

# ILLINOIS VALLEY COMMUNITY COLLEGE



## COURSE OUTLINE

DIVISION: Workforce Development

COURSE: IMT 1200; Equipment Maintenance

Date: Spring 2014

Credit Hours: 3.0

Prerequisite(s): None

Delivery Method:  **Lecture**                      **2 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 provides a basic theory of power transmission equipment and practical applications of it. Basic concepts and procedures for the maintenance and replacement of bearings, vee, timing, and flat belts, chain and chain drives, shaft couplings, gearing, clutches and brakes, lubrication, centrifugal pumps, bearings, screw threads, mechanical fasteners, and packing and seals will be studied. Basic troubleshooting techniques needed to maintain this equipment will be studied.

## 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:

This student will be able to:

- 1.0 Develop a general understanding of the mechanical design, operation, maintenance, and application of basic components to mechanical systems.
- 2.0 Develop classroom and laboratory experiences that will simulate typical industrial applications.
- 3.0 Understand basic principles of weight, mass, gravity, energy, and force systems.
- 4.0 Recognize basic principles of bearings. Be familiar with the types of bearings, their applications, and standards.
- 5.0 Be familiar with basic power transmission devices, such as belting, chains, and couplings.
- 6.0 Become familiar with various types of mechanical fasteners, their applications, and markings.
- 7.0 Be able to identify industrial applications of gears, gear and variable speed drives, clutches and brakes and accessories.
- 8.0 Be familiar with basic lubrication systems and materials. Understand words such as: viscosity, pour point, and penetration.
- 9.0 Be able to recognize warning signs and causes of equipment failure and review basic trouble-shooting concepts.

### COURSE TOPICS AND CONTENT REQUIREMENTS:

- I. Introduction to Course Content
  - A. Introduction to Basic Power Facts
    1. Weight, mass and gravity
  - B. Energy and Force Systems
    1. Energy - chemical potential and kinetic energies
    2. Force, work, torque, power

- 3. Law of Levers and Moments
    - 4. Inertia and centrifugal/centripetal forces
  - C. Basic Behavior of Materials
- II. Belt Drives
  - A. "V" belts
  - B. Variations of belting - flat belts
  - C. Gearbelt
  - D. Poly "V"
  - E. HP rating/calculations/pulleys
- III. Gears – Open
  - A. Theory- Pressure angle
  - B. Types – Standards
  - C. Maintenance –Wear – Breakage
- IV. Gears – Enclosed – Speed Reducers
  - A. Basic Gear Reduction Types
  - B. Service Factors
  - C. Selection/Maintenance
- V. Chain Drives
  - A. Material
  - B. Types
  - C. Lubrication
  - D. Power transmitted
  - E. Calculations for Chain
- VI. Couplings and U-Joints
  - A. Flexible disc
  - B. Lovejoy
  - C. Chain
  - D. Rubber flex
  - E. Application/selection/alignment
- VII. Packings and Seals
  - A. Types/Installation Methods
- VIII. Bearings
  - A. Plain bearings
  - B. Ball and roller bearings
  - C. Taper roller bearing
  - D. Needle bearing
  - E. Applications of types of bearing
  - F. Bearing standards
  - G. Replacement procedures
- IX. Screw Threads and Mechanical Fasteners
  - A. Screw Thread Standards
  - B. Types and Applications
- X. Clutches and Brakes
  - A. Theory
  - B. Types
  - C. Selection/Maintenance
- XI. Conveyor Components
  - A. Types/Applications
  - B. Drives

- XII. Lubrication
  - A. Types of Systems/Oils/Greases
  - B. Applications
- XIII. Centrifugal Pumps
  - A. Theory – pump hydraulics
  - B. Types of impellers

**INSTRUCTIONAL METHODS:**

1. Lecture
2. Demonstration
3. Audio-visual assistance
4. Laboratory

**INSTRUCTIONAL MATERIALS:**

*Millwrights and Mechanics Guide*, Carl A. Nelson, 4th edition, MacMillan (Optional)

Power Transmission Handbook, 5<sup>th</sup> edition, copyright 2013, ISBN 978-0-9817331-6-6.  
(Required)

**STUDENT REQUIREMENTS AND METHODS OF EVALUATION:**

1. Ability to work with others.
2. Be familiar with fundamental mathematics.

**OTHER REFERENCES**

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# Course Competency/Assessment Methods Matrix

IMT 1200; Equipment Maintenance		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
	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 Develop a general understanding of the mechanical design, operation, maintenance, and application of basic components to mechanical systems.		X		X	X			X	X			X	X	X									X									
2.0 Develop classroom and laboratory experiences that will simulate typical industrial applications.			X	X	X		X																									
3.0 Understand basic principles of weight, mass, gravity, energy, and force systems.						X		X	X																							
4.0 Recognize basic principles of bearings. Be familiar with the types of bearings, their applications, and standards.				X	X			X	X																							
5.0 Be familiar with basic power transmission devices, such as belting, chains, and couplings.				X	X			X	X																							
6.0 Become familiar with various types of mechanical fasteners, their applications, and markings.		X		X				X	X																							

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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	
	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							
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.																																	
7.0 Be able to identify industrial applications of gears, gear and variable speed drives, clutches and brakes and accessories.					X			X	X																								
8.0 Be familiar with basic lubrication systems and materials. Understand words such as: viscosity, pour point, and penetration.		X		X	X			X	X																								
9.0 Be able to recognize warning signs and causes of equipment failure and review basic trouble-shooting concepts.			X	X	X			X	X																								