Remarque
This course can be taken by students of all engineering sections.

Summary
This course consists of two parts: 1) architecture of automation systems, hands-on lab 2) handling of faults and failures in real-time systems, including fault-tolerant computing.

Content
Trends like digitalization and internet of things affect the way industrial plants are designed, deployed and operated. Industrial Automation comprises the control, communication and software architecture in (real-time) automation systems: factories, energy production and distribution, vehicles and other embedded systems.

Keywords
1. Processes and plants, automation system architecture
2. Instrumentation, Programmable Logic Controllers and embedded computers
3. Industrial communication networks, field busses
4. Field device access protocols and application program interfaces
5. Human interface and supervision
6. Manufacturing Execution Systems
8. Real-time response and performance analysis
9. Dependability (Reliability, Availability, Safety, ...)

Learning Prerequisites
Recommended courses
Communication networks

Learning Outcomes
By the end of the course, the student must be able to:

• Characterize the (software) architecture of a automation system
• Apply methods and trade-offs in real-time systems
• Analyze a plant
• Propose suitable automation solutions meeting the requirements
• Analyze the reliability, availability, safety of a system
Transversal skills

• Write a scientific or technical report.
• Use both general and domain specific IT resources and tools
• Communicate effectively with professionals from other disciplines.
• Keep appropriate documentation for group meetings.
• Access and evaluate appropriate sources of information.

Teaching methods

Oral presentation aided by slides, exercises as part of the lecture, practical work (workshop at Siemens and group assignment).

Expected student activities

• Understand material presented during lectures by asking questions and/or independent (online) searches
• Attend Siemens workshop (one full day on Siemens premises in Renens)
• Work on group assignment
• Hand-in artifacts for assignment on time

Assessment methods

Assignment 25% and final oral exam 75%

Resources

Bibliography
Nussbaumer, Informatique Industrielle (EPFL)

Ressources en bibliothèque
• Informatique Industrielle / Nussbaumer

Websites
• http://lamspeople.epfl.ch/pignolet/IA/index.html

Moodle Link
• https://moodle.epfl.ch/course/view.php?id=14114