

Course guide

300111 - STCWIFI - Wifi and 5G Convergence in 6g

Last modified: 04/07/2026

Unit in charge: Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: **Degree:** MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE FOR CONNECTED INDUSTRIES (AI4CI) (Syllabus 2025). (Optional subject).

Academic year: 2026 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Khaldoun Al-Agha (Green Communications), Guy Pujolle (Green Communications), Johan Oudinet (Green Communications), Periklis Chatzimisios (International Hellenic University), Athanasios Iossifides (International Hellenic University)

Others: Khaldoun Al-Agha (Green Communications), Guy Pujolle (Green Communications), Johan Oudinet (Green Communications), Periklis Chatzimisios (International Hellenic University), Athanasios Iossifides (International Hellenic University)

PRIOR SKILLS

Computer networks (NETARCH), basic principles of digital communications and Linux.

REQUIREMENTS

Computer networks (NETARCH), basic principles of digital communications and Linux.

TEACHING METHODOLOGY

Lectures, assignments, project

LEARNING OBJECTIVES OF THE SUBJECT

The main goal of this course is to cover the main aspects related to WiFi and 5G technologies with special attention to their convergence in 6G for connected industries. This course also presents the integration of the cloud computing continuum in such an environment.

STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	36.00
Self study	48,0	64.00

Total learning time: 75 h

CONTENTS

WiFi and 5G Convergence in 6G for Connected Industries

Description:

The course is divided into two parts. In the first three days, the students will learn all the theoretical aspects as described below. In the last two days they will focus on practical aspects with directed studies on an Edge distributed platform with nodes integrating 5G and Wi-Fi cards.

Topics:

Service and network architecture of 5G
Evolution of mobile communication systems to 5G networks
Use cases (eMBB, mMTC, URLLC) and KPIs
Software Defined Networking (SDN)/Network Functions Virtualization (NFV)
3GPP reference model and core network functionalities
Cloud RAN and functional split
Network slicing
Quality of Service in 5G
NR (New Radio)
Frequency bands
Radio access techniques and numerology
Bandwidth parts
Massive MIMO and beamforming
IEEE 802.11
IEEE 802.11 PHY/MAC
IEEE 802.11be – Enhancements for Extremely High Throughput (Wi-Fi 7)
IEEE 802.11bn – Ultra High Reliability (Wi-Fi 8)
IEEE 802.11bd – Enhancements for Next Generation V2X
IEEE 802.11bf – Enhancements for Wireless LAN Sensing
Future directions
Wi-Fi – 5G convergence towards 6G
Uses cases (V2X, Industry 4.0 TSN, WiFi and Private 5G, Offloading)
3GPP Access Traffic Steering, Switching and Splitting (ATSSS), Licensed-Assisted Access (LAA)
Artificial Intelligence in 5G and WiFi
New trends and studies

Complementary content: Digital infrastructure, Internet of Things, 6G

Full-or-part-time: 75h

Theory classes: 27h

Self study : 48h

GRADING SYSTEM

Lab reports, in-class quizzes. A project assignment to perform after the STC execution will also be evaluated.