Washtenaw Community College Comprehensive Report

FLP 101 Fluid Power Fundamentals - I
Effective Term: Fall 2022

Course Cover

College: Advanced Technologies and Public Service Careers
Division: Advanced Technologies and Public Service Careers
Department: Advanced Manufacturing
Discipline: Fluid Power
Course Number: 101
Org Number: 14410
Full Course Title: Fluid Power Fundamentals - I
Transcript Title: Fluid Power Fundamentals - I
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Inactivation
Change Information:
Other:
Rationale: FLP 101 / 110 / 226 are being combined into one MEC 105 course.
Proposed Start Semester: Fall 2022
Course Description: In this class, students are introduced to the fundamental principles of fluid power in both hydraulics and pneumatics. Subject matter includes application of Pascal's Law, prime mover requirements, principle of operation of fluid power fixed displacement pumps and compressors, control valves and actuators. Component failure modes and troubleshooting concepts are also covered. FLP 101 is generally offered in the first 7 1/2 week session.

Course Credit Hours

Variable hours: No
Credits: 2
Lecture Hours: Instructor: 30 **Student:** 30
Lab: Instructor: 15 **Student:** 15
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 45 **Student:** 45
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

General Education

Request Course Transfer

Proposed For:

Student Learning Outcomes

1. Apply the concepts and formulas inherent in Pascal's Law.
   Assessment 1
   Assessment Tool: Departmental exam
   Assessment Date: Fall 2022
   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: Departmental exam will be scored using the answer key.
   Standard of success to be used for this assessment: 70% of students will score 70% or higher on the outcome-related questions.
   Who will score and analyze the data: Departmental faculty will analyze the data.

2. Identify fluid power symbols.
   Assessment 1
   Assessment Tool: Departmental exam
   Assessment Date: Fall 2022
   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: Departmental exam will be scored using the answer key.
   Standard of success to be used for this assessment: 70% of students will score 70% or higher on the outcome-related questions.
   Who will score and analyze the data: Departmental faculty will analyze the data.

3. Indicate operation and purpose of novice level components in fluid power circuits.
   Assessment 1
   Assessment Tool: Departmental exam
   Assessment Date: Fall 2022
   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: Departmental exam will be scored using the answer key.
   Standard of success to be used for this assessment: 70% of students will score 70% or higher on the outcome-related questions.
   Who will score and analyze the data: Departmental faculty will analyze the data.

4. Perform basic formula calculations as related to introductory fluid power circuits.
   Assessment 1
   Assessment Tool: Departmental exam
   Assessment Date: Fall 2022
   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: Departmental exam will be scored using the answer key.
   Standard of success to be used for this assessment: 70% of students will score 70% or higher on the outcome-related questions.
   Who will score and analyze the data: Departmental faculty will analyze the data.

Course Objectives

1. Explain two major differences between hydraulic and pneumatic circuits.
2. Explain why air, oil and water are all fluids.

3. Explain Pascal's Law as it relates to fluids.
4. Explain Bernoulli's principle as it relates to fluids.
5. Identify the International Standards Organization (ISO) and American National Standards Institute (ANSI) schematic symbols of commonly-used fluid power components.
6. Describe the function of three types of positive displacement hydraulic pumps.
7. Explain the operation of fluid cylinders and motors.
8. Perform basic formula calculations to determine force, velocity, torque, time, area, volume, rpm, pressure and horsepower.
9. Determine pump size and relief setting needed to accomplish a particular task.
10. Given gallons per minute (GPM) of the pump, determine proper fluid conductor size for pump inlet and outlet lines.
11. Describe aeration and cavitation, and list three causes for each.
12. Describe the relationship between gauge pressure, absolute pressure and vacuum in inches of mercury.
13. Differentiate between parallel and series circuits, and describe the difference.
14. Describe the difference between positive and non-positive pumps.
15. List advantages and disadvantages of direct acting and compound pressure controls.

New Resources for Course

Course Textbooks/Resources

Textbooks

IFPS. *Lightning Reference Manual*, 8th ed. International Fluid Power Society, 2001, ISBN: 9789970008001.

Eaton Hydraulics. *Industrial Hydraulics Manual*, 5th ed. Eaton Hydraulics, 2000, ISBN: 9780978802202.

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Other: Document camera

Reviewer	Action	Date
Faculty Preparer:		
Allan Coleman	*Faculty Preparer*	*Jan 20, 2022*
Department Chair/Area Director:		
Allan Coleman	*Recommend Approval*	*Jan 20, 2022*
Dean:		
Jimmie Baber	*Recommend Approval*	*Jan 21, 2022*
Curriculum Committee Chair:		
Randy Van Wagnen	*Reviewed*	*Feb 15, 2022*
Assessment Committee Chair:		
Vice President for Instruction:		
Kimberly Hurns	*Approve*	*Feb 18, 2022*

Washtenaw Community College Comprehensive Report

FLP 101 Fluid Power Fundamentals - I
Effective Term: Spring/Summer 2020

Course Cover

Division: Advanced Technologies and Public Service Careers
Department: Advanced Manufacturing
Discipline: Fluid Power
Course Number: 101
Org Number: 14410
Full Course Title: Fluid Power Fundamentals - I
Transcript Title: Fluid Power Fundamentals - I
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.
Other:
Rationale: Three-year syllabus review
Proposed Start Semester: Fall 2019
Course Description: In this class, students are introduced to the fundamental principles of fluid power in both hydraulics and pneumatics. Subject matter includes application of Pascal's Law, prime mover requirements, principle of operation of fluid power fixed displacement pumps and compressors, control valves and actuators. Component failure modes and troubleshooting concepts are also covered. FLP 101 is generally offered in the first 7 1/2 week session.

Course Credit Hours

Variable hours: No
Credits: 2
Lecture Hours: Instructor: 30 **Student:** 30
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Total Contact Hours: Instructor: 45 **Student:** 45
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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

General Education

Request Course Transfer

Proposed For:

Student Learning Outcomes

1. Apply the concepts and formulas inherent in Pascal's Law.
   Assessment 1
   Assessment Tool: Departmental exam
   Assessment Date: Fall 2022
   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: Departmental exam will be scored using the answer key.
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   Who will score and analyze the data: Departmental faculty will analyze the data.

2. Identify fluid power symbols.
   Assessment 1
   Assessment Tool: Departmental exam
   Assessment Date: Fall 2022
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
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3. Indicate operation and purpose of novice level components in fluid power circuits.
   Assessment 1
   Assessment Tool: Departmental exam
   Assessment Date: Fall 2022
   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: Departmental exam will be scored using the answer key.
   Standard of success to be used for this assessment: 70% of students will score 70% or higher on the outcome-related questions.
   Who will score and analyze the data: Departmental faculty will analyze the data.

4. Perform basic formula calculations as related to introductory fluid power circuits.
   Assessment 1
   Assessment Tool: Departmental exam
   Assessment Date: Fall 2022
   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: Departmental exam will be scored using the answer key.
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   Who will score and analyze the data: Departmental faculty will analyze the data.

Course Objectives

1. Explain two major differences between hydraulic and pneumatic circuits.
2. Explain why air, oil and water are all fluids.

3. Explain Pascal's Law as it relates to fluids.
4. Explain Bernoulli's principle as it relates to fluids.
5. Identify the International Standards Organization (ISO) and American National Standards Institute (ANSI) schematic symbols of commonly-used fluid power components.
6. Describe the function of three types of positive displacement hydraulic pumps.
7. Explain the operation of fluid cylinders and motors.
8. Perform basic formula calculations to determine force, velocity, torque, time, area, volume, rpm, pressure and horsepower.
9. Determine pump size and relief setting needed to accomplish a particular task.
10. Given gallons per minute (GPM) of the pump, determine proper fluid conductor size for pump inlet and outlet lines.
11. Describe aeration and cavitation, and list three causes for each.
12. Describe the relationship between gauge pressure, absolute pressure and vacuum in inches of mercury.
13. Differentiate between parallel and series circuits, and describe the difference.
14. Describe the difference between positive and non-positive pumps.
15. List advantages and disadvantages of direct acting and compound pressure controls.

New Resources for Course

Course Textbooks/Resources

Textbooks

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Eaton Hydraulics. *Industrial Hydraulics Manual*, 5th ed. Eaton Hydraulics, 2000, ISBN: 9780978802202.

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Other: Document camera

Reviewer	Action	Date
Faculty Preparer:		
Jim Popovich	*Faculty Preparer*	*Aug 12, 2019*
Department Chair/Area Director:		
Thomas Penird	*Recommend Approval*	*Aug 14, 2019*
Dean:		
Brandon Tucker	*Recommend Approval*	*Aug 22, 2019*
Curriculum Committee Chair:		
Lisa Veasey	*Recommend Approval*	*Sep 19, 2019*
Assessment Committee Chair:		
Shawn Deron	*Recommend Approval*	*Oct 10, 2019*
Vice President for Instruction:		
Kimberly Hurns	*Approve*	*Oct 14, 2019*

WASHTENAW COMMUNITY COLLEGE

MASTER SYLLABUS

Course Discipline Code & No: FLP 101 Title: Fluid Power Fundamentals - I Effective Term WI 2010

Division Code: HAT Department Code: INTD Org #:

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 FLP 111)*
  *Must submit inactivation form for previous course.
- ☒ Course title (was Fluid Power Fundamentals)
- ☒ Course description
- ☐ Course objectives (minor changes)
- ☒ Credit hours (credits were: 4)
- ☒ Total Contact Hours (total contact hours were: 90)
- ☐ 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.
The content taught in FLP 111 has been split into two separate courses FLP 101 and FLP 110 to allow students to receive introductory (101) training to all areas (robotics, fluid power and numerical control) and then focus on their area of concentration.

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: 12/1/09

Dept. Chair Recommendation ☒ Yes ☐ No

Print: GARY L. SCHULTZ (Department Chair) Signature: [signature] Date: 12/1/09

Division Review by Dean

☐ Request for conditional approval

Recommendation ☒ Yes ☐ No [signature] (Dean's/Administrator's Signature) Date: 12/21/09

Curriculum Committee Review

Recommendation ____

☐ Tabled ☒ Yes ☐ No [signature] (Curriculum Committee Chair's Signature) Date: 3/11/10

Vice President for Instruction Approval

[signature] (Vice President's Signature) Date: 3-12-10

Approval ☒ Yes ☐ No ☐ Conditional

Do not write in shaded area.
Log File 12/21/09 Copy ☐ Banner ____ C&A Database ____ C&A Log File ____ Basic skills ☐ Contact fee ☐

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

MASTER SYLLABUS

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

Course:	Course title:
FLP 101	Fluid Power Fundamentals - I

Credit hours: 2

If variable credit, give range:

_____ to _____ credits

Contact hours per semester:

	Student	Instructor
Lecture:	30	30
Lab:	15	15
Clinical:		
Practicum:		
Other:		
Totals:	45	45

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

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

☒ 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)

☒ 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)
					☐	
☐ 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

Program: _____

☐ and ☐ or Other (please specify):

_____

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 _____

☐ U of M as _____

☐ _____ as _____

☐ _____ as _____

☐ _____ as _____

☐ _____ as _____

Course:	Course title:
FLP 101	Fluid Power Fundamentals - I

Course description State the purpose and content of the course. Please limit to 500 characters.	This is an introductory class covering the fundamental principles of fluid power, both hydraulics and pneumatics. Subject matter includes application of Pascal's Law, prime mover requirements, principles of operation of fluid power fixed displacement pumps and compressors, control valves and actuators. Component failure modes and troubleshooting are also covered. This course contains material previously taught in FLP 111. FLP 101 is generally offered in the first 7½ week session.	
Course outcomes List skills and knowledge students will have after taking the course. **Assessment method** Indicate how student achievement in each outcome will be assessed to determine student achievement for purposes of course improvement.	**Outcomes** (applicable in all sections)	**Assessment** Methods for determining course effectiveness
	Apply the concepts and formulas inherent in Pascal's Law.	Departmental exam
	Identify fluid power symbols.	Departmental exam
	Indicate operation and purpose of novice level components in fluid power circuits.	Departmental exam
	Perform basic formula calculations as related to introductory fluid power circuits.	Departmental exam
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
	Explain two major differences between hydraulic and pneumatic circuits. Explain why air, oil and water are all fluids. Explain Pascal's Law as it relates to fluids. Explain Bernoulli's principle as it relates to fluids. Identify the ISO or ANSI schematic symbols of commonly-used fluid power components. Describe the function of three types of positive displacement hydraulic pumps. Explain the operation of fluid cylinders and motors. Perform basic formula calculations to determine force, velocity, torque, time, area, volume, rpm, pressure and horsepower. Determine pump size and relief setting needed to accomplish a particular task. Given GPM of the pump, determine proper fluid conductor size for pump inlet and outlet lines. Describe aeration and cavitation and list three causes for each. Describe the relationship between gage pressure, absolute pressure and vacuum in inches of mercury. Differentiate between parallel and series circuits and describe the difference. Describe the difference between positive and non-positive pumps. List advantages and disadvantages of direct acting and compound pressure controls.	Exams, quizzes and completion of lab exercises

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

Student Materials:

List examples of types		Estimated costs
Texts Supplemental reading Supplies Uniforms Equipment Tools Software	Industrial Hydraulics Manual by Easton Hydraulics	
	Fluid Power Designers' Lighting Reference Manual – 8th + ed.	$ 90.00
	3-ring binder	$ 22.00
	Calculator	$ 20.00
	Safety Glasses	

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.

☐ Level I classroom
Permanent screen & overhead projector

☐ Level II classroom
Level I equipment plus TV/VCR

☒ Level III classroom
Level II equipment plus data projector, computer, faculty workstation

☐ Off-Campus Sites
☐ Testing Center
☐ Computer workstations/lab
☐ ITV
☐ TV/VCR
☐ Data projector/computer
☐ Other _____

Assessment plan:

Learning outcomes to be assessed (list from Page 3)	Assessment tool	When assessment will take place (semester & year)	Course section(s)/other population	Number students to be assessed
Apply the concepts and formulas inherent in Pascal's Law.	Departmental exam	Fall 2010 and every three years thereafter	All sections	All students
Identify fluid power symbols.	Departmental exam	Fall 2010 and every three years thereafter	All sections	All students
Indicate operation and purpose of novice level components in fluid power circuits.	Departmental exam	Fall 2010 and every three years thereafter	All sections	All students
Perform basic formula calculations as related to introductory fluid power circuits.	Departmental exam	Fall 2010 and every three years thereafter	All sections	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.
   Departmental exam will be scored using the answer key.

2. Indicate the standard of success to be used for this assessment.
   The overall class average on all questions identified for assessment will be 70% or higher.

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

4. Explain the process for using assessment data to improve the course.
   Assessment results will be discussed by faculty teaching the class and presented at a department meeting. Areas of weakness and their solutions will be identified. Necessary course changes will be implemented.