

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Telecommunication mobile systems</b>		Code <b>1010334591010334977</b>
Field of study <b>Information Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>5 / 9</b>
Elective path/specialty <b>Information Technologies</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>8</b> Classes: <b>-</b> Laboratory: <b>8</b> Project/seminars: <b>-</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b> <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  dr Paweł Misiorek email: pawel.misiorek@put.poznan.pl tel. 665 3958 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
<b>1</b>	<b>Knowledge</b>	K_W07: Student has organized and theoretically grounded knowledge concerning computer network technologies.  K_W05: Student has organized and theoretically grounded knowledge concerning basic programming constructions, algorithm implementations, programming paradigms, programming styles, software verification and evaluation methods, formal languages, compilers, and platforms.
<b>2</b>	<b>Skills</b>	K_U02: Student is able to work alone and in a group; student is able to estimate time needed for given work realisation; student can construct and realize the work schedule in a way ensuring meeting the deadlines.  K_U03: Student is able to prepare the documentation of his engineering task realisation and to provide the description of the obtained results.
<b>3</b>	<b>Social competencies</b>	K_K04: Student is aware of the responsibility for her/his own work and is willing to follow the principles of teamwork and to share the responsibility for the implementation of tasks realized within the team
<b>Assumptions and objectives of the course:</b> The goal of the course is to broaden the students' knowledge and skills in the areas of currently developed mobile systems and solutions, including (i) the issues of mobile application design and programming related to today's leading technologies of providing advertising inventory in mobile applications and (ii) the issues of collection, representation and processing data on mobile users for the purposes of delivered content optimization.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Student has organized and theoretically-grounded knowledge concerning teleinformatics, protocols and services used in telecommunication networks. - [K_W15]		
<b>Skills:</b>		
1. Student is able to provide the critical analysis of the operation of computer hardware, operating systems, and computer networks. - [K_U11]		
2. Student is able to analyse the selected platforms for programming protocols and services in telecommunication networks. - [K_U18]		
<b>Social competencies:</b>		

1. Student understands the need and knows the possibilities of continuous training and learning (second- and third-order studies, postgraduate studies, other courses) - improving her/his language skills, professional skills, personal skills, and social skills. - [K\_K01]

### Assessment methods of study outcomes

Lectures: Exam (50,01% is necessary to pass the exam);  
 Laboratories: the mark calculated as the average of individual marks given after each laboratory (including quality of conducted tasks, given presentations and provided reports).

### Course description

Lectures: The course will focus on the issues of mobile applications design and programming in mobile teleinformation systems, including currently developed methods of advertising delivery to mobile devices, in particular related to Real-Time Bidding technology. In particular, the course scope will include the elements of OpenRTB protocol including communication and data representation issues, methods of integrating mobile applications with RTB Sell-Side Platforms (e.g., Google AdMob platform), and advertising solutions used in most popular social media. In addition, aspects of data collection and processing will be discussed (including the case of Big Data) from the perspective of personalization and optimization the RTB-based advertising delivery system. Finally, the aspects of the application of machine learning algorithms to optimize participation in RTB micro-auctions will be presented on the basis of the latest research results and with the purpose of introducing students to research activities.

2017 update: RTB technology elements, mobile application programming, social media issues, data collection and processing.

Laboratories: Laboratory classes will focus on experimental verification of knowledge derived during the lectures, and will include the issues of mobile application design, ad delivery to mobile devices, simulating the operation of RTB technology components, data collection, analysis and processing (including publicly available collections of RTB-related data).

Teaching methods:

lectures - lectures including multimedia presentation supported by the examples given in the table, the theory presented in close connection with practice, taking into account the economic and social aspects;  
 laboratories - laboratories supported with multimedia presentations, the use of instructions and open-access tools, demonstrations and reports.

### Basic bibliography:

1. Comer D. E., Sieci komputerowe i intersieci, WNT, 2013.
2. Jakob Nielsen, Raluca Budiu, Funkcjonalność aplikacji mobilnych : nowoczesne standardy UX i UI, [tł. Marta Najman], Helion 2013.
3. Charlie Collins, Michael Galpin, Matthias Kaeppler, Android w praktyce [tł. Tomasz Walczak], Helion, 2012.
4. zasoby: <https://developer.android.com/training/index.html>
5. Andrzej Sznajder. Technologie mobilne w marketingu. Warszawa : Oficyna a Wolters Kluwer business, 2014.

### Additional bibliography:

1. Jun Wang, Weinan Zhang, Shuai Yuan, Display Advertising with Real-Time Bidding (RTB) and Behavioural Targeting;, Foundations and Trends in Information Retrieval: Vol. 11: No. 4-5, 158 pages (2017)
2. Tommi Mikkonen, Programming mobile devices: an introduction for practitioners, Wiley 2007.
3. Dokumentacja otwartego projektu RTBkit ([www.rtbkit.org](http://www.rtbkit.org))
4. Dokumentacja protokołu OpenRTB (<https://www.iab.com/guidelines/real-time-bidding-rtb-project/>)
5. Weinan Zhang, Shuai Yuan, Jun Wang, Xuehua Shen. Real-Time Bidding Benchmarking with iPinYou Dataset. Technical report. UCL.2014
6. Andrzej Szwabe, Paweł Misiorek, Michał Ciesielczyk, Logistic Regression Setup for RTB CTR Estimation;, in: Proceedings of the 9th International Conference on Machine Learning and Computing, ICMLC 2017, Singapore, Singapore, pp. 61-70, ACM, New York, USA.
7. Andrzej Szwabe, Paweł Misiorek, Michał Ciesielczyk, Evaluation of Tensor-Based Algorithms for Real-Time Bidding Optimization. In: Nguyen N.,(eds) Intelligent Information and Database Systems. ACIIDS 2017. Lecture Notes in Computer Science, vol 10191, pp. 160-169.
8. Kyle Richter, Joe Keeley, iOS : tajniki SDK : biblioteka przydatnych narzędzi [tł. Krzysztof Rychlicki-Kicior], Helion 2014.

### Result of average student's workload

Activity	Time (working hours)
----------	----------------------

1. Lectures	8	
2. Laboratories	8	
3. Consultations and the exam	7	
4. Preparation to laboratories	23	
5. Preparations of reports of laboratories and preparation to the exam	20	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	66	3
Contact hours	23	1
Practical activities	44	2