STUDY MODULE DESCRIPTION FORM

Name of the module/subject **UMTS System**		Code **1010812131010812684**
Field of study **Electronics and Telecommunications**	Profile of study (general academic, practical) **general academic**	Year /Semester **2 / 3**
Elective path/specialty **Radio Communications**	Subject offered in: **English**	Course (compulsory, elective) **elective**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **2** Classes: **-** Laboratory: **-** Project/seminars: **1**		No. of credits **3**
Status of the course in the study program (Basic, major, other) **other**	(university-wide, from another field) **from field**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **3 100%** **3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	K1_W14 K1_W15
2	**Skills**	K1_U15 K1_U19
3	**Social competencies**	n.a.

Assumptions and objectives of the course:

UMTS System Architecture and Operation. Signal Processing in Physical Layer (L1), Physical Channels and Procedures. Upper Layer (L2/L3) Architecture and Functionality. NAS Layer Basics and Interaction with Lower Layers. HSDPA/HSUPA Extensions. Introduction to 4G Systems - LTE & Cdma2000.

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

Knowledge:

1. Has a systematic, advanced knowledge of 3G mobile communication systems. - [K2_W06]

Skills:

1. Is able to analyze, design, construct and exploit 3G mobile communications systems. - [K2_U16]

Social competencies:

1. Is aware of the main challenges facing mobile communications in the 21st century. - [K2_K07]

Assessment methods of study outcomes

Laboratory exercises.
Written exam.

Course description

Lectures:
1. Introduction. UMTS System Architecture.
2. Physical Layer (FDD mode).
3. Signal Processing in the PHY Layer.
4. MAC Layer - Protocols and Procedures.
5. RLC Layer - Protocols and Procedures.
6. RRC Layer - Protocols and Procedures.
7. Measurement Procedures in UTRAN.
8. UMTS Core Network.
9. UTRA TDD mode.
10. HSPA Extension.
11. LTE & 4G Systems.
12. Cdma2000 Basics.

Lab exercises:
1.Physical Channels Multiplexing and Scrambling.
2.UMTS Downlink Performance in AWGN Channel.
3.UMTS Uplink Performance in AWGN Channel.
4.12.2/64 kbps Reference Channel Simulation.
5.12.2/768 kbps Reference Channel Simulation.
6.12.2 kbps UTRA TDD Reference Channel Simulation.

Basic bibliography:

1. H. Holma, A. Toskala, WCDMA for UMTS, Wiley 2006

Additional bibliography:

1. A. Richardson, WCDMA Design Handbook, Cambridge University Press 2005
2. H. Holma, A. Toskala, HSDPA/HSUPA for UMTS, Wiley 2006

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures.	30
2. Laboratory exercises.	15
3. Preparation to lab exercises.	15

Student's workload

Source of workload	hours	ECTS
Total workload	80	3
Contact hours	50	2
Practical activities	30	1