Smart devices

Skills
Introduction to Sensors
Understand basic notions of sensors, data acquisition: physics, electronics and metrology p
testing
Be able to design the datasheet of the sensor manufactured
Microcontrollers and Open Source Hardware
Understand microcontroller archictecture and how to use them
Be able to design data acquisition system (sensor, conditioner, microcontroller) with respe
Be able to design the electronic circuit of a sensor’s signal conditioner (design + simulatio
Be able to design a shield to accommodate the gas sensor
Be abe to design the sofware to use the gas sensor and its HMI
Be able to combine all of the above mentioned components into a smart device

1-level of application: follow-up of instructions or procedures
2-level analysis: improvement or optimization of solutions or proposals
3-level of control: design of programs or definitions of specifications
4-level of expertise: definition of guidelines or strategies

GP : Physics students
AE: Electronics/ Control
I: Computer science/ISIS
R: Network
B: Business

GP	AE	I	R	B
4	4	4	4	1
4	4	4	4	1
4	4	3	3	1
4	4	3	3	1
4	4	3	3	1
4	4	3	3	1
4	4	3	3	1
3	3	4	4	1
4	4	3	3	1

Evaluation method
Exercise of application by project group to be inserted in the portfolio
Cleanroom training
Datasheet inserted in portfolio
Portfolio
Portfolio
Portfolio
Portfolio
Portfolio
Portfolio

Communication:

Protocols and communication
Understand the major development phases for mobile communications and development c
Understand the impact of new mobile technology
Be able to analyse and evaluate optimal wireless network technologies
Be able to suggest optimal technological solutions for IoT networks
Understand and master optimisation of communication protocols for IoT with respect to en
Understand and master optimisation of communication protocols with respect to security c
transmitter-receiver
Mastering the architecture of an energy management system, simple storage, energy recc

Security for IoT networks
Understand the fundamentals of security
Be able to identify security weaknesses in an IoT architecture
Be able to assess the impact of exploiting a security vulnerability in an IoT architecture
Be able to propose adequate security counter-measures

1-level of application: follow-up of instructions or procedures
2-level analysis: improvement or optimization of solutions or proposals
3-level of control: design of programs or definitions of specifications
4-level of expertise: definition of guidelines or strategies

GP : Physics students
AE: Electronics/ Control
I: Computer science/ISIS
R: Network
B: Business

GP	AE	I	R	B
4	4	4	4	2
4	4	4	4	2
4	4	4	4	2
4	4	4	4	2
4	4	4	4	2
4	4	4	4	3
4	4	3	3	2
4	4	3	3	2
GP	**AE**	**I**	**R**	**B**
4	4	4	4	3
3	3	3	3	1
3	3	4	4	1
3	3	3	3	1

Evaluation method

Evaluation method
TP Report
TP Report
TP Report
TP Report

Middleware and Service Traning Unit

Service Oriented Architecture
Know how to define a Service Oriented Architecture
Deploy an SOA with web services
Deploy and configure an SOA using SOAP
Deploy and configure an SOA using REST
Integrate a process manager in an SOA
Middleware for the Internet of Things
Know how to situate the main standards for the Internet of Things
Deploy an architecture compliant to an IoT standard and implement a sensor network
deploy and configure and IoT architecture using OM2M
Interact with the different resources of the architecture using REST services
Integrate a new technology into the deployed architecture
Adaptability: Cloud and Autonomic Computing
Understand the concept of cloud computing
Use a IaaS-type cloud service
Deploy and adapt a cloud-based platform for IoT

1-level of application: follow-up of instructions or procedures
2-level analysis: improvement or optimization of solutions or proposals
3-level of control: design of programs or definitions of specifications

4-level of expertise: definition of guidelines or strategies

GP : Physics students
AE: Electronics/ Control
I: Computer science/ISIS
R: Network
B: Business

GP	AE	I	R	B	Evaluation method
3	4	4	4	3	Project
3	4	4	4	1	Project
3	4	4	4	1	Project
3	4	4	4		Project
3	4	4	4	1	Project
GP	**AE**	**I**	**R**	**B**	**Evaluation method**
3	4	4	4	3	TP Report
3	4	4	4	1	TP Report
3	4	4	4	1	TP Report
3	4	4	4	1	TP Report
3	4	4	4	1	TP Report
GP	**AE**	**I**	**R**	**B**	**Evaluation method**
3	3	4	4	3	TP Report
3	3	4	4	1	TP Report
3	3	4	4	1	TP Report

Analysis and data processing, business applications

Software Engineering
Define the different phases in software development
know the different project management methods
Apply one of these methods a project
Processing Semantic Data
design and understand a model for an application
Know how to infer new knowlegde from a knowledge base
Be able to enrich data with semantic meta-data
Data Processing and Analysis: Big Data
Know how to explore and represent data sets
Master R
Master complexity associated to statistical data processing and know the techniques to b

1-level of application: follow-up of instructions or procedures
2-level analysis: improvement or optimization of solutions or proposals
3-level of control: design of programs or definitions of specifications
4-level of expertise: definition of guidelines or strategies

GP : Physics students
AE: Electronics/ Control
I: Computer science/ISIS
R: Network
B: Business

GP	AE	I	R	B	Evaluation method
3	3	3	3	3	Project
3	3	3	3	4	Project
3	3	3	3	3	Project
GP	**AE**	**I**	**R**	**B**	**Evaluation method**
3	3	4	3	2	TP Report
3	3	4	3	1	TP Report
3	3	4	3	1	TP Report
GP	**AE**	**I**	**R**	**B**	**Evaluation method**
4	3	3	3	1	TP Report
3	3	4	3	1	TP Report
4	3	4	3	1	TP Report

Innovation and humanity

Manage an innovative project:
Solve a problem in a creative way
Develop the first stage of innovation
Understand production, validation, distribution, acceptability, and aftermath of innovation
structure and lead an innovative project
Learn teamwork
Multi-disciplinary students work as a team
Be convincing: present and defend an idea
express and exchange hypotheses
Suggest a strategy to solve the problem identified
Suggest a model
choose, design and / or justify a protocol or an experimental prototype
self evaluation with portfolio
Reflect upon my training process and methods
Be able to put forward my training experiences, whether they be explicit or implicit
Be self-sufficient and responsible towards my education

1-level of application: follow-up of instructions or procedures
2-level analysis: improvement or optimization of solutions or proposals
3-level of control: design of programs or definitions of specifications
4-level of expertise: definition of guidelines or strategies

GP : Physics students
AE: Electronics/ Control
I: Computer science/ISIS
R: Network
B: Business

GP	AE	I	R	B
4	4	4	4	4
4	4	4	4	4
4	4	4	4	4
4	4	4	4	4
GP	**AE**	**I**	**R**	**B**
4	4	4	4	4
GP	**AE**	**I**	**R**	**B**
4	4	4	4	4
4	4	4	4	4
4	4	4	4	4
4	4	4	4	4
GP	**AE**	**I**	**R**	**B**
4	4	4	4	4
4	4	4	4	4
4	4	4	4	4

Evaluation method
Evaluation method
Evaluation method
Evaluation method
report/WEB
report/web
report/WEB

Innovativ project

	GP
Analyse a real-life problem	4
Suggest a technological solution to a problem	4
Implement a prototype to solve the problem	4
Present and debate (in English) the technical choice made	4
Produce a report (in English) for the developed project	4

1-level of application: follow-up of instructions or procedures

2-level analysis: improvement or optimization of solutions or proposals

3-level of control: design of programs or definitions of specifications

4-level of expertise: definition of guidelines or strategies

GP : Physics students
AE: Electronics/ Control
I: Computer science/ISIS
R: Network
B: Business

AE	I	R	B	Evaluation method
4	4	4	4	report/presentation
4	4	4	4	report/presentation
4	4	4	4	prototype
4	4	4	4	presentation
4	4	4	4	report

Business startup

Discover methods to validate and prioritize innovations and market targets
Know the points to work to offer value and build a good business model
Define if an idea is patentable and carry out a search of anteriority
Define your financing tool according to your needs and adapt
set goals in line with your means, discover and select digital and traditional commercial ac
recuit, manage and organise a startup
make a pitch

1-level of application: follow-up of instructions or procedures
2-level analysis: improvement or optimization of solutions or proposals
3-level of control: design of programs or definitions of specifications
4-level of expertise: definition of guidelines or strategies

GP : Physics students
AE: Electronics/ Control
I: Computer science/ISIS
R: Network
B: Business

GP	AE	I	R	B	Evaluation method
3	3	3	3	4	portfolio
3	3	3	3	4	portfolio
3	3	3	3	4	portfolio
3	3	3	3	4	portfolio
3	3	3	3	4	portfolio
3	3	3	3	4	portfolio
3	3	3	3	4	presentation

Security

Knowing the main issues in security for IoT
Understand the terminology of security
Being able to have a critical look at the design of a system from a security point of view
Being able to understand a scientific article that explains a weakness or a security solution

1-level of application: follow-up of instructions or procedures
2-level analysis: improvement or optimization of solutions or proposals
3-level of control: design of programs or definitions of specifications
4-level of expertise: definition of guidelines or strategies

GP : Physics students
AE: Electronics/ Control
I: Computer science/ISIS
R: Network
B: Business

GP	AE	I	R	B	Evaluation method
3	3	3	3	3	report/presentation
2	2	3	3	2	report/presentation
2	2	3	3	2	report/presentation
2	2	3	3	2	report/presentation