EPFL

CS-487	**Industrial automation**

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Cursus	Sem.	Type
Computer science	MA2	Opt.
Cybersecurity	MA2	Opt.
Electrical and Electronical Engineering	MA2, MA4	Opt.
Robotics	MA2	Opt.
SC master EPFL	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Oral
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Project	1 weekly
Number of positions	

Remark

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

Summary

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

Content

1. Processes and plants, control 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, ...)

Keywords

Industrial Automation considers the control, communication and software in real-time systems: factories, energy production and distribution, vehicles and other embedded systems.
Industrial Automation encompasses the whole chain from sensors, motors, controllers, communication networks, operator visualization, archiving and up to manufacturing execution systems and enterprise resource management. It includes fault-tolerance against hardware and software faults and the evaluation methods.
This application-oriented course does not require previous knowledge in control theory. It complements communication systems courses with a focus on industrial applications.

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 control 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

- Communicate effectively with professionals from other disciplines.
- Keep appropriate documentation for group meetings.
- Use both general and domain specific IT resources and tools
- 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 report and slides for assignment on time

Assessment methods

Assignment 25% and final oral exam 75%

Resources

Bibliography

Nussbaumer, Informatique Industrielle (EPFL)
Olsson, Gustav & Rosen, Christian - industrial automation,Dept. of Industrial Electrical Engineering and Automation, Lund University, Lund, Sweden.

Ressources en bibliothèque

- Informatique Industrielle / Nussbaumer

Websites

- http://lamspeople.epfl.ch/kirrmann/

Moodle Link

- http://moodle.epfl.ch/course/view.php?id=14114