ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Workforce Development

COURSE: IMT 1206; Industrial Pneumatics

Date: Spring 2014

Credit Hours: 2

Prerequisite(s):

Delivery Method:		
	☒ **Lecture**	**1 Contact Hours (1 contact = 1 credit hour)**
	☐ **Seminar**	**0 Contact Hours (1 contact = 1 credit hour)**
	☒ **Lab**	**2 Contact Hours (2 contact = 1 credit hour)**
	☐ **Clinical**	**0 Contact Hours (3 contact = 1 credit hour)**
	☐ **Online**	
	☐ **Blended**	

Offered: ☐ **Fall** ☒ **Spring** ☐ **Summer**

IAI Equivalent –***Only for Transfer Courses***-go to *http://www.itransfer.org*:

CATALOG DESCRIPTION:
This course is designed to safely introduce all components, circuits, and principles commonly used in industry, and to fully acquaint the student with principles of pneumatic power. Practical working pneumatic circuits with many variations will be developed in a laboratory environment. Electro-mechanical exercises tie machine pneumatic power and electrical behavior together for industrial understanding. This course is competency-based instruction.

GENERAL EDUCATION GOALS ADDRESSED

[See the last page of this form for more information.]

Upon completion of the course, the student will be able:

[Choose those goals that apply to this course.]

☒ To apply analytical and problem solving skills to personal, social and professional issues and situations.
☒ To communicate orally and in writing, socially and interpersonally.
☐ To develop an awareness of the contributions made to civilization by the diverse cultures of the world.
☐ To understand and use contemporary technology effectively and to understand its impact on the individual and society.
☒ To work and study effectively both individually and in collaboration with others.
☒ To understand what it means to act ethically and responsibly as an individual in one's career and as a member of society.
☐ To develop and maintain a healthy lifestyle physically, mentally, and spiritually.
☒ To appreciate the ongoing values of learning, self-improvement, and career planning.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals.]

Upon completion of the course, the student will be able to:

1.0 Apply basic formulas to determine potential energy, kinetic energy, force, work, power, pressure, and vacuum energy.
2.0 Understand the use of terminology common to pneumatic applications.
3.0 Understand and use standard symbols common to pneumatic circuits.
4.0 Understand and perform calculations involving the utilization of vacuum in pneumatic applications.
5.0 Perform calculations necessary to determine the size of actuators required in various applications.
6.0 Understand the operation of and the pneumatic circuitry required for:
   a. Check valves
   b. Accumulator
   c. Cylinders
   d. Flow control valves
   e. Directional control valves
   f. Pressure control valves
   g. Compressors
   h. Motors
   i. After coolers
   j. Driers
   k. FRL units
   l. Receivers
7.0 Design a basic pneumatic circuit to accomplish a simplified task.

COURSE TOPICS AND CONTENT REQUIREMENTS:

I. Evolution of Compressed Air
II. Force Transmission Through Air
   A. Force and Pressure
   B. Cylinders/Intensifiers
   C. Pascal's Law
   D. Gauges/Pressure/Vacuum
III. Energy Transmission Through a Pneumatic System,
   A. Gases/Molec

B. Compressors - How They Work
C. Flow Rate - Free Air vs Standard Air

IV. Control of Pneumatic Energy
A. Valves
B. Control of Pressure and Flow
C. Pneumatic Symbols

V. Compressors
A. Types - Positive Disp., Piston, Vane, Screw
B. Multistage Compressors
C. Compressor Location

VI. Aftercoolers, Driers, Receivers, and Air Distribution
A. Compressed Air/Condensation
B. Loop Systems/Leaks

VII. Check Valves/Cylinders and Motors
A. Check Valve Functions

VIII. Directional Control Valves
A. Types 2-way, 3-way, 4-way, and various spool construction
B. Sizing a valve for flow - CV - Flow Coefficient

IX. Flow Controls Valves and Silencers
A. Orifice/Size Affects Flow/Needle Valves
B. Silences - Mufflers

X. Regulators/Boosters, and Sequence Valves
A. Types
B. Dual Pressure Circuits
C. Air/Oil Boosters

XI. Air Preparation
A. Contaminants in Pneumatic Systems
B. Filtrations
C. Lubrication
D. FRL Units

XII. Vacuum Devices and Pneumatic Circuits
A. Pascal's Law
B. Maximum Vacuum Pick-up and Practical Limitations
C. Single and Double Acting Cylinders
D. Two-hand and Reciprocating Circuits
E. Intensifier Circuits
F. Air Motor and Rotary Actuator Circuits

INSTRUCTIONAL METHODS:

1. Lecture
2. Demonstration
3. Videos
4. Laboratory experiments

INSTRUCTIONAL MATERIALS:

Industrial Pneumatic Technology, The Parker Hannifan Corporation.

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

1. Ability to work as a member of a team.
2. Satisfactory performance on all written exams.
3. Satisfactory performance on all laboratory assignments.

OTHER REFERENCES

Fluid Power in Plant and Field, 2nd edition, Womack Educational Publications.

Course Competency/Assessment Methods Matrix

IMT 1206; Industrial Pneumatics	**Assessment Options**																															
For each competency/outcome place an "X" below the method of assessment to be used.	**Assessment of Student Learning**	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	**Direct/ Indirect**	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D						
1.0 Apply basic formulas to determine potential energy, kinetic energy, force, work, power, pressure, and vacuum energy.					X			X	X			X																				
2.0 Understand the use of terminology common to pneumatic applications.				X	X			X	X			X																				
3.0 Understand and use standard symbols common to pneumatic circuits.					X			X	X			X																				
4.0 Understand and perform calculations involving the utilization of vacuum in pneumatic applications.				X	X			X	X			X																				
5.0 Perform calculations necessary to determine the size of actuators required in various applications.				X	X			X	X			X																				

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7.0 Design a basic pneumatic circuit to accomplish a simplified task.				X	X	X		X	X			X																				