _____ Entered in: Banner 4/19 C&A Database 4/19 Log File 4/19

Approved for General Education Area/Group _____ Syllabus Date _____ Basic skills table updated
 Contact fee

MAY 05 2004

COURSE AND SYLLABUS FORM

WASHTENAW COMMUNITY COLLEGE

Course Discipline & No.: FLP 214 Title: Hydraulic Circuits and Controls

Credit hours: <u>4</u> If variable credit, give range: _____ to _____ credits	Instructor contact hours per semester: Lecture: <u>30</u> Lab: <u>60</u> Clinical: _____ Practicum: _____ Other: _____ Total contact hours: <u>90</u>	Class capacity: <u>24</u> Standard capacity is 30 students unless otherwise specified in the Master Agreement.	Grading options: <input type="checkbox"/> P/NP (limited to clinical & practica) <input type="checkbox"/> S/U (for courses numbered below 100) <input checked="" type="checkbox"/> Letter grades
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Prerequisites. Select one: <input type="checkbox"/> College-level Reading & Writing <input type="checkbox"/> Reduced Reading/Writing Scores COMPASS Reading _____ COMPASS Writing _____ <input type="checkbox"/> No Basic Skills Prerequisite (College-level Reading and Writing is <u>not</u> required.)	In addition to Basic Skills in Reading/Writing: Level I (enforced in Banner) <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:40%;">Course/Test</th> <th style="width:20%;">Grade/Score</th> <th style="width:40%;">Concurrent Enrollment</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><u>FLP 111</u></td> <td style="text-align: center;"><u>C-</u></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> and <input type="checkbox"/> or _____</td> <td style="text-align: center;">_____</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> and <input type="checkbox"/> or _____</td> <td style="text-align: center;">_____</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td><input type="checkbox"/> and <input type="checkbox"/> or _____</td> <td style="text-align: center;">_____</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table> Level II (enforced by instructor on first day of class) <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:40%;">Course</th> <th style="width:60%;">Grade/Score</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> and <input type="checkbox"/> or _____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td><input type="checkbox"/> and <input type="checkbox"/> or _____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td><input type="checkbox"/> and <input type="checkbox"/> or _____</td> <td style="text-align: center;">_____</td> </tr> </tbody> </table>	Course/Test	Grade/Score	Concurrent Enrollment	<u>FLP 111</u>	<u>C-</u>	<input type="checkbox"/>	<input type="checkbox"/> and <input type="checkbox"/> or _____	_____	<input type="checkbox"/>	<input type="checkbox"/> and <input type="checkbox"/> or _____	_____	<input type="checkbox"/>	<input type="checkbox"/> and <input type="checkbox"/> or _____	_____	<input type="checkbox"/>	Course	Grade/Score	<input type="checkbox"/> and <input type="checkbox"/> or _____	_____	<input type="checkbox"/> and <input type="checkbox"/> or _____	_____	<input type="checkbox"/> and <input type="checkbox"/> or _____	_____
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Corequisites (<u>must</u> be enrolled in this class also during the same semester): _____ _____																								

Enrollment restrictions (In addition to prerequisites, if applicable.) <input type="checkbox"/> and <input type="checkbox"/> or <input type="checkbox"/> Instructor consent required <input type="checkbox"/> and <input type="checkbox"/> or <input type="checkbox"/> Admission to program required Program _____ <input type="checkbox"/> and <input type="checkbox"/> or <input type="checkbox"/> Other (please specify): _____	Please send syllabus for transfer evaluation to: <input type="checkbox"/> EMU <input type="checkbox"/> UM <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____	Instructional mode <input checked="" type="checkbox"/> On campus <input type="checkbox"/> Online <input type="checkbox"/> Blended (online and on-campus combined) <input type="checkbox"/> ITV <input type="checkbox"/> Other
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Course Options General Education Group I (Select one area) <input type="checkbox"/> Writing <input type="checkbox"/> Nat. Sci. <input type="checkbox"/> Speech <input type="checkbox"/> Soc./Behav/ Sci. <input type="checkbox"/> Math <input type="checkbox"/> Arts/Hum. Courses must meet all criteria. <input type="checkbox"/> 1. Is a standard introductory course in the discipline <input type="checkbox"/> 2. Has a verified transfer acceptance <input type="checkbox"/> 3. Meets the critical thinking requirement <input type="checkbox"/> 4. Assesses academic achievement <input type="checkbox"/> 5. Covers minimum knowledge/skills	Honors section. Not all criteria are required. Check relevant items. <input type="checkbox"/> 1. Emphasis on primary source materials <input type="checkbox"/> 2. Emphasis on independent study/research <input type="checkbox"/> 3. Greater rigor of course materials <input type="checkbox"/> 4. Interdisciplinary approach <input type="checkbox"/> 5. Development of critical thinking skills <input type="checkbox"/> 6. Additional course objectives <input type="checkbox"/> 7. Additional instructional methods <input type="checkbox"/> 8. Satisfaction of the service component
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List all new resources needed for course, including library materials.

COURSE AND SYLLABUS FORM

Syllabus

<p>Course discipline code & number FLP 214</p>	<p>Course title Hydraulic Circuits and Controls</p>	<p>Credit hours 4</p>
<p>Course description Brief statement of the purpose and content of the course</p>	<p>This course further develops the concepts of directional, pressure and flow controls covered in FLP 111. Troubleshooting and reading of hydraulic blueprints is emphasized. Circuits will include conventional valving, modular sandwich, screw in, and slip in cartridge valves. An introduction to proportional valves, servo valves, and electrical ladder control diagrams is included. Lab exercises play an important roll in this class.</p>	
<p>Course outcomes List brief statements that indicate what students will know and be able to accomplish as a result of taking the course. Indicate how these outcomes will be assessed for NCA assessment of student achievement.</p>	<p>Outcomes</p> <p>Students completing this class will be able to build a hydraulic circuit on the fluid power trainer. Capstone lab project.</p> <p>Students completing this class will be able to identify symbols in hydraulic circuits given timing diagram or truth tables, describe purpose of the components in that circuit and describe component failure modes.</p> <p>Students completing this class will be able describe approaches to identify faulty components through logical troubleshooting methods.</p>	<p>Assessment Method</p> <p>Capstone lab project.</p> <p>Department pre/post exams</p> <p>Department print reading exam.</p>
<p>Content outline List in sequence the instructional units/modules/clusters of related topics that will be taught, and indicate the major instructional objectives for each unit. Indicate methods that will be used in each unit to evaluate student work for grading.</p>	<p>Unit and Unit Objectives</p> <p>Student will recognize safety risks associated with equipment having hydraulic components.</p> <p>The student will be able to identify symbols of hydraulic components used in circuits.</p> <p>The student will be able to convert measurements for speed/force/pressure/area into other equivalent units of measurement, and calculate results of formulated problems using these conversions.</p> <p>The student will be able to identify and build regenerative circuits and describe the advantages/disadvantages of regenerative circuits as compared with conventional cylinder circuits.</p> <p>The student will be able to describe the operation of both direct-acting and pilot-operated relief valves, with applications of using the vent connection of the two-stage relief.</p> <p>The student will be able to identify the symbols, describe component application for: pressure reducing valves, sequence valves, unloading valves, counterbalance valves.</p> <p>The student will be able to identify and build meter-in, meter-out and bleed-off flow control circuits and the characteristics of each.</p>	<p>Evaluation Method</p> <p>Safety test</p> <p>Capstone circuit exam</p> <p>Quizzes and department exam</p> <p>Lab exercises and department written exam.</p> <p>Lab exercise and department written exam.</p> <p>Lab exercises and department written exam.</p> <p>Lab exercises and department written exam.</p>

COURSE AND SYLLABUS FORM

Student Materials

List examples of types		Estimated costs.
Texts Supplemental reading Supplies Uniforms Equipment Tools Software	Vickers Industrial Hydraulics Manual Fluid Power Designers Lightning Reference Handbook	\$ 100.00

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

Check level only if the specified equipment is needed for all sections of a course.

<input type="checkbox"/> Level I classroom Permanent screen & overhead projector	<input type="checkbox"/> Off-Campus Sites <input type="checkbox"/> Testing Center <input type="checkbox"/> Computer workstations/lab <input type="checkbox"/> ITV <input type="checkbox"/> TV/VCR <input type="checkbox"/> Data projector/computer <input checked="" type="checkbox"/> Other <u>Hydraulic equipment in T&I lab</u>
<input type="checkbox"/> Level II classroom Level I equipment plus TV/VCR	
<input checked="" type="checkbox"/> Level III classroom Level II equipment plus data projector, computer, faculty workstation	