San Bernardino Valley College
Curriculum Approved: January 27, 2003
Last Updated: December 2002

I. COURSE DESCRIPTION:

A. Department Information:

Division:	Technical
Department:	Machine Trades
Course ID:	MACH 097A
Course Title:	Mechanical Systems
Units:	2
Lecture	1 Hours
Laboratory:	3 Hours
Prerequisite:	None

B. Catalog and Schedule Description:
This course focuses on the basic of mechanical drive systems that include mechanical fasteners, measuring instruments, motors, power transmission systems, as well as mechanical drive installation processes.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

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

A. Explain the operations of a mechanical power transmission system.
B. Analyze components that connect motor assemblies to determine wear.
C. Demonstrate the functions of a motor coupling when aligning motor shafts.
D. Set-up adjacent shaft-to-shaft power transfer when utilizing a v-belt, multiple v-belt, chain drives, and gear drives.
E. Analyze the application of multiple gear shaft system.
F. Assess mechanical efficiency of a power system.
G. Calculate the tension of a synchronous belt drive system.
H. Classify the various types of bearings commonly used in mechanical drive systems.
I. Identify and evaluate brake and clutch systems used in a mechanical drive system.

IV. COURSE CONTENT:

A. Operations of a Power Transmission System
   1. Mechanical power transmission safety
   2. Motor mounting
   3. Shaft speed measurement
B. Key Components of Motor Assemblies
   1. Key seat fasteners
   2. Key assembly for hub to shaft connections
   3. Torque and power measurement
   4. Mechanical efficiency
C. Power Transmission Systems
   1. Shaft alignment
   2. Bering type application
D. Shaft-to-Shaft Power Transfer Processes
   1. Belt type concepts, v-belt operations, belt tensioning
   2. Chain drive concepts, operations, tensioning
   3. Spur gear drive, concepts, operations, and analysis
E. Application of Multiple Shaft Drives
   1. Gear analysis
   2. Drive installation
   3. Sleeve couplings
F. Mechanical Industrial Drive Systems
   1. Heavy duty v-belt drives
      a) Conventional
      b) Multiple

c) Variable speed
d) Wedge

2. Heavy duty v-belt selection and maintenance
3. Heavy duty chain drives

G. Synchronous Belt Drives
1. Timing belt drives
2. High torque drive (HTD) belt drives
3. Synchronous belt drive selection and application
4. Synchronous belt drive maintenance and troubleshooting

H. Bearings
1. Solid plain bearings
2. Plain bearing lubrication and selection
3. Plain bearing maintenance and troubleshooting
4. Ball bearings, roller bearing, anti-friction bearings

I. Brake and Clutch Systems
1. Brake and clutch concepts
2. Brakes
3. Friction and cam clutches
4. Brake/clutch selection and maintenance
5. Linear Drive Systems

V. METHODS OF INSTRUCTION:

This course is designed for a combination of hands-on and lecture components, where hydraulic assemblies can be tested and operated. The instructional methods to be used include:

A. Multimedia Curriculum, Student Experimentation
B. Hands-on Skill Exercises-Authentic Assessment
C. Formula Calculations

VI. TYPICAL ASSIGNMENTS:

A. Discussion
Discuss mechanical powers systems, safety, shaft-to-shaft power transfer, motor coupling, brakes and clutches.

B. Reading
Read Amatrol Learning Activity Packets on Mechanical Drive Systems and answer the following questions:
1. Explain the operations of a mechanical power transmission system.
2. What are issues the maintenance technician is faced with when evaluating v-belts?

C. Hands-on Skill Demonstration
1. Demonstrate precision shaft alignment.
2. Demonstrate the use of a v-belt drive system.

D. Student Portfolio demonstrating lab competencies

VII. EVALUATION(S):

A. Methods of Evaluation
1. Objective and subjective examinations (for lecture and skill exercises)
Typical Questions:
a) Describe three methods of power transmission.
b) Describe two methods of axial power transmission commonly used.
2. Portfolio graded on content and materials

B. Frequency of Evaluation
1. Twenty-four computerized Learning Activity Packets
2. Forty hands-on application tests
3. One student portfolio

VIII. TYPICAL TEXT(S):

Integrated Systems Technology, Learning Activity Packets 1-10, Amatrol Corporation, Jeffersonville, Indiana, 2000

Edward Hoffman, Student Shop Reference Handbook, 2nd Edition, Industrial Press, New York, 2000

Weingartner, Machinist Ready Reference, 10th Edition, Prakken Publication, Ann Harbor, Michigan, 2000

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

Calculator