



# UE Embedded systems and internet of things (IOT)

 ECTS  
3 crédits

 Crédits ECTS  
Echange  
3.0

 Composante  
UFR PhITEM  
(physique,  
ingénierie, terre,  
environnement,  
mécanique)

 Période de  
l'année  
Printemps (janv.  
à avril/mai)

- > **Langue(s) d'enseignement:** Anglais
- > **Ouvert aux étudiants en échange:** Oui
- > **Crédits ECTS Echange:** 3.0
- > **Code d'export Apogée:** PAX8ECAB

## Présentation

### 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.

### Objectifs

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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## Heures d'enseignement

UE Embedded systems and internet of things (IOT) - CM/TD	Cours magistral - Travaux dirigés	9h
UE Embedded systems and internet of things (IOT) - TP	TP	18h

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## Pré-requis recommandés

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

**Période** : Semestre 8

## Infos pratiques

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### Campus

› Grenoble - Polygone scientifique