COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mobile computing and wireless communication [N2Inf1-ZTI>PMOB]

Course

Field of study
Computing

Year/Semester
2/3

Area of study (specialization)
Advanced Internet Technologies

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
16

Laboratory classes
16

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

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Course objective

The aim of the lecture is to familiarize students with the problems of mobile computing, one of the youngest and the most dynamically developing areas of IT. The idea of enabling the user mobile full access to data regardless of place and time is becoming more and more possible to be implemented. The lecture will discuss the latest mobile technologies and wireless and their practical applications in every sphere of human life. It will be shown the need to use mobile systems, the complexity of the problems occurring in them and the methods solving these problems based on adapted methods used in other industries computer science. Students will develop problem-solving skills related to analysis, selection and ability to apply selected mobile and wireless systems in practice.

Course-related learning outcomes

Knowledge:
Has basic knowledge of physics necessary to correctly understand wave phenomena in systems wireless (K_W2)

Skills:
Is able to obtain information from literature (in the native language and English), integrate it and perform it their interpretation and critical assessment, draw conclusions and formulate and fully justify opinions. (K_U1)

Social competence:
Understands that in IT, especially in modern mobile systems, knowledge, technologies and skills become obsolete very quickly. (K_K1)
Knows examples and understands the causes of malfunctioning IT systems to serious financial and social losses or to serious loss of health or even life. (K_K2)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The learning outcomes presented above are verified in the following way:
Formative assessment:
a) in terms of lectures:
- based on answers to questions about the material discussed during lectures.
b) in the scope of laboratories / exercises:
- based on the assessment of the current progress in the implementation of project tasks.
Summary rating:
a) in the field of lectures, verification of the assumed learning outcomes is carried out by:
- assessment of knowledge and skills demonstrated on a written test with different problem characteristics solutions: 50% of the questions concern basic knowledge 50% of the questions are problem questions about
greater complexity; the number of questions on the test is approximately 4; all questions are scored similarly, combined
you can get 4 points; passing the test is from 50 points; the final grade consists of 60%
grade from the written test and 40% grade from the laboratory.
- discussion of test results,
b) in the field of laboratories, verification of the assumed learning outcomes is carried out by:
- assessment of the implementation of tasks related to given laboratory classes: during each class laboratory tests, the student receives a list of tasks to be completed: compulsory with points to be completed on
classes and additional tasks with a higher level of difficulty, it is possible to obtain additional ones points for activity during classes.

Programme content

Lecture:
The lecture program covers the following topics:
• Introduction – the importance of mobile systems. Introducing the idea of mobile computing. Showing the development of the field and the factors influencing its development. Representation of multitude
applications, huge benefits for the end customer and complex and non-trivial problems,
that face designers of modern mobile systems.
• Concepts and definitions. Basic architectures, terminal classifications. Distinction between systems mobile and wireless. *Demonstrating the features and elements of a complex, network-centric system mobile.
• Positioning and navigation of mobile users. Basic navigation concepts, definitions
units of measurement. Methods of determining the counted and observed position, devices and systems positioning. Indoor navigation and integrated navigation systems. Local character
position information and strategies for updating it.
• GPS, GLONASS, GALILEO satellite navigation systems. History of creation, architecture and principle operation of satellite navigation systems. Construction of the Navstar satellite and GPS receiver. Errors in position determination and correction, differential systems, description of communication interfaces.
• Cellular systems. The idea and need for using cellular systems. Basic concepts i
definitions. Increasing the capacity of cellular systems. Discussion of "roaming" phenomena i

"handover". Advantages and disadvantages of cellular solutions.
• Architecture and operation of the GSM system. Basic components of the GSM system, structure and types mobile terminals, base station complexes, central part. Maintaining information about terminal location, establishing connections. Security in the GSM system, transmission technologies mobile data.
• Wireless communication systems. Geostationary and non-geostationary satellite systems communication. Dispatching, trunking and paging systems. Wireless telephony, communications in the citizen band. Laser, infrared and ultrasonic systems. Standards Bluetooth and IrDA.
• Spatial and SIP data representations. Representations of spatial data, attribute data. Helical spatial data type. Characteristics of GIS and SIP systems and their functionality. Basic space-time analyses. Applications of GIS systems.
• Complex mobile computing problems. Recursive space decomposition given resolution level. Spatial data scattering. Geographic routing.
• User position prediction, uncertain positions.
• State-of-the-art applications of mobile systems. Network-centric systems. Future-proof programs using mobile technologies and processing (e.g. DEEPWATER, LAND WARIOR). Unmanned aerial systems (UAVs), sea and land unmanned systems.

Laboratory classes are conducted in the form of fifteen two-hour exercises, held in: lab. The exercises are carried out in teams of 2 people. The laboratory program includes the following issues:
- Configuration of heterogeneous wireless networks
- Configuration and use of satellite positioning systems
- Mobile measuring devices
- Wireless video transmission, configuration of video systems
- Local and personal networks
- Configuration of mobile equipment and accessories
- Architecture of complex mobile systems based on the network-centric paradigm

Teaching methods

1. lecture: multimedia presentation illustrated with examples given on the board.
2. laboratory exercises: solving tasks, defining problems independently and analyzing possible solutions

Bibliography

Basic
1. W.Hołubowicz, P. Płóciennik. GSM digital mobile phone system. EFP, 1995
2. W. Hołubowicz, P. Płóciennik. Wireless communication systems. PDN, 1997
3. Narkiewicz, Janusz Global GPS positioning system [electronic document] / Janusz Narkiewicz. WKił, 2003
4. Ibe, Oliver ChukwudiFixed broadband wireless access networks and services / Oliver C. Ibe. Exists copy in this locationJohn Wiley&Sons, 2002.
5. .
6. W. Hołubowicz, P. Płóciennik. GSM digital mobile phone system. EFP, 1995
7. W.Hołubowicz, P. Płóciennik. Wireless communication systems. PDN, 1997
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9. Ibe, Oliver ChukwudiFixed broadband wireless access networks and services / Oliver C. Ibe. Exists copy in this locationJohn Wiley&Sons, 2002.
10. .
Supplementary
1. Verma, Prashant Kumar, Mobile device security: recipes, Helion, 2017
2. Verma, Prashant Kumar, Mobile device security: recipes, Helion, 2017

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	32	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	68	2,50