


# UE Embedded systems and internet of things (IOT)

 **ECTS**  
3 credits

 **Component**  
UFR PhITEM  
(physique,  
ingénierie, terre,  
environnement,  
mécanique)

 **Semester**  
Printemps

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** PAX8ECAB

## Presentation

### Description

Advanced embedded and robotic systems are more and more made of several computation units, spread out from the embedded object (Thing) to the cloud, and connected through communication links and network. Among other digital design considerations, processing performance, micro-controllers architecture, Internet of Things will be addressed in this course.

After completion of this course, student will be able to :

- apprehend the diversity in the micro-controllers current commercial offer,
- understand their internal differences and the consequences on computation performance, power consumption, cost...
- choose processing units suited to a specific application,
- program micro-controllers and cloud tools to control an embedded or IoT system.

#### **Content**

- Introduction to embedded systems,
- general internal architecture of micro-controllers for embedded systems,
- quick tour of dedicated internal structures to enhance processing performance, and speed up code execution : FPU, memory caching, DMA, SIMD,
- basics of the IoT : quick tour of communication links (Ethernet, LoRa...) and protocols (MQTT), Cloud database.

During the labs, focus will be set on :

- basics of micro-controller programming,
- performance measurement on two very different micro-controllers product lines,
- implement an IoT application, requiring cooperation of small autonomous robots, and central or cloud computation.

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## Course parts

UE Embedded systems and internet of things (IOT) - CM/TD	Lectures (CM) & Teaching Unit (UE)	9h
UE Embedded systems and internet of things (IOT) - TP	Practical work (TP)	18h

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## Recommended prerequisites

- Boole logic,
- Basics of a structured language like C/C++ or Python language.

## Useful info

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### Campus

› Grenoble - Scientific Polygon