UCL Faculté des sciences appliquées

FSA

MECA2755	Automatisation industrielle

[30h+30h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s):	Hervé Buyse, Paul Fisette, Jean-Claude Samin
Language:	french
Level:	2nd cycle course

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)	
ELME21/M	Première année du programme conduisant au grade d'ingénieur civil électro-mécanicien (mécatronique)	(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)	

Other credits in programs