



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mobile systems [N2Inf1-IWPB>SMOB]

Course

Field of study

Computing

Year/Semester

2/3

Area of study (specialization)

Information Technology in Business Processes

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

16

Laboratory classes

18

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

-

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 advanced and in-depth knowledge of mobile systems (K2st_W1)

has structured and theoretically based general knowledge in the field of mobile systems

(K2st_W2)

has advanced detailed knowledge of mobile systems (K2st_W3)

has advanced and detailed knowledge of the processes occurring in the life cycle of systems of systems

mobile (K2st_W5)

has knowledge of development trends and the most important new achievements in the field of systems

mobile (K2st_W4)

knows advanced methods, techniques and tools used to solve complex tasks

engineering and conducting research in the area of mobile systems (K2st_W6)

Skills:

Is able to notice the legal and economic aspects of the use of a selected mobile technology

wireless (K2st_U5)

Is able to assess the risk of implementing a given mobile or wireless system (K2st_U6)

Is able to prepare a presentation of a solution to a problem in the field of mobile systems and

wireless. (K2st_U16)

Can use it to formulate and solve engineering tasks and simple problems

research analytical, simulation and experimental methods. (K2st_U4)

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.

(K2st_U1) Can use specialized terminology in Polish and English

mobile and wireless systems.. (K2st_U15)

He can design and implement algorithms in the field of positioning, navigation and management

wireless communication (K2st_U11)

Is able to critically analyze the operation of complex mobile and wireless systems

(K2st_U9)

Social competence:

Understands that in IT, especially in modern mobile systems, knowledge, technologies and

skills become obsolete very quickly. (K2st_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.

(K2st_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

Course topics

Positioning and Navigation
Wireless Communication
Mobile Systems Architectures
Energy Management
Unmanned Systems
Network-Centric Systems
Mobile System Applications

Teaching methods

1. lecture: multimedia presentation illustrated with examples given on the board.
2. laboratory exercises: solving tasks, independent definition of problems and analysis 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 Chukwudi Fixed broadband wireless access networks and services / Oliver C. Ibe. Exists copy in this location John Wiley & Sons, 2002.

Supplementary

1. Verma, Prashant Kumar, Mobile Device Security: Recipes, Helion, 2017.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	36	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	89	3,50