(faculty stamp)

COURSE DESCRIPTION

1. Course title: SDR SYSTEMS	**2. Course code:**
3. Validity of course description: 2016/2017	
4. Level of studies: BSc programme	
5. Mode of studies: intramural studies	
6. Field of study: MAKROKIERUNEK	
7. Profile of studies: general	
8. Programme:	
9. Semester: 7	
10. Faculty teaching the course: Institute of Informatics RAu2	
11. Course instructor: dr inż. Grzegorz Baron	
12. Course classification:	
13. Course status: elective	
14. Language of instruction: English	
15. Pre-requisite qualifications: elementary knowledge of C++, C# programming, elementary knowledge of electronics and electrotechnics	
16. Course objectives: The goal of the course is to give students basic knowledge about Software Defined Radio (SDR) systems. That is very interesting part of communication technologies domain. The main idea of SDR is, that only input part of the whole receiver is prepared as a hardware module. The rest of the signal processing is performed using software modules executed on dedicated or typical hardware (i. e. standard PC computer)	
17. Description of learning outcomes:	

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
W1	He has knowledge of electrical circuit theory, the theory and methods of signal processing required in the field of SDRs.	Evaluation of obtained knowledge during the laboratory	Lectures	K1A_W5 K1A_W6

W2	He has knowledge of signal sampling and reconstruction, signal filtering, and understands the time and frequency analysis of signals necessary to understand signal processing in SDR systems.	Evaluation of obtained knowledge during the laboratory	Lectures	K1A_W13
U1	Student can analyze simple signal processing systems using analog and digital techniques, and use these systems to process signals in time and frequency domain in the area necessary to implement SDR systems.	Execution of laboratory exercises, evaluation of report	Laboratory	K1A_U9 K1A_U13 K1A_U20
U2	Student is capable of designing, programming, and configuring a simple SDR system (or its elements) based on selected components.	Execution of laboratory exercises, evaluation of report	Laboratory	K1A_U17 K1A_U18 K1A_U21
U3	Student can acquire information from literature, databases and other sources; can integrate the information obtained, and is able to prepare documentation that reports the methodology used during the laboratory and presents obtained results in clear way.	Execution of laboratory exercises, evaluation of report	Laboratory	K1A_U1 K1A_U2 K1A_U3 K1A_U5 K1A_U6

18. **Teaching modes and hours**
Lecture / Laboratory
15/30

19. Syllabus description:

Lectures:

The schedule of lectures contains such topics as: fundamentals of radio signal transmission, introduction to digital signal processing including theory of analog to digital and digital to analog conversion, digital filters, methods of modulation, sample antennas solutions, presentation of SDR software such as open source GNURadio, SDR#. Some exemplary applications like receiving of voice communication (for example in legal amateur bands), extended squitter ADS-B data frames or NOAA weather satellite images are presented.

Laboratory:
During the laboratory students are introduced into practice of SDR by some exercises. Starting from

presentation of laboratory equipment through exercises during which students get familiar with typical SDR solutions and can observe and analyse the process of receiving, demodulating, and decoding of radio signal in different ways. Finally they are encouraged to write or modify some SDR code to get possibility to receive signal of specific frequency and modulation.

20. Examination: no

21. Primary sources:

1. K.W. Barlee et. Al. Strathclyde Academic Media, 2015
2. Software Defined Radio: Architectures, Systems and Functions, Marcus Dillinger, Kambiz Madani, Nancy Alonistioti, Wiley, 2003

22. Secondary sources:

1. Software Defined Radio The Software Communications Architecture, John Bard, Vincent J. Kovarik, John Wiley & Sons Ltd, 2007
2. The ABCs of Software Defined Radio, Martin Ewing

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	15/10
2	Classes	
3	Laboratory	30/5
4	Project	
5	BA/ MA Seminar	
6	Other	
	Total number of hours	45/15

24. Total hours: 60

25. Number of ECTS credits: 2

26. Number of ECTS credits allocated for contact hours: 2

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1

26. Comments:

Approved:

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(date, Instructor's signature) (date, the Director of the Faculty Unit signature)