COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mobile Systems Design [N2Inf1-AMiWdIP>SMOB]

Course

Field of study
Computing

Year/Semester
1/1

Area of study (specialization)
Mobile and Embedded Applications for the Internet of Things

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
12

Laboratory classes
16

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

The student starting this course should have basic knowledge of physics and electronics. They should also have the ability to: solve basic problems in the field of computer system design, programming in high level languages and obtaining information from indicated sources. Moreover, the student should understand the necessity of expanding his/her competences.

Course objective

To provide students with basic knowledge of modern mobile and wireless technologies (standards, applications, systems and software). To develop students" ability to solve problems related to the development of mobile and wireless systems in both hardware and software layers and services offered by the system.

Course-related learning outcomes

Knowledge:
1. Structured, theory-based, general knowledge about mobile and wireless systems.
2. Knowledge of navigation systems, wireless communication systems, mobile systems.

3. Areas and examples of practical applications of mobile systems.

Skills:
1. The ability to design and initial valuation of a mobile system in the selected area of application.
2. Team work on a selected design issue.

Social competences:
1. Understanding that mobile systems are developing rapidly and once acquired, knowledge and skills can quickly become outdated and insufficient.
2. Understanding the importance of norms and standards in the field.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Assessment of the knowledge acquired during the lecture is based on a written examination in the form of a test, which may include 20 to 50 both open and closed questions. In case of closed questions it is a multiple choice test. The score of individual questions is given in the content of the question. The form of the test and the issues to it are discussed during one of the last lectures. For a score of 3.0 he/she should get at least 50% of points, 3.5 at least 60% of points, 4.0 for at least 70% of points, etc.
In terms of laboratories, the verification of the assumed educational results is carried out by:
1. evaluation of the offer of the designed mobile system prepared as a responsive website
2. evaluation of the progress of the project work on the basis of the multimedia presentations prepared by the students

Programme content

The lecture program includes the following issues:
Introduction to the field of mobile systems. The idea of mobile processing. The importance of mobile systems. Basic concepts and architecture. The most important applications of mobile systems. Positioning and navigation of mobile users. Basic concepts and measures related to positioning and navigation. Methods of determining the position. Devices and systems used for determining the position, including integrated systems. Methods of updating position information. Satellite navigation systems: GPS, GLONASS, GALILEO (history, current state, directions of development, architecture, principle of operation, errors and their correction). Characteristics of navigation satellites and communication interfaces. Navigation in buildings. Mobile systems: basic concepts, principle of operation, architecture, principles of expansion, "roaming" and "handover", applications, advantages and disadvantages. GSM system: architecture, terminal overview, base station assembly, central component, operating principle (terminal location information, setting), services. 3G, 4G and 5G technologies. Wireless communication systems: geostationary and non-geostationary satellite systems, dispatching, tranking and paging systems. Wireless telephony, communication in civil band. Infrared, laser, radio and ultrasonic systems. Wireless LAN, MAN and PAN networks. Bluetooth and IrDA standards. Wireless ad-hoc networks. Mobile Internet. Security of mobile systems.
During the laboratory classes, students work in teams of 2-3 persons on the design of a mobile system for the application specified by the instructor, who acts as a contractual investor. The teams are to develop an offer of such a system including, among other things, system architecture, hardware specification, description of software and technologies selected to implement the system, preliminary valuation of the project, evaluation of scalability of the proposed solution, as well as presentation of its main advantages and disadvantages.

Course topics

none

Teaching methods

1. Lecture: multimedia presentation.
2. Laboratory exercises: development of a mobile system, multimedia presentation of the project, discussion on the proposed solution, documentation of the approved project in the form of an offer prepared in HTML5 in the form of a responsive page / website.

Bibliography

Basic
1. D.P. Agrawal, Q-A. Zeng, Introduction to wireless and mobile systems. Cengage Learning, 2011.
2. M. Szkotak, Technologie mobilne, iTst@rt Wydawnictwo Informatyczne, 2011.
3. K. Lal, T. Rak. Systemy telefonii komórkowej : wybrane zagadnienia. Oficyna Wydawnicza Politechniki Rzeszowskiej, 2005.
4. A. M. Simon, A. Bul: GSM advanced system communication, Wydawnictwo Pracowni Komputerowej Jacka Skalmierskiego, 2004
5. J. Narkiewicz: GPS i inne satelitarne systemy nawigacyjne. Wydawnictwa Komunikacji i Łączności, 2007.
6. J. Ross: Sieci bezprzewodowe : przewodnik po sieciach Wi-Fi i szerokopasmowych sieciach bezprzewodowych. Helion, 2009.
7. P. Ludwikowski, R. Nawrowski: Projektowanie zewnętrznych sieci radiowych : od 2,4 GHz do 38 GHz. Wydaw. Politechniki Poznańskiej, 2010.
Additional
1. M. Clark. Wireless access networks. Wiley, 2002.
2. T. Imieliński. Mobile Computing. KLUWER, 1996.
3. S. Shekhar, S. Chwala, Spatial database A TOUR. Prentice Hall, 1983.
4. D.P. Agrawal, Q-A. Zeng, Introduction to wireless and mobile systems. Cengage Learning, 2011.
5. R. Zieliński, Satelitarne sieci teleinformatyczne. WNT, 2011.
6. Ch. Collins, M. Galpin, M. Kaeppler „Android w praktyce”, Helion, 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	70	3,00