COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mobile and satellite communication systems [S2EiT1>SRRiS]

Course

Field of study
Electronics and Telecommunications

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

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Prerequisites

Basic knowledge of 2G/3G cellular systems technology, with a mathematical background. Knowledge of important standards, architectures and wireless networks principles.

Course objective

The course presents the theoretical background as well as standards defining modern wireless systems, including 3G/4G cellular systems and broadband wirelss access systems. Digital satellite systems are covered too.

Course-related learning outcomes

Knowledge:
Knows the state-of-the-art transmission techniques (spread-spectrum/multi-carrier) implemented in the 3G/4G cellular systems.
Understands the digital signal processing methods applied to wireless systems.

Skills:
Can analyse standardisation documents produced by working groups, e.g. belonging to 3GPP. Knows the 3GPP standards related to UMTS/HSPA and LTE systems. Is able to evaluate satellite system parameters.

Social competences:
Is aware of the impact of modern communication technologies on the society.
Understands the importance of communication standards in cellular communications and legal regulations.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture: written/oral exam consisting of 5-6 questions, based on the list of 25 topics shared during the course duration. 50% of the total number of points necessary to pass.
Tutorial: test consisting of 3-5 problems to solve, 50% of the total number of points required to pass.

Programme content

Lecture:
1. History of digital cellular and satellite communication systems and the standards.
2. Signal propagation, interference, fading in communication channels - a recap.
3. CDMA cellular systems - UMTS standard and its enhancement (HSPA).
4. Evolution of wireless standards - IMT-Advanced, LTE and WiMAX.
5. Satellite links - propagation, multiple access, ground stations.
6. Examples of satellite communication systems - VSAT, Iridium, Globalstar.
7. Evolution towards 5G.

Tutorial:
1. Radio link budget in cellular and satellite systems.
2. Estimation of cellular system capacity for different multiple access technologies.

Teaching methods

Lecture: multimedia presentation
Tutorials: case study, problem solving.

Bibliography

Basic
K. Wesołowski, Systemy radiokomunikacji ruchomej, wyd. 3, WKiŁ, Warszawa, 2003
J. Kołakowski, J. Cichocki, UMTS. System telefonii komórkowej trzeciej generacji, WKiŁ, Warszawa, 2003
R. Zieliński, Systemy satelitarne, WNT, Warszawa, 2007
Additional
G. L. Stüber, Principles of Mobile Communications, 2nd ed., Kluwer, Boston 2001
A. Goldsmith, Wireless Communications, Cambridge University Press, New York, 2005
H. Holma, A. Toskala, WCDMA for UMTS - HSPA Evolution and LTE, Wiley, CHichester, 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,00
Classes requiring direct contact with the teacher	55	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	35	1,00