

Heartland Community College

Master Course Syllabus

Division Name: CTE
Course Prefix and Number: MAIN 220
Course Title: Mechatronics

DATE PREPARED: August 25, 1994
DATE REVIEWED: November 2019
DATE REVISED: November 2019

PCS/CIP/ID NO: 12-144201
IAI NO. (if available):
EFFECTIVE DATE OF FIRST CLASS: Fall 2020

CREDIT HOURS: 3
CONTACT HOURS: 4
LECTURE HOURS: 2
LABORATORY HOURS: 2

PREREQUISITE(S):
-Completion of MAIN 101

CATALOG DESCRIPTION:

Mechatronics covers electrical and mechanical integration, as well as the repair and installation of advanced automation. You will learn about robotic operations, motor controls, safety, and maintenance. Additionally, you will learn troubleshooting techniques for automation systems.

TEXTBOOK:

Instructors for this class should use the following textbooks or comparable text 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:

MAIN 220 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:

Course Outcomes	Essential Competencies	Range of Assessment Methods
1. Physically demonstrate proper safety used in an automation and control environment	T	Labs
2. Identify the input and output commands required for robot integration in an automated process	PS/CT	Assignments Exams/Quizzes Labs
3. Identify the input and output commands required for variable frequency drives in an automated process	PS/CT	Assignments Exams/Quizzes Labs
4. Identify the input and output commands required for motor controls in an automated process	PS/CT	Assignments Exams/Quizzes Labs
5. Apply mechanical, electrical, motor, and fluid theories to a complete automated system	T	Assignments Labs
6. Given an automated system troubleshoot the problem causing the system not to function	T	Assignments Labs Final Project
7. 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 Final Project

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):

- Repair and install advanced automation, including robotic operations. (MAIN 220)
- 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. Safety
2. Control machinery
3. Robotic control
4. Manufacturer and engineering documentation
5. Machine start-up
6. Preventive maintenance
7. Measurement devices

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%
TOTAL	100%

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.

Module #	Module Topic(s)
0	Orientation
1	Introduction to Electric Motor Control Manual Motor Control and Overload Protection
2	Control Ladder Logic Control Relays and Motor Starters
3	Exam #01
4	Introduction to Variable Frequency AC Drives
5	Variable Frequency AC Drives - Speed and Torque Control
6	Variable Frequency AC Drives - Accel./Decel. and Braking
7	Variable Frequency AC Drives - Fault Diagnostics and Troubleshooting
8	Exam #02
9	Automation Operations Programmable Logic Controller Operation Basic PLC Programming
10	PLC Motor Control
11	PLC Timer and Counter Instructions
12	Pick-and-Place Feeding
13	PLC Event Sequencing
14	Indexing
15	Sorting and Parts Storage
16	Exam #03