Mohawk valley community college
Utica and Rome New york

ET 251 Mechatronics Systems

Course or Catalog Description:

ET251 Mechatronics Systems C-2 P-2 Cr-3

This course provides hands-on experience in the control, maintenance, and simulation of a mechatronics system in a team environment to promote learning a broad array of job-ready troubleshooting skills in integrated technologies. Topics covered include: system level programming/troubleshooting, applications and calibration of hall-effect sensors, vacuum grippers, pneumatic robots, material feeding system, magnetic sensors, photoelectric sensors, magnetic reed switches, limit switches, inductive sensor, capacitive sensors, ultrasonic sensor, synchronous belt drive, ball screw drives, part rejection/transfer, stepper motors, homing sensors, GMR (Giant Magnetoresistive) sensors, pneumatic screw feeders, pick and place assembly, gravity feeders, servo robotics, and parts transfer.

1. Prerequisites: None

1. Required Texts, Reading, Materials:
2. STUDENT LEARNING OUTCOMES:

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

1. Comply with safety standards and codes regarding mechanical devices.
2. Assemble the mechanical mounts and components to various mechatronic modules per layout/schematic diagrams.
3. Use calibration and/or diagnostic tools to adjust system’s mechanical operations to specifications.
4. Construct a function-sequence chart for mechanicals of various mechatronic modules.
5. Troubleshoot induced faults to the system’s mechanics.
6. Comply with OSHA and NEC codes regarding electrical safety.
7. Measure and analyze electrical components to spec sheets prior to installation.
8. Install electrical components and wiring harness or terminal blocks on various mechatronic modules, per layout/schematic diagrams.
9. Construct a Step-displacement chart and I/O maps.
10. Troubleshoot induced faults to the system’s electrical portion.
11. Identify pneumatic symbols and the components represented in layout/schematic diagrams.
12. Install pneumatic and electro-pneumatic components to various mechatronic modules per layout/schematic diagrams.
13. Comply with OSHA codes regarding air pressure systems.
14. Measure and adjust pneumatic components, using manual override techniques.
15. Construct a Step displacement chart and I/O maps for pneumatic components.
16. Troubleshoot induced faults to the system’s pneumatic and electro-pneumatic portion.
17. Complete installation of robot, including wiring and controller interface.
18. Install PLC(s) to various mechatronic modules, including the wiring to input/output module terminals or a terminal block.
19. Confirm PLC and robotic programs of various mechatronic modules.
20. Load programs and confirm operations of PLC(s) and robot.
21. Interface mechatronic modules to form an assembly line system. Final adjustments, measurement and manual overrides are used to prepare for single run testing.
22. Troubleshoot a system with diagnostic techniques to identify the problem and restore the system to operation.
23. DETAILED COURSE OUTLINE: Topics
24. Process Logic Controllers – Introduction (1 period)
25. Chapter 1 Mathematics, Physics, and Chemistry

Formulas and Tables (1 period)

1. Chapter 2 Basic Mechanics (1 period)
2. Chapter 3 Hydraulics / Pneumatics (1 period)
3. Chapter 4 Electric Motors (1 period)
4. Chapter 5 Relays (1 period)
5. Chapter 6 Solenoids (1 period)
6. Chapter 7 Servo Motors (1 period)
7. Chapter 8 Shape Memory Alloys (1 period)
8. Chapter 9 Sensors (1 period)
9. Chapter 10 Power Electronics (1 period)
10. Chapter 11 Power Supply (1 period)
11. Chapter 12 - 17 (1 period)
12. Final Review and make up as needed (1 period)

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| **DATE** | **FACULTY NAME** | **CHANGE** | **INPUT** | **MEASUREMENT** | **ASSESSMENT** | **ACTION** |
| 1/16/16 | Michael Higgins | Add disclaimers |  |  |  |  |
| 4/20/16 | M. Higgins | Reformat Course Outline and Schedule | From administration |  |  |  |
| 8/17/16 | M. Higgins | Reformat Course Outline and Schedule | From Sybil web page |  |  |  |
| 1/20/19 | M Higgins | Reviewed to conform to College Standards | Review Standards |  |  |  |
| 1/20/19 | M Higgins | Update CRN, class times | New semester |  |  |  |
| 8/15/19 | M Higgins | Update CRNs, Sec #’s | SIRS |  |  |  |
| 1/7/2021 | M Higgins | Update CRNs, Sec #’s | SIRS |  |  |  |
| 8/17/2021 | M Higgins | Update CRNs, Sec #’s | SIRS |  |  |  |
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