

## NEXT GENERATION MOBILE COMMUNICATION NETWORKS AND VERTICAL APPLICATIONS

### GENERAL

<b>SCHOOL</b>	ENGINEERING		
<b>DEPARTMENT</b>	INFORMATICS AND COMPUTER ENGINEERING		
<b>LEVEL OF STUDIES</b>	POSTGRADUATE		
<b>COURSE CODE</b>		<b>SEMESTER</b>	2nd
<b>COURSE TITLE</b>	Next Generation Mobile Communication Networks and Vertical Applications		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>(In case credits are allocated to distinct parts of the course, e.g., Lectures, Laboratory Exercises, etc. If credits are allocated uniformly to the entire course, state the weekly teaching hours and total credits.)</i>		<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>
Lectures		3	8

### COURSE CONTENT

The course content consists of the following units:

**Unit 1: Course Description – Introductory Concepts**

Presentation and concise description of the theoretical lectures. Introduction to mobile wireless networks. Analysis and evaluation of basic multiplexing schemes (TDMA, FDMA, CDMA) and digital modulation techniques (ASK, FSK, PSK, QAM). Overview of past Generation networks (1G – 3G).

**Unit 2: 4th Generation Networks**

Analysis and evaluation of Orthogonal Frequency Division Multiplexing (OFDM, OFDMA, SC-FDMA). WiMAX Networks. LTE Networks (emphasis on the physical layer and MAC sublayer). LTE-A Networks (emphasis on the physical layer and MAC sublayer).

**Unit 3: 5th Generation Networks**

Analysis and evaluation of the key technological features of 5G. Presentation of elements from the 5G-PPP reference framework. Presentation of significant Key Performance Indicators (KPIs). Detailed discussion of small/smart cells methodologies, Network Functions Virtualization (NFV), and Cloud/Edge computing, along with evaluation of their contribution to Next Generation Networks.

**Unit 4: 5th Generation Vertical Applications**

Presentation and analysis of the fundamental technological background for developing solutions related to specific 5G use cases directly associated with vertical market sectors. Notable examples of modern applications include the following:

- Network slicing,
- e-Health,
- Industry 4.0 and robotic applications,
- Mobility with autonomous vehicles and unmanned aerial vehicles,
- Ultra-reliable and low-latency communications,
- Non-orthogonal multiplexing for multi-user transmission,

- Transceivers with massive antenna arrays,
- Millimeter-wave information transmission.