

Revised FALL 2016

MEC 140 Introduction to Mechatronics

COURSE OUTLINE

Prerequisites: Basic knowledge of algebra or divisional approval

Course Description:

Presents foundational concepts in mechatronics including analog and digital electronics, sensors, actuators, microprocessors, and microprocessor interfacing to electromechanical systems. Surveys components and measurement equipment used in the design, installation, and repair of mechatronic equipment and circuits.

Semester Credits: 3 Lecture Hours: 2 Lab Hours: 2

VIRGINIA WESTERN COMMUNITY COLLEGE
PO Box 14007
Roanoke, VA 24038
(540)-857-7273



Introduction to Mechatronics

Course Outcomes:

At the completion of this course, the student should be able to:

- Explain the role of programmable logic controllers within a given system or module.
- Trace and describe the flow of information in a given mechatronic system or subsystem with a focus on the control function of PLCs in the system.
- Describe the basic functions and design of PLCs.
- Read, analyze and utilize the technical documents such as data sheets, timing diagrams, operation manuals, schematics, and ladder diagrams.
- Correctly localize, identify and document system malfunctions in or caused by PLC hardware , based upon the technical documentation.
- Apply safety rules while working on the system.
- Transfer the knowledge learned from one system to another system.

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Required Materials:

1. Tooling University (online subscription)
2. Internet access
3. Blackboard

Textbook (optional)*:

The following supplementary materials are available: [Simulation software for PLC programming.](#)

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Topical Description:

Content to be covered within this course includes the following topics:

- Function and design of a programmable logic controller (PLC)
- Types of signals in control systems
- Number systems and digital logic
- Configuration of a PLC
- Basic function modules of PLC
- Program processing
- Basic fundamentals of the programming language STEP7
- Testing and simulation of a PLC program
- Safety issues, including local regulations
- Preventive and routine maintenance of PLCs
- Troubleshooting of the PLC hardware within a module or system

NOTE: The order in which the content will be discussed is dependent upon the mechatronic system which is being used. In each case, the component and/or class of components will be discussed within the context of the system and the module in which the component is located. This means that the exact order of presentation will vary according to the system available for instruction. It is also important that all classes of electrical components be discussed, whether available in the training system or not. Focus in all cases is on the role of the components within a module and system, identification of problems, routine maintenance, troubleshooting, and safety issues with the goal of preventing system downtime or reducing them to a minimum.

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Course Materials

Recommended basic course materials are in digital form:

Course materials provided by SMSCP Partner Schools to their students are at the partner school's discretion, and may include special software such as SIMIT, Diagnostic Kit software, etc. If desired, a supporting textbook on basic PLC topics may be required by the school or instructor. Students must also have access to a mechatronic training system containing all or most of the basic component types covered in the course. Please see the SMSCP "Hardware Requirements" document for more information on system requirements for Level 1 instruction.

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Notes to Instructors

1. Use Rockwell Industrial Automation Software suite
2. STEP 7 in W110

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