



**CREDIT COURSE OUTLINE**

**I. COVER PAGE**

(1) MFGT 24	(2) Hydraulics	(3) 2
Number	Title	Units

(4) Lecture / Lab Hours:	(8) Classification:	
Course Hours		
Weekly Lec hours: 2.00	Degree applicable:	X
Weekly Lab hours: 0.50	Non-degree applicable:	
Total Contact hours: 45.00	Basic skills:	
Lec will generate __ hour(s) outside work.	(9) RC	Fulfills AS/AA degree requirement: (area)
Lab will generate __ hour(s) outside work.		
(5) Grading Basis:	Grading Scale Only	
	Pass/No Pass option	X
	Pass/No Pass only	
(6) Advisories:	Major:	Machine Tool Technology Maintenance Mechanic Welding Technology
• Eligibility for English 126 and Mathematics 103	Certificate of:	Machine Tool Machinist Maintenance Mechanic
(7) Pre-requisites (requires C grade or better):	Certificate in:	
• Industrial Technology 205		
Corequisites:	(10) CSU	Baccalaureate: X
•	(11) Repeatable: (A course may be repeated three times)	0
	(12) C-ID:	
	Proposed Start Date:	Fall 2012

(12) Catalog Description:  
The basic principles of fluid power, hydraulic sources, controls, systems and hydraulic components. Specific safety regulations in the design and application of hydraulic equipment will be explored.

**II. COURSE OUTCOMES:**

*(Specify the learning skills the student demonstrates through completing the course and link critical thinking skills to specific course content and objectives.)*

Upon completion of this course, students will be able to:

- I. Practice safe shop techniques in operating and servicing hydraulic systems.
- II. Calculate common mathematical problems associated with hydraulic systems.

**III. COURSE OBJECTIVES:**

*(Specify major objectives in terms of the observable knowledge and/or skills to be attained.)*

In the process of completing this course, students will:

- I. Identify the basic components of a hydraulic system.
- II. Apply hydraulic principles to operating hydraulic systems.
- III. Compute mathematical formulas and understand basic physics principles that apply to hydraulic systems.
- IV. Learn proper maintenance of hydraulic systems.
- V. Learn safety precautions as needed in hydraulic systems.

**IV. COURSE OUTLINE:**

**Lecture Content:**

- A. Introduction to Hydraulics
  1. History
  2. How fluid power works
  3. Components of the system
  4. Industrial application
  5. Mathematics and physics of hydraulics
- B. Hydraulic Principles
  1. Force and pressure

- 2. Laminar and turbulent flow
- 3. Fluids
- C. Distribution of Power: Fluid lines, fittings & hoses
- D. Actuators
  - 1. Cylinders
  - 2. Seals
  - 3. Cushioning
  - 4. Rotary actuators
  - 5. Fluid, gear, vane, piston, axial piston, and radial piston motors
- E. Safety and Maintenance Procedures
- F. System Records
- G. Trouble-shooting Systems

**Lab Content:**

Lab Outline

- A. Hydraulic devices – assemble and disassemble
  - 1. Cylinders
  - 2. Motors
  - 3. Accumulators
  - 4. Pumps
- B. Hydraulic principles – desk top units or trainers
  - 1. Connect valves, pump and cylinder
  - 2. Construct load arm
  - 3. Calculate forces involved in lifting a load with hydraulics
- C. Pneumatic principles – desk top units or trainers
  - 1. Connect valves, pump and cylinders
  - 2. Lift loads

**V. APPROPRIATE READINGS**

**Reading assignments may include but are not limited to the following:**

- I. Sample Text Title:
  - 1. Recommended - - *FOS-Hydraulics Text and Student Guide*, John Deere Publishing Company, 2011,
  - 2. Recommended - - *Hydraulic Pumps and Controls*, Parker Hannifin Corporation, 2011,

II. Other Readings

- Global or international materials or concepts are appropriately included in this course
- Multicultural materials and concepts are appropriately included in this course

If either line is checked, write a paragraph indicating specifically how global/international and/or multicultural materials and concepts relate to content outline and/or readings.

**VI. METHODS TO MEASURE STUDENT ACHIEVEMENT AND DETERMINE GRADES:**

Students in this course will be graded in at least one of the following four categories. Please check those appropriate. A degree applicable course must have a minimum of one response in category A, B, or C.

<b>A. Writing</b>			
Check either 1 or 2 below			
	1. <i>Substantial writing assignments are required. Check the appropriate boxes below and provide a written description in the space provided.</i>		
X	2. <i>Substantial writing assignments are NOT required. If this box is checked leave this section blank. For degree applicable courses you must complete category B and/or C.</i>		
	a) essay exam(s)		d) written homework
	b) term or other paper(s)		e) reading reports
	c) laboratory report(s)		f) other (specify)

**Required assignments may include but are not limited to the following:**

<b>B. Problem Solving</b>			
Computational or non-computational problem-solving demonstrations, including:			
X	a) exam(s)		d) laboratory reports
X	b) quizzes		e) field work

<input checked="" type="checkbox"/>	c) homework problems	<input checked="" type="checkbox"/>	f) other (specify): Laboratory assignments
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**Required assignments may include but are not limited to the following:**

Sample question:

Calculate hydraulic pressure measurement.

<b>C. Skill demonstrations, including:</b>			
<input checked="" type="checkbox"/>	a) class performance(s)	<input checked="" type="checkbox"/>	c) performance exams(s)
<input type="checkbox"/>	b) field work	<input type="checkbox"/>	d) other (specify)

**Required assignments may include but are not limited to the following:**

1. Periodic lab assignments assess understanding of hydraulic system principles.
2. Class performance is measured daily for participation, and overall quality of working environment.

<b>D. Objective examinations including:</b>			
<input checked="" type="checkbox"/>	a) multiple choice	<input checked="" type="checkbox"/>	d) completion
<input checked="" type="checkbox"/>	b) true/false	<input type="checkbox"/>	e) other (specify):
<input checked="" type="checkbox"/>	c) matching items	<input type="checkbox"/>	

**COURSE GRADE DETERMINATION:**

Description/explanation: Based on the categories checked in A-D, it is the recommendation of the department that the instructor's grading methods fall within the following departmental guidelines; however, the final method of grading is still at the discretion of the individual instructor. The instructor's syllabus must reflect the criteria by which the student's grade has been determined. (A minimum of five (5) grades must be recorded on the final roster.)

If several methods to measure student achievement are used, indicate here the approximate weight or percentage each has in determining student final grades.

Problem Solving 20 - 40% Skills Demonstration 40 - 60% Objective Examination 20 - 40%

**VII. EDUCATIONAL MATERIALS**

For degree applicable courses, the adopted texts, as listed in the college bookstore, or instructor-prepared materials have been certified to contain college-level materials.

Validation Language Level (check where applicable):

	College-Level Criteria Met	
	YES	NO
Textbook	<u>  X  </u>	<u>      </u>
Reference materials	<u>  X  </u>	<u>      </u>
Instructor-prepared materials	<u>  X  </u>	<u>      </u>
Audio-visual materials	<u>  X  </u>	<u>      </u>

Indicate Method of evaluation:

Used readability formulae (grade level 10 or higher)	<u>      </u>
Text is used in a college-level course	<u>  X  </u>
Used grading provided by publisher	<u>      </u>
Other: (please explain; relate to Skills Levels)	<u>      </u>

<i>Computation Level</i> (Eligible for MATH 101 level or higher where applicable)	<u>  X  </u>	<u>      </u>
Content		
Breadth of ideas covered clearly meets college-level learning objectives of this course	<u>  X  </u>	<u>      </u>
Presentation of content and/or exercises/projects:		
Requires a variety of problem-solving strategies including inductive and deductive reasoning.	<u>  X  </u>	<u>      </u>
Requires independent thought and study	<u>  X  </u>	<u>      </u>
Applies transferring knowledge and skills appropriately and efficiently to new situations or problems.	<u>  X  </u>	<u>      </u>

List of Reading/Educational Materials

Recommended - - *FOS-Hydraulics Text and Student Guide*, John Deere Publishing Company, 2011,

Recommended - - *Hydraulic Pumps and Controls*, Parker Hannifin Corporation, 2011,

FOS-Hydraulics Text and Student Guide 2006 John Deere Publishing Company Hydraulic Pumps and Controls 2006 Parker Hannifin Corporation Machinery's Handbook 28th ed. Industrial Press ©2008

Comments:

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- X   This course requires special or additional library materials (list attached).  
  —   FOS-Hydraulics Text and Student Guide 2006 John Deere Publishing Company Hydraulic Pumps and Controls  
  —   2006 Parker Hannifin Corporation Machinery's Handbook 28th ed, Industrial Press ©2008  
  X   This course requires special facilities:  
  —   Manufacturing Shop

Attached Files:

[Manufacturing Pathways](#)

[MFGT 24 Advisory Justification](#)

**BASIC SKILLS ADVISORIES PAGE** The skills listed are those needed for eligibility for English 125, 126, and Math 201. These skills are listed as the outcomes from English 252, 262, and Math 250. In the right hand column, list at least three major basic skills needed at the beginning of the target course and check off the corresponding basic skills listed at the left.

Eligibility for ENGL 126  
(as outcomes for ENGL 262)

- apply a variety of vocabulary skills for increased comprehension during reading.
- apply prereading and active reading strategies to increase success with and comprehension of unfamiliar texts.
- analyze expository texts to determine explicit/implicit main ideas and logical support, leading to author's intended meaning.
- determine basic organizational writing patterns to increase comprehension of expository texts.
- distinguish between fact and opinion and determine author's tone and purpose in non-fiction writings.

- Identify the basic components of a hydraulic system.
- Apply hydraulic principles to operating hydraulic systems.
- Compute mathematical formulas and understand basic physics principles that apply to hydraulic systems.
- Learn proper maintenance of hydraulic systems.
- Learn safety precautions as needed in hydraulic systems.

Check the appropriate spaces.

- Eligibility for Math 201 is advisory for the target course.
- Eligibility for English 126 is advisory for the target course.
- Eligibility for English 125 is advisory for the target course.

If the reviewers determine that an advisory or advisories in Basic Skills are all that are necessary for success in the target course, stop here, provide the required signatures, and forward this form to the department chair, the appropriate associate dean, and the curriculum committee.

## REQUISITES

### Prerequisite -- IT 205 FOUNDATION SKILLS IN INDUSTRIAL TECHNOLOGY

- Recognize the various types of tools, materials, and processes as they relate to manufacturing technology.
- Students will be able to describe basic functions within a manufacturing career pathway of their choice.

- Identify the basic components of a hydraulic system.
- Learn safety precautions as needed in hydraulic systems.

### ESTABLISHING PREREQUISITES OR COREQUISITES

Every prerequisite or corequisite requires content review plus justification of at least one of the seven kinds below. Prerequisite courses in communication and math outside of their disciplines require justification through statistical evidence. Kinds of justification that may establish a prerequisite are listed below.

Check one of the following that apply. Documentation may be attached.

Significant statistical evidence indicates that the absence of the prerequisite course is related to unsatisfactory performance in the target course.

Justification: Indicate how this is so.

The health or safety of the students in this course requires the prerequisite.

Justification: Indicate how this is so.

The prerequisite course is part of a sequence of courses within or across a discipline.

The prerequisite is required in order for the course to be accepted for transfer to the UC or CSU systems.

Justification: Indicate how this is so.

The prerequisite/corequisite is required by law or government regulations.

Explain or cite regulation numbers:

The safety or equipment operation skills learned in the prerequisite course are required for the successful or safe completion of this course.

Justification: Indicate how this is so.

The safety or equipment operation skills learned in the prerequisite course are required for the successful or safe completion of this course.

Justification: Indicate how this is so.

Three CSU/UC campuses require an equivalent prerequisite or corequisite for a course equivalent to the target course:

**Justification:**

## **JUSTIFICATION OF LIMITATION ON ENROLLMENT**

Enrollment in courses or blocks of courses may be limited based on performance, honors, or other performance based criteria. Be mindful of the disproportionate impact the limitation will have on specific groups of students. It is important to determine if the limitation will disproportionately keep under-represented students from enrolling in the course or block of courses.

Describe the reasons for limiting the enrollment.

Course Designator: MFGT 24

Course Title(s): Hydraulics

Rationale for Limiting Enrollment:

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