POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)
pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name

PO 5.2.1 Sieci komórkowe - EC 5.2.1 Cellular Networks

Course

Field of study

Teleinformatics

Year/Semester

3/5

Area of study (specialization)

Profile of study

general academic

Level of study

first-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

0

Projects/seminars

0/0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

dr inż. Paweł Kryszkiewicz
Institute of Radiocommunications
61 665 39 23
pawel.kryszkiewicz@put.poznan.pl

Responsible for the course/lecturer:

Prerequisites

A student starting this course should have basic knowledge of the basics of telecommunications, signal theory and probability calculus, as well as digital telecommunications systems. He/She should have the ability to perform calculations using a mathematical apparatus in the field of mathematical analysis and probability calculus, and to obtain information from the indicated sources. He/She should also understand the need to expand competences.
In addition, in the field of social competences, the student must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

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1. Provide students with basic knowledge in the field of: mobile radiocommunication networks, in particular cellular networks and their importance in ICT networks.
2. Developing students' skills in solving basic computational problems related to the analysis of links and cellular networks.
3. Shaping students' skills in acquiring knowledge about new systems and standards of cellular networks, such as elements of teleinformatic networks.

Course-related learning outcomes

Knowledge

1. Has knowledge of the influence of the radio environment on the operation and capacity of cellular systems and the principles of designing and analyzing teleinformation networks, in particular cellular networks.
2. Has in-depth knowledge of the propagation of electromagnetic waves, radio communication techniques as well as the architecture and operation of cellular teleinformatic networks.

Skills

1. Can determine the basic parameters and properties of radio signals and cellular systems, compare radio environments, and design elements of cellular networks, optimizing the work of network devices under the imposed limitations.
2. Can solve typical tasks in the field of propagation of electromagnetic waves in various environments and the analysis of cellular networks.

Social competences

1. Can perceive and formulate directions for the development of wireless telecommunications systems, both in terms of basic research and entire systems
2. Understands the impact of own work on the results of the team and the need to comply with the rules of teamwork in solving technical problems and the benefits of exchanging experiences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

For the lectures:
Written exam during the last class, consisting of many questions requiring a short answer. Each question is scored independently. The final grade is determined on the basis of the total number of points obtained.

For the laboratories:
A test consisting of computational tasks is carried out. It consists of several independently assessed tasks. The total number of points obtained is used to determine the academic grade (range 2-5). Verification of the correct conduct of laboratory tasks takes place on the basis of the submitted reports as well as an oral / written answer regarding the content of a given laboratory task. Each topic of laboratory research is assessed using an academic scale (2-5). The final grade for laboratories is determined as the weighted average of the test result and the laboratory tasks grades, rounded to the closest grade on the academic scale. The weights are proportional to the class time devoted to a given segment.

Programme content

Lectures:

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1.Classification of mobile radiocommunication systems.
2. Propagation of signals in mobile radio channels
3. Models of mobile radio channels
4. Basic techniques of the physical layer in radiocommunication systems
5. Multiple-access methods used in radio channels
6. The concept of mobile telephony
7. Principles of designing cellular systems and methods of increasing their capacity
8. The principle of operation of next-generation cellular systems: architecture of radio access network and fixed network, physical layer and higher layers
9. Data transmission methods in cellular networks
10. Prospects for the development of cellular networks and their importance in ICT networks

Laboratories:
1. Calculation of the received signal strength in radio channels
2. Calculation of mobile radio channel parameters and design of receivers
3. Design of the power and coverage areas of base stations in a mobile cellular system
4. Performing propagation measurements and analysis of cellular network signals

Teaching methods

lecture: multimedia presentation, supplemented with up-to-date examples and additional explanations on the blackboard
laboratories: solving problems, carrying out measurements and modeling results, preparing reports

Bibliography

Basic

1. Wesolowski, Krzysztof. Mobile communication systems. John Wiley & Sons, Inc., 2001.

Additional

3. S Tse D., Viswanath P., Fundamentals of Wireless Communication, Cambridge University Press, 2005
4. Rappaport T., Wireless Communications: Principles and Practice, Prentice Hall PTR, 2002
5. E. Dahlman, S. Parkvall, J. Skold "5G NR: The Next Generation Wireless Access Technology" Academic Press, 2020

Breakdown of average student's workload

	Hours	ECTS
Total workload	56	3.0
Classes requiring direct contact with the teacher	30	2.0
Student's own work (preparation for tests, preparation for laboratory classes, literature studies)	26	1.0