STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Wireless Communications**	Code **101080222101081234‍1**

Field of study **Technical Applications of Internet**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 2**

Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**

Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**

No. of hours					No. of credits **4**
Lecture: **2**	Classes: **2**	Laboratory: **-**	Project/seminars: **-**		

Status of the course in the study program (Basic, major, other) **other**	(university-wide, from another field) **university-wide**

Education areas and fields of science and art **technical sciences** **Technical sciences**	ECTS distribution (number and %**)** **4 100%** **4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	K_W01 possesses extended knowledge in mathematics, physics, computer science and telecommunications, required for modeling tasks and solving of interdisciplinary problems in these areas
		K_W013 has grounded knowledge in the area of signal theory and wireless systems
2	**Skills**	K_U01 - can effectively make use of available resources (available in both cases: in classical form as books, as well as in modern form such as Internet, discussion forums, databases etc.)
		K_U02 - can effectively communicate and exchange information by means of modern telecommunications techniques, also in English
3	**Social competencies**	K_K01 - is aware of his/her knowledge and skills limitations; can precisely formulate the problems; understand the need of further study and of systematic reading of scientific publications in the range of the studied part of science;

Assumptions and objectives of the course:

The goal of the course is to present the fundamentals of the architecture and functioning of the modern telecommunication systems

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has the basic, grounded, both theoretical and practical knowledge on the key achievements in the area of telecommunications - [K_W02]

2. Knows the basic rules used during the designing process of telecommunication systems (both wired and wireless, analogue and digital) - [K_W04]

3. Knows the fundamental technologies used for solving practical problems in telecommunications - [K_W04]

4. Possesses the grounded knowledge in signals theory, wireless communications, waves propagation theory, wireless and wired network, wireless system standards - [K_W013]

Skills:

1. Can use synergistically the knowledge from physics, telecommunications and similar areas, and can apply this knowledge for the analysis purposes of the potential possibilities of implementation of selected wireless systems - [K_U09]

2. Is able to propose the improvements of currently available applications of wireless communication systems - [K_U10]

3. Can solve typical problems related to the signal propagation and designing and dimensioning of wireless communications systems - [K_U12]

4. Can solve typical problems related to analysis of the popular wireless communication systems   - [K_U12]

Social competencies:
1. is aware of his/her knowdlege and skills limitations; can precisely formulate the problems; understand the need of further study and of systematic reading of scientific publications in the range of the studied part of science; - [K_K01]
2. Understand the need of knowledge popularization in the area of wireless communications systems - [K_K04]
3. Can formulate his/her own opinion about the basics problems related to wireless communications systems, especially in the area of signal propagation and associated challenges in the context of the Internet of the Future - [K_K07]
4. Is aware of the need for professional treatment of the problems to be solved and for taking responsibility for proposed solutions - [K_K08]

Assessment methods of study outcomes
One-hour long writing exam is planned that will cover the subjects presented during the lecture.
The exercises will be credited based on the engagement in solving the problems during the meetings and based on two writing tests.

Course description
Lecture:

Lecture:

1.   The fundamentals of the wireless transmission

2.   Properties of various transmission channels used in wireless communications (physical phenomena and their characteristics)

3.   Multiple Access techniques

4.   The fundamentals of the spread spectrum systems

5.   The Fundamentals of the GSM systems (architecture of the radio Access networks and core Network, PHY and MAC layers)

6.   Data transmission in GSM (GPSR and EDGE)

7.   The basics of UMTS systems and its further improvements (HSPA)

8.   LTE systems

9.   Multicarrier transmission used in WiMAX and WiFi networks

10.   Multimedia systems (DVB-T and DVB-H)

11.   Bluetooth and ZigBee and their applications

12.   The perspectives of the wireless system development? LTE-A, cognitive radio, V2X transmission

Exercises:

1.   Signal propagation issues

2.   Power budget analysis

3.   Channel modeling

4.   Application of propagation models

5.   Solving problem related to the interference issues in various cases (FDMA, TDMA i CDMA)

6.   Basics of traffic management

Basic bibliography:

1. Krzysztof Wesołowski, ?Systemy radiokomunikacji ruchomej?, Wydawnictwa Komunikacji i Łączności WKŁ, Warszawa 2003 r.

Additional bibliography:

1. A. Molisch, ?Wireless Communication Systems?, John Wiley & Sons, 2005 r.

2. G. Stueber, ?Principles of Mobile Communication Systems?, Kluwer Academic Publishers, 2003 r.

Result of average student's workload	
Activity	**Time (working hours)**
1. Preparation to the exam	10
2. Preparation to each excercise unit	1
3. Preparation to each test	5
4. Participation in the course	60
Student's workload	

Source of workload	hours	ECTS
Total workload	60	4
Contact hours	30	2
Practical activities	30	2