



National University of Engineering (UNI)
School of Computer Science
Syllabus 2027-I

1. COURSE

CS3P3. Internet of Things (Elective)

2. GENERAL INFORMATION

2.1 Course	: CS3P3. Internet of Things
2.2 Semester	: 9 th Semester.
2.3 Credits	: 3
2.4 Hours	: 1 HT; 4 HP;
2.5 Duration of the period	: 16 weeks
2.6 Type of course	: Elective
2.7 Learning modality	: Face to face
2.8 Prerequisites	: CS3P1. Parallel and Distributed Computing . (8 th Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

The Internet of Things (IoT) has transformed how we interact with the physical world by connecting billions of devices. This course explores the architectural foundations of IoT, emphasizing device mobility, wireless communication, and the societal implications of pervasive sensing. Students will analyze the technical challenges of constrained systems and the ethical responsibilities associated with large-scale data collection in interconnected environments.

5. GOALS

- Understand the architecture of IoT systems and the role of mobility in network design.
- Evaluate the societal and ethical impacts of IoT technologies.
- Implement communication protocols for constrained and mobile devices.
- Analyze security risks in the lifecycle of an IoT ecosystem.

6. COMPETENCES

AG-C09) Design and Development of Solutions: Designs, implements, and evaluates solutions for complex computing problems. (Usage)

AG-C11) Use of Tools: Applies modern computing tools in problem solving. (Usage)

7. TOPICS

Unit 1: Mobility Support (12 hours)	
Competences Expected: AG-C09,AG-C11	
Topics	Learning Outcomes
- Principles of cellular communication (e.g., 4G, 5G) - Principles of Wireless LANs (mainly 802.11) - Device to device communication (e.g., IoT communication) - Multi-hop wireless networks (e.g., ad hoc networks, opportunistic, delay tolerant)	- Describe some aspects of cellular communication such as registration [Describe] - Describe how 802.11 supports mobile users [Describe] - Describe practical uses of device-to-device communication, as well as multihop [Describe] - Describe one type of mobile network such as ad hoc [Describe]
Readings : [Hanes2017], [Buyya2016]	

Unit 2: Security Ethics, Law and Society (12 hours)	
Competences Expected: AG-C09,AG-C11	
Topics	Learning Outcomes
- Societal impacts of Internet of Things (IoT) devices and other emerging technologies on security and privacy Civil Liberties and Expression, Data, Surveillance and Privacy Technology, Privacy Philosophical Foundations and Legislation, Computer Crimes and Attacks, Security Laws, Policies and Responsibility. - Privacy by design and privacy engineering Civil Liberties and Expression, Data, Surveillance and Privacy Technology, Privacy Philosophical Foundations and Legislation, Computer Crimes and Attacks, Security Laws, Policies and Responsibility.	- Analyze the societal impacts of pervasive IoT surveillance [Evaluar]. - Apply privacy-by-design principles to IoT data architectures [Usar].
Readings : [Hanes2017]	

Unit 3: Networked Applications (24 hours)	
Competences Expected: AG-C09,AG-C11	
Topics	Learning Outcomes
- Distributed application paradigms (e.g., client/server, peer-to-peer, cloud, edge, and fog). See also: Communication, Coordination - Protocols for constrained networks (CoAP, MQTT, LoRaWAN).	- Define the principles of naming, addressing, resource location [Define] - Analyze the needs of specific networked application demands [Analyze] - Describe the details of one application layer protocol [Describe] - Implement a simple client-server socket-based application [Implement]
Readings : [Hanes2017]	

8. WORKPLAN

8.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

8.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

8.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

9. EVALUATION SYSTEM

Theory Sessions:

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

Lab Sessions:

In order to verify their competences, several activities including active learning and roleplay will be developed during lab sessions.

Oral Presentations:

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

Reading:

Throughout the course different readings are provided, which are evaluated. The average of the notes in the readings is considered as the mark of a qualified practice. The use of our virtual campus allows each student to access the course information, and interact outside the classroom with the teacher and with the other students.

The final grade NF depends on the following grades:

- PE : Partial Exam.
- FE : Final Exam.
- P : Permanent Evaluation (Average of practical work and graded assignments).

The final grade NF is calculated as follows:

$$NF = \frac{PE + FE + P}{3}$$

10. BASIC BIBLIOGRAPHY