

Faculty of Applied Sciences



MECA2755 Industrial automation.

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s): Paul Fiset, Jean-Claude Samin
Language: French
Level: Second cycle

Aims

Provide students with basics in the fields of :

- Industrial sensors
- Pneumatic and electropneumatic systems
- Robotics
- Programmable Logic Controllers (PLC)
- Field bus technology
- Mechanical indexors

Give students the opportunity to practice in the field of sequential automation, via seven laboratories dealing with pneumatic and electropneumatic logics, as well as programming an industrial conveyor.

Main themes

- Industrial sensors
- Pneumatic and electropneumatic systems
- Industrial Robotics
- Programmable Logic Controllers
- Field bus technology
- Mechanical indexors

Content and teaching methods

1. Introduction (1 lecture) :

What is industrial automation and what does it involve ? - course organization - grading - illustrations (video)

2. Industrial sensors (2 lectures)

Types and characteristics of sensors

Presentation of different types of sensors - principle and technology:

- displacement/position sensors
- velocity/acceleration sensors
- force/torque sensors
- pressure sensors
- #

3. Pneumatic and electropneumatic systems (3 lectures, 5 labs)

Pneumatic systems :

- compressed air : production, filtering, lubrication
- valves and cylinders: technology, applications, dimensioning
- pneumatic logics : simple circuits - study of signal problems
- bi-stable /mono-stable devices
- Installation : layout and dimensioning

Electropneumatic systems:

- electro-valves, relays, # : technology, dimensioning
- electropneumatic logics : simple circuits - study of signal problems
- bi-stable /mono-stable devices

4. Robotics (3 lectures)

Introduction: industrial robots, economic/statistical aspects

Robot classification, performances

Robot components :

- actuators
- transmission elements
- effectors (grippers, #)

5. Programmable Logic Controllers (3 lectures + 2 labs)

Introduction : origins, PLC versus electropneumatic logic

Technology, functioning, peripheral devices

Programming languages

Ladder programming : principles, practical examples

Grafcet programming : origins, principles, practical examples

Functional approach to sequential programming (Grafcet based)

6. Field bus (1 lecture)

Origins, principle - economic aspects

Technology, description of widespread field buses (Profibus DP, ASI, #)

Fieldbus and pneumatic systems

7. Mechanical indexors (1 lecture)

Applications, advantages, limitations

Technology : paradromic and globic cams

Characteristic parameters (dwell, index, stops, double index, #)

Static and dynamic dimensioning - practical examples

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prérequisites : no

Grading : Written exam

Support :

- Notes : sensors, pneumatic systems and robotics
- Copies of slides : PLC, Mechanical indexors, Field bus

Visits to companies are organized during semester 1 or 2 in the field of industrial automation (ex. production lines, car manufacturing, #)

Other credits in programs

ECGE3DS/SC	Diplôme d'études spécialisées en économie et gestion (Master in business administration) (Supply Chain Management)	(5 credits)	Mandatory
ELEC23	Troisième année du programme conduisant au grade d'ingénieur civil électricien	(5 credits)	
ELME22/E	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (énergie)	(5 credits)	
ELME22/M	Deuxième année du programme conduisant au grade d'ingénieur civil électro-mécanicien (mécatronique)	(5 credits)	Mandatory
MECA22	Deuxième année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)	Mandatory
MECA23	Troisième année du programme conduisant au grade d'ingénieur civil mécanicien	(5 credits)	