IND 250
Introduction to Basic Computer Integrated Manufacturing
COURSE OUTLINE

Prerequisites: Basic knowledge of algebra; previous education or experience with PLCs (installation and/or programming).

Course Description:

IND 250 Introduction to Basic Computer Integrated Manufacturing (3 CR) Presents basic principles used in the design and implementation in a computer integrated manufacturing system. Emphasizes team concept and all aspects of a computer integrated manufacturing system to include the following: Robotics, Conveyor Control, Machining Center Integration Quality Control, Statistical Quality Control, and Computer Integrated Manufacturing (CIM) software. Lecture 1 hour. Laboratory 4 hours. Total 5 hours per week.

Semester Credits: 3 **Lecture Hours:** 1 **Lab Hours:** 4

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Course Outcomes:

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

1. Understand the role of analogue sensors and analogue modules in PLC technology.

2. Understand the components PROFIBUS and MPI Bus.

3. Apply the knowledge to ensure proper performance of networks.

4. Use STEP 7, RS Logix & RS Linx correctly.

5. Carry out troubleshooting and preventive maintenance of PLC technology

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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.

Introduction to Basic Computer Integrated Manufacturing

Topical Description:

Course Content
Level 2, Course 2
Introduction to Totally Integrated Automation

1. Analogue Modules & Values

    1.1.   Wiring of Analogue Modules
               (different types $\Rightarrow$ Voltage, Current, Resistance)
    1.2.   Scaling and Unscaling (FC 105 & FC 106)

2. PLC-Programming

    2.1.   Real Numbers
    2.2.   Co mparison Functions (REAL)
    2.3.   Accumulator Functions (PUSH, POP, TAK)
    2.4.   Arithmetic Functions (+, -, *, / $\Rightarrow$ INT, DINT, REAL)
    2.5.   Conversion Functions (ITB, BTI)
    2.6.   Jump Functions (JU, JC, JCN)

3. MPI-Bus & PROFIBUS

    3.1.   Bus cable & PROFIBUS plugs (MPI & PROFIBUS)
    3.2.   MPI-Bus connection in S7 project
               (MPI-Network in STEP7 HardwareConfig)
    3.3.   Define Global Data in STEP 7
    3.4.   Implementation into the S7 project (Slaves)
    3.5.   Maintenance & Troubleshooting
    3.6.   Data traffic

3.7. Implementation of Non-Siemens-PROFIBUS modules
(GSD, GSE – file)

This course is the second in a series of six courses which prepare students for certification as a Siemens Certified Mechatronic Systems Associate. The job profile for which the Level 2 certification prepares students is that of a technician who has a well-rounded understanding of the complex inter-relationships and inter-workings of a mechatronic system.

This course, as all courses within the Certification Program, is based upon a systems-oriented approach. Students learn about individual components and system characteristics within the context of an actual mechatronic system. At the beginning of this course, students should first be presented with a complex system. Ideally, this system is physically available at the educational institution and within the first class meetings should be visited by the students. By focusing on an actual system, students understand clearly why they are learning the subject material. This increases significantly the learning effect and promotes a fuller understanding of the material being learned. By viewing the system as a whole, learning retention is also increased, as the student experiences the components as part of a whole, rather than in isolation.

Of great importance is that the student is able to transfer the knowledge learned to a new system and is able to quickly familiarize himself with the new system.

This understanding leads to a better informed employee who has sufficient knowledge to make well-informed decisions about the running of the system upon which he or she is working.

For this course in particular, students will build on their previous knowledge of PLCs , either as part of the Level 1 course entitled "Digital Fundamentals and PLCs ", or through equivalent education or experience.   The knowledge of digital basics will be built upon to not only include more functions and advanced topics but to focus on communications between PLCs as well.

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Notes to Instructors

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