# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mobile and Internet systems development [S2Inf1-IP>AMI]

## Course

Field of study
Computing

Year/Semester
1/1

Area of study (specialization)
Internet of Things

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
15

Other
0

Tutorials
0

Projects/seminars
30

## Number of credit points

6,00

## Coordinators

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## Lecturers

## Prerequisites

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## Course objective

1. To familiarize students with the problems of mobile computing, The lecture will discuss the latest mobile and wireless technologies and their practical applications in every sphere of human life. The need to use mobile systems, the complexity of problems occurring in them as well as ways of solving these problems based on adapted methods used in other branches of computer science will be shown. 2. Students will develop problem solving skills related to the analysis, selection and practical application of selected mobile and wireless systems.

## Course-related learning outcomes

Knowledge:
1. has advanced and in-depth knowledge of broadly understood mobile and wireless systems (k2st_w1)
2. has structured, theoretically based, detailed knowledge related to selected issues, such as: architectures of mobile systems, wireless technologies, multimodal positioning of mobile users, navigation in various environments, wireless communication, problems of band and energy

management and applications of mobile systems in many areas of life. (k2st_w3)
3. has advanced and detailed knowledge of the processes occurring in the life cycle of mobile and wireless it systems (k2st_w5)

Skills:
1. is able to assess the usefulness and possibility of using new achievements (methods and tools) and new it products in the field of mobile and wireless systems (k2st_u6)
2. is able to integrate knowledge from various areas of computer science, as well as automation, robotics, telecommunications and navigation, and apply a systemic approach, also taking into account non-technical aspects (k2st_u5)
3. is able to make a critical analysis of existing mobile and wireless systems and propose their improvements (improvements) (k2st_u8)
4. is able to cooperate in a team, assuming various roles (k2st_u15)
5. is able to solve complex it tasks, including non-standard tasks and tasks with a research component (k2st_u10)
6. is able to assess the usefulness of methods and tools for solving an engineering task involving the construction or evaluation of a mobile or wireless system or its components, including the limitations of these methods and tools (k2st_u9)

Social competences:
1. understands the importance of using the latest knowledge in the field of mobile and wireless systems in solving research and practical problems (k2st_k2)
2. understands that knowledge, technologies and skills become obsolete very quickly. (k2st_k1)

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Formative evaluation:
a) as for lectures:
- based on answers to questions about the material discussed during lectures.
b) as for laboratories:
- based on the assessment of the current progress and effects of project tasks.
Summative assessment:
a) in the field of lectures, the assumed learning outcomes are verified by:
- assessment of knowledge and skills demonstrated in a written exam with different characteristics of problems to be solved: 50% of questions concern basic knowledge, 50% of questions are more complex problem questions; the number of questions in the exam is about 4; all questions are scored similarly, you can get 4 points in total; passing the exam is from 50 points; the final grade consists of 60% of the written exam and 40% of the practical classes.
- discussion of exam results,
b) as for laboratories, the assumed learning outcomes are verified by:
- assessment of the completion of tasks: the student defines the problem/problems to be performed: tasks with additional points are possible, with a higher level of difficulty, it is also possible to obtain additional points for activity during classes.

## Programme content

The lecture program includes the following topics:
Introduction. The idea of mobile computing. 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. Positioning methods. Positioning devices and systems. Methods for 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. Cellular systems: basic concepts, principle of operation, architecture, expansion principles, "roaming" and "handover", applications, advantages and disadvantages. GSM system: architecture, overview of terminals, set of base stations, central component, principle of operation (information about the location of the terminal, connection setup), services. 3G and 4G technologies: GPRS, EDGE, HSPA, LTE. Wireless communication systems: geostationary and non-

geostationary satellite systems, dispatching, trunking and paging systems. Wireless telephony, communication in the citizen band. Infrared, laser, radio and ultrasonic systems. Bluetooth and IrDA standards. Ad-hoc wireless networks. Mobile Internet. Security of mobile systems. Features of the android platform, programming languages available for it. Development environments for the Android platform - environment configuration, tools in them. MIT AppInventor as a friendly environment for creating mobile applications for Android devices. Tools and programming languages for mobile devices running iOS and Windows Phone. Selected non-standard mobile device programming platforms (e.g. Firefox OS)
Laboratory classes are conducted in the form of 2-hour exercises, taking place in the laboratory, preceded by a 2-hour instruction session at the beginning of the semester. Exercises are carried out by two-person teams of students. The laboratory program covers the following issues: configuration of devices working in wireless local area networks, application of security rules in wireless networks, configuration of the connection between a mobile device and a computer, configuration and use of selected wireless and mobile devices for positioning, navigation, video transmission, etc. Android mobile devices. Setting up development environments to enable mobile device development. Creating a simple mobile application in Java.
The project will concern practical applications of mobile technologies

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## Teaching methods

Lecture: multimedia presentation, discussion.
Laboratory exercises: practical exercises, discussion, demonstration, projects

## Bibliography

Basic
1. W.Hołubowicz, P. Płóciennik. GSM cyfrowy system telefonii komórkowej. EFP, 1995
2. W.Hołubowicz, P. Płóciennik. Systemy łączności bezprzewodowej. PDN, 1997
3. Narkiewicz, JanuszGlobalny system pozycyjny GPS [dokument elektroniczny] / Janusz Narkiewicz.

WKił, 2003
4. Ibe, Oliver ChukwudiFixed broadband wireless access networks and services / Oliver C. Ibe. Istnieje egzemplarz w tej lokalizacjiJohn Wiley&Sons, 2002.
Additional
1. Verma, Prashant Kumar, Bezpieczeństwo urządzeń mobilnych : receptury, Helion, 2017

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 150 | 6,00 |
| Classes requiring direct contact with the teacher | 75 | 3,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 75 | 3,00 |