

# Heartland Community College

## Master Course Syllabus

**Division Name:** Career and Technical Education  
**Course Prefix and Number:** MAIN 102  
**Course Title:** Mechanical Systems

**DATE PREPARED:** August 25, 1994

**DATE REVIEWED:**

**DATE REVISED:** June 1, 2020

**PCS/CIP/ID NO.:** 12-470303

**IAI NO. (if available):**

**EFFECTIVE DATE OF FIRST CLASS:** January 2021

**CREDIT HOURS:** 3

**CONTACT HOURS:** 4

**LECTURE HOURS:** 2

**LABORATORY HOURS:** 2

**PREREQUISITE(S):**

- Completion of MATH 091 OR
- Placement at MATH 092 or higher

**CATALOG DESCRIPTION:**

Mechanical Systems examines general mechanical and physics principles and how they apply to common mechanical devices. In hands-on sessions, students install and maintain mechanical equipment. You will learn about mechanical power transmission systems, lubrication concepts, belt and gear drives, pulleys, bearings, and sheaves. Additionally, you will also learn about chains, brakes, and clutch systems.

**TEXTBOOK:**

Instructors for this class should use the following textbooks/online resources or comparable text/online resource that addresses at a minimum the topics listed in the Course Outline and that provides students with the opportunity to achieve the learning outcomes for this course:

Amatrol Learning Content (available via activation codes)

**RELATIONSHIP TO ACADEMIC DEVELOPMENT PROGRAMS AND TRANSFERABILITY:**

Mechanical Systems was designed to meet the specific needs of an Associate of Applied Science degree and not necessarily as a transfer course, particularly in relation to the Illinois Articulation Initiative. This course may transfer to various institutions in a variety of ways. Please see an academic advisor for an explanation concerning transfer options.

**LEARNING OUTCOMES:**

<b>Course Outcomes</b>	<b>Essential Competencies</b>	<b>Range of Assessment Methods</b>
1. Apply general principles of force, motion, and simple machines to the work environment	PS/CT	Exams/Quizzes Assignments
2. Demonstrate the proper use of torque fastening devices on industrial equipment to manufacturer and engineering specifications	PS/CT T	Labs
3. Correctly select and install drive systems including couplings, clutches, brakes, and belts	PS/CT T	Assignments/Exams
4. Correctly repair bearings using the proper tools and references	T	Assignments
5. Compose a list of appropriate tools and reference materials to properly repair mechanical systems to manufacturers' specifications	PS/CT	Exams/Quizzes Assignments Labs
6. Research and apply, along with reflect and share, in written form, information about industrial technology as it relates to the student's field of study	C	Assignments

**ESSENTIAL COMPETENCIES:**

**Communication (C)** - Students communicate effectively.

**Problem Solving/Critical Thinking (PS/CT)** - Students think critically to solve problems or explore issues.

**Technology (T)** - Students appropriately utilize technology.

**PROGRAM OUTCOME(S):**

- Troubleshoot and repair electronic and mechanical systems. (MAIN 101, MAIN 102, MAIN 201, MAIN 202)
- Develop specialized technical skills in one or more areas (Design & Fabrication, Construction, Electronics, Renewable Energy, Facilities Maintenance, Industrial Maintenance, and/or Welding).

**COURSE/LAB OUTLINE:**

1. Understand basic mechanics
2. Follow torque specifications
3. Identify lubricants
4. Repair and install drive systems
5. Installation and maintenance of bearings
6. Use manufacturer's operation and maintenance manuals
7. Repair light equipment to manufacturer's specifications

**METHOD OF EVALUATION (Tests/Exams, Grading System):**

Assessment Method	% of Final Grade
Exams/Quizzes	20-40%
Labs	20-40%
Assignments (may include a Final Project)	20-40%
<b>TOTAL</b>	<b>100%</b>

Course grades will be determined by the use of the following grading scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	Below 60%

**REQUIRED WRITING AND READING:**

Documentation is an important part of this course. All labs are to include descriptive comments within the write-up/answer section relating to each lab. Students will be expected to read assigned selections from the textbook and or labs, articles or other course related materials, at a minimum of 25 pages per week. Estimate is based on a 16-week course schedule. Please note if your class is not a 16-week class your weekly reading assignment will be increased. There is no formal research or writing assignments in this course. However, discipline specific writing and documentation is an important part of these courses, therefore discipline appropriate writing/reading methods will be taught and used in this course.

**SAMPLE COURSE CALENDAR:**

This sample course calendar is provided to guide instructors; each instructor will modify to suit.

<b>Week #</b>	<b>Topic</b>
0	Orientation
1	Introduction to Mechanical Drive Systems Key Fasteners
2	Power Transmission Systems Introduction to V-Belt Drives
3	Introduction to Chain Drives Spur Gear Drives Multiple Shaft Drives
4	Heavy Duty V-Belt Drives V-Belt Selection and Maintenance Synchronous Belt Drives
5	Lubrication Concepts Precision Shaft Alignment
6	Couplings Heavy-Duty Chain Drives
7	Midterm Exam
8	Plain Bearings Ball Bearings
9	Roller Bearings Antifriction Bearing Selection and Maintenance
10	Gaskets and Seals Advanced Gear Drives Gear Drive Selection and Maintenance
11	Finish section on Mechanical Drives 3
12	Brakes and Clutches
13	Brake/Clutch Selection and Maintenance
14	Linear Ball Bushings

15            Ball Screw Drives

16            Final Exam