Module Description, available in: EN

Integrated Automation

General Information

Number of ECTS Credits

3

Module code

TSM_IntAuto

Valid for academic year

2025-26

Last modification

2019-07-04

Coordinator of the module

Katrin Lohan (OST, katrin.lohan@ost.ch)

Explanations regarding the language definitions for each location:

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	Lausanne			Lugano	Zurich		
Instruction					**X** E 100%		
Documentation					**X** E 100%		
Examination					**X** E 100%		

Module Category

TSM Technical scientific module

Profile Recommendations

This module is recommended for the following profiles:

	Zurich
Profile	MA

Lessons

2 lecture periods and 1 tutorial period per week

Entry level competences

Prerequisites, previous knowledge

- Basic principles of automation technology
- Basic principles of communication technology, e.g. OSI Reference Model, Ethernet, TCP/IP etc.
- Basic principles of statistics and random variables

Brief course description of module objectives and content

In an automation system in manufacturing technology or process automation, sensors measure non-electric values and actuators, such as drives, influence the process. The individual components are controlled by control systems and automatic controllers, connected with industrial networks, and supervised by humans.

The emphasis of this module is on the selection and determination of the individual components, bearing in mind functional aspects, with special attention to functional safety.

Aims, content, methods

Learning objectives and competencies to be acquired

The student will be able to :

- establish the specifications of an integrated mechatronic system, including the sensors, the actuators, and the control systems;
- master the operation of electric drives for automated processes; be able to choose a motor with its controls according to the applications;
- select and to integrate technologies of sensors according to applications;
- determine a suitable communication system for an automation task on the basis of functions and performance parameters;
- designate the evaluation criteria for the application of user interfaces;
- plan and size an Ethernet-based network;
- calculate comprehensive parameters (MTBF, MTTF, MTU…) on the basis of statistical data;
- complete a risk analysis

Module content with weighting of different components

The module is divided in three courses:

1. *Drives and Sensors (ca. 35%)*
    - Functionality, calculation, and operational behavior of motors
    - Functionality and choice of sensors
    - Drive design and regulation
    - Decentralized drive systems
    - Application examples
2. *Communication and Networks (ca. 30%)*
    - Functionality and integration of automation components (bus systems, automation devices, communication modules, process control systems)
    - Networked automation technology
    - Service and monitoring systems, Human Machine Interface
    - Planning and the basic principles of project planning with Profinet / industrial Ethernet-based networks
    - Application examples
3. *Safety Engineering in Automation Technology (ca. 35%)*
    - Project planning for an error-proof automation system
    - Error-proof communication and programming
    - Remote diagnostics, elimination of errors, and remote maintenance
    - Application examples

Teaching and learning methods

- Lecture, presentations and discussion of theoretical topics
- Discussion of practical applications and examples form the industry
- Exercises and self-study of selected topics

Literature

The lecturers' scripts will contain references to current literature.

Assessment

Additional performance assessment during the semester

The module does not contain an additional performance assessment during the semester

Basic principle for exams

As a rule, all standard final exams are conducted in written form. For resit exams, lecturers will communicate the exam format (written/oral) together with the exam schedule.

Standard final exam for a module and written resit exam

Kind of exam

Written exam

Duration of exam

120 minutes

Permissible aids

Aids permitted as specified below:

Permissible electronic aids

All **OFFLINE** electronic devices (e.g. laptops, tablets, calculators) are **allowed**

Other permissible aids

Open book

Exception: In case of an electronic Moodle exam, adjustments to the permissible aids may occur. Lecturers will announce the final permissible aids prior to the exam session.

Special case: Resit exam as oral exam

Kind of exam

Oral exam

Duration of exam

30 minutes

Permissible aids

No aids permitted