

IDENTIFICATION

Course code : IOT501
ECTS : 1

DURATION

Lectures : 6
Tutorial classes : 6
Labs : 12
Total : 24

Project :
Personnal work :

ASSESSMENT

At least two continuous assessments.

TEACHING MATERIALS

Slides and guided work sheets.

LANGUAGE

English

CONTACT

Pierre Ugo TOURNoux
pierre.tournoux@univ-reunion.fr

Modifié le : 14 juillet 2026

UE : UE5-IOT

COURSE : Internet of Things : Principles and Architectures

SCOPE OF THE COURSE

OBJECTIVES

To provide engineering students with the foundations to identify IoT-enabled applications and the elements of the IoT ecosystem required to implement these applications.

COMPETENCE AND SKILLS

- List and implement IoT network protocols
- Implement IoT-specific data distribution protocols
- Select suitable development environments (IDE) for prototyping and product development

PROGRAM

1. Introduction to IoT and its applications
 - Definition and challenges of IoT.
 - Examples of applications in various fields (healthcare, agriculture, smart cities, Industry 4.0).
 - Case study of existing IoT projects.
2. IoT Connectivity : Protocols and Networks
 - LPWAN networks : LoRaWAN, SigFox, LTE-M, NB-IoT.
 - Sensor networks : Zigbee, Thread, 6TiSCH, BLE-mesh.
 - Criteria for selecting a protocol (range, power consumption, bandwidth).
3. Hardware Architectures : IoT Microcontrollers
 - Overview of ARM Cortex and RISC-V architectures.
 - Criteria for selecting a microcontroller based on IoT constraints.
 - Practical examples using development boards.
4. Programming Environments
 - Introduction to tools : Segger, STM32CubeIDE, Zephyr.
 - Practical implementation : creating a simple IoT project (sensor + communication).
5. Data Formats and Associated Protocols
 - Exploration of CBOR formats and CoAP, Matter, 6LoWPAN protocols.
 - Practical cases : transmission and interpretation of IoT data.
6. Review of Classic IoT Sensors
 - Presentation of temperature, humidity, accelerometer, vibration, light, and sound sensors.

- Methods for integrating sensors into an IoT ecosystem.

7. Measuring and Optimizing Energy Consumption

- Principles of consumption measurement.
- Optimization techniques to extend the lifespan of IoT devices.
- Study of trade-offs between performance and power consumption.

BIBLIOGRAPHY

- Timothy Chou, *Precision : Principles, Practices and Solutions for the Internet of Things*, 2016

REQUIREMENTS

Algorithms and data structures in C