Production System Automation

Programme course

6 credits

Automation av produktionssystem

TMPS42

Valid from: 2017 Spring semester

Determined by
Board of Studies for Mechanical Engineering and Design

Date determined
2017-01-25

Offered for the last time
Spring semester 2021

Main field of study
Mechanical Engineering

Course level
Second cycle

Advancement level
A1X

Course offered for
- Industrial Engineering and Management - International, M Sc in Engineering
- Industrial Engineering and Management, M Sc in Engineering
- Mechanical Engineering, M Sc in Engineering
- Mechanical Engineering, Master's programme

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
Production Engineering. Manufacturing Engineeering.

Intended learning outcomes
The aim of the course is to provide a theoretical and practical overview on computerized manufacturing equipment focusing on system level automation. After the course the students should be able to:

- Understand the logic based formalism that supports the programming of industrial controllers
- Design programs for industrial controllers that are able to interpret the information collected from a set of sensors and convert that information into the corresponding actuation.
- Design programs that can communicate with other programs and therefore control a complex system.
- Understand the main programming principles for large automated systems.
- Understand the current and emerging automation and system architectures as well as their application context.

Course content

The course focuses on the principles, concepts and technologies required/used to automate current manufacturing systems containing different equipment: robots, conveyor belts, automated guided vehicles, etc. The automotive industry is a known example of a sector applying these systems. Good automation practices, allied with the latest technology, are fundamental in improving production efficiency. This is a precondition for sustaining and/or increase industrial production in Sweden.
The initial part of the course covers the basics of programmable logic controllers (PLC) programming and communication, the formal models that support them and how these relate to the most common sensors, actuators and equipment found in large automated manufacturing systems..
In addition the course introduces emerging technologies such as automation based in service oriented architectures and multiagent systems as the new approaches to create highly reconfigurable systems and therefore substantially tackle the mass customization concept.
The following topics are covered:

1. Boolean Algebra
2. PLC Programming (using the IEC 61131-3)
3. iPLC communication
4. Sensors & Actuators
5. System architectures for automation

Teaching and working methods

The course will consist of lectures and laboratory exercises. The lectures covering the different topics provide the supporting conceptual background that will be applied in the laboratory exercises. The laboratory exercises consolidate the knowledge acquired on the lectures by providing an “hands on” experience whereby the students programs a set of mini-factories.

Examination

LAB1	Laboratory work	3 credits	U, G
TEN1	Written examination	3 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Course literature

Selected Literature on the different topics provided by the examiner and freely available.

Department
Institutionen för ekonomisk och industriell utveckling

Director of Studies or equivalent
Mats Björkman

Examiner
Luis Ribeiro

Course website and other links

Education components
Preliminary scheduled hours: 0 h
Recommended self-study hours: 160 h

Course literature
MODERN Produktionsteknik del 2, Liber utbildning. Vid institutionen prducerade laborations-PM.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.