

WROCLAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES

FACULTY OF Fundamental Problems of Technology SUBJECT CARD
Course name in Polish Przetwarzanie sygnalów i danych biomedycznych
Course name in English Biomedical signal and data processing
Course language English
University-wide general course type: 1) basic course (mathematics, physics, chemistry, other) 2) humanity course 3) managerial skills 4) English language 5) other modern language Departmental course developing professional skills: 1) specialized course 2) interdisciplinary course 3) seminar (interdisciplinary, specialized, departmental)
Type of course (obligatory, optional)
Educational effects according to ZW 26/2017: P8U_W, P8S_WG, P8U_U, P8S_UW, P8_UK, P8S_KK
Subject code FTP9002W

*delete as applicable

	Lecture	Laboratory	Seminar
Number of hours of organized classes in University (ZZU)	30		
Number of hours of total student workload (CNPS)	90		
Form of crediting	Exam **	Exam / crediting with grade*	Oral presentation
Number of ECTS points	3		
including number of ECTS points for practical (P) classes			
including number of ECTS points for direct teacher-student contact (BK) classes	2		

*delete as applicable **In case of didactic courses also inspections and evaluation classes

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES
1. Fundamental knowledge and skills in the mathematical analysis and algebra. 2. Basic knowledge and skills in Fourier analysis

SUBJECT OBJECTIVES	
C1	Knowledge of English Language
C2	Acquisition of knowledge of advanced signal and data processing methods in biomedicine
C3	Acquisition of skills in the implementation of advanced numerical algorithms and their use for signal and data processing in biomedical applications.

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SUBJECT EDUCATIONAL EFFECTS

related to knowledge:

PEK_W01 Knows and understands the advantages, disadvantages and limitations of the selected series of signal and data processing algorithms

PEK_W02 Has the knowledge in the application of signal and data processing algorithms in biomedical engineering

related to skills:

PEK_U01 critical analysis of natural and social phenomena

PEK_U02 discussion and presenting knowledge in writing and oral form for non-specialists

related to social competences:

PEK_K01 awareness of the role of interdisciplinary collaboration

PEK_K02 awareness of the role of popularization of science

PROGRAM CONTENTS

Form of classes – lecture		Number of hours
Lec1	Introduction to signal and data processing	2
Lec2,3	Deterministic signals, time and frequency representation	4
Lec4	Linear systems	2
Lec5,6	Filter design	4
Lec7	Random signals, Nonstationarity	2
Lec8	Spectral analysis	2
Lec9	Coherence function	2
Lec10,11	Maximum likelihood estimation	4
Lec12,13,14	Detection and estimation	6
Lec15	Time-frequency distributions	2
Total hours		30

TEACHING TOOLS USED

N1	lecture with traditional delivery tools
N2	seminars and discussions
N3	team mini-project

EVALUATION OF ACHIEVED SUBJECT EDUCATIONAL EFFECTS

Evaluation: F – forming (partial) C – concluding	Educational effect number	Way of evaluating achievement of educational effects
F1	P8U_W, P8S_WG, P8U_U, P8S_UW, P8_UK, P8S_KK	discussions
F2	P8U_W, P8S_WG, P8U_U, P8S_UW, P8_UK, P8S_KK	Team mini-project
$P = 0.25 \cdot F1 + 0.75 \cdot F2$		

WROCLAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES**PRIMARY AND SECONDARY LITERATURE****PRIMARY LITERATURE:**

- [1] Haykin S. Modern Filters, Macmillan, 1990.
- [2] Kay S. M. Fundamentals of Statistical Signal Processing, Prentice Hall, 1993.
- [3] Gonzalez R. C., Woods R. E. Digital Image Processing using Matlab, Gatesmark Publishing, 2009.
- [4] Cohen L. Time-frequency distributions, Prentice Hall, 1995.

SECONDARY LITERATURE:

- [1] Northrop R. B. Signals and Systems Analysis in Biomedical Engineering, CRC Press, 2010.
- [2] Scharf L. L. Statistical signal processing. Detection, Estimation, and Time Series Analysis, Addison Wesley, 1991.

SUBJECT SUPERVISOR

(NAME AND SURNAME, E-MAIL ADDRESS)

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