

CS-487

Industrial automation

Sommer Philipp Alexander, Tournier Jean-Charles

Cursus	Sem.	Type
Computer science	MA2, MA4	Opt.
Cybersecurity	MA2, MA4	Opt.
Electrical and Electronical Engineering	MA2, MA4	Opt.
Energy Science and Technology	MA2, MA4	Opt.
Mechanical engineering	MA2, MA4	Opt.
Microtechnics	MA2, MA4	Opt.
Robotics, Control and Intelligent Systems		Opt.
Robotics	MA2, MA4	Opt.
SC master EPFL	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Withdrawal Session	Unauthorized Summer
Semester Exam	Spring Oral
Workload	90h
Weeks	14
Hours	3 weekly
Courses	2 weekly
Exercises	1 weekly
Number of positions	36

Il n'est pas autorisé de se retirer de cette matière après le délai d'inscription.

Remark

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) dependable systems and 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. 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.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.

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

Introduction to Industrial Automation, Stamatios Manesis & George Nikolakopoulos, CRC Press, 2018

Ressources en bibliothèque

- [Introduction to Industrial Automation / Manesis](#)

Moodle Link

- <https://go.epfl.ch/CS-487>