DOCTORAL SCHOOL OF WROCŁAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

SUPERVISOR DECLARING/CONDUCTING COURSE: dr hab. inż. Agnieszka Wyłomańska, prof. uczelni
FACULTY OF PURE AND APPLIED MATHEMATICS, DEPARTMENT OF APPLIED MATHEMATICS

COURSE CARD

Course name in Polish: Metody matematyczne w analizie danych eksperymentalnych
Course name in English: Mathematical Methods in the Analysis of Experimental Data
Course language: Polish
Specialized courses for PhD students receiving education in
discipline: mathematics, environmental engineering, mining and power engineering
2) interdisciplinary course in the field of several disciplines: mathematics, environmental engineering, mining and power engineering

Subject code: MAQ100121W

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	30			
Grading	Exam			

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge of the probability theory.

COURSE OBJECTIVES

1. Systematisation of knowledge in the description, modelling and analysis of time series in engineering applications.
2. Development of skills related to the methodology and methodology of conducting of scientific research.
3. Understanding the importance of the participation of PhD students and young researchers in collegiate bodies making decisions on the organization of the scientific research process and the course of doctoral studies as well as direct contact with superiors.

PROGRAM CONTENTS

Form of classes – lecture (Lec)		Number of hours
Lec1	Introduction, discussion on the form of conducting classes, organizational matters. Rules for passing the lecture. Organization of the scientific research process. Signals: basic concepts. Signal classes. Single and multi-dimensional signals. Basic tasks and problems.	2

Lec2	Acquisition and analysis of signals and their mathematical description (basic concepts).	2
Lec3	Podstawowe własności szeregów czasowych. Analiza sygnałów z wykorzystaniem modelu regresji.	2
Lec4	Basic models of time series and their analysis (part 1)	2
Lec5	Basic models of time series and their analysis (part 2)	2
Lec6	Extensions of the classical time series models (part 1)	2
Lec7	Extensions of the classical time series models (part 2)	2
Lec8	Gaussian and stable distributions. Time series models based on the stable distributions.	2
Lec9	The anomalous diffusive processes and their applications.	2
Lec10	Application of the time series methods: environmental engineering (indoor air quality, radon activity concentration).	2
Lec11	Application of time series methods: vibration signals analysis	2
Lec12	Segmentation methods for real signals.	2
Lect13	Application of time series methods: turbulence in the earth's plasma	2
Lec14	Applications of signal analysis: analysis of work processes in LHD machines	2
Lec15	Exam	2
	Total hours:	**30**

TEACHING TOOLS USED

N1. Lecture, multimedia presentations, open discussion, consultations.

ACHIEVED SUBJECT LEARNING OUTCOMES

Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	P8S_WG	Has knowledge in the field of description, modeling and analysis of time series
Knowledge	P8S_WG	Has advanced knowledge of directional subjects in a given discipline or in interdisciplinary subjects
Skills	P8U_UW	Has scientific and technological skills relevant to methods and methodology of conducting scientific research and critical evaluation of the results obtained
Social competence	P8S_KO	Is aware of the need for doctoral students and young researchers to participate in collective decision-making bodies in matters concerning the organisation of the educational process at a doctoral school, as well as to have direct contact with their superiors

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PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] P. J. Brockwell, R. A. Davis, "Introduction to Time Series and Forecasting", Springer, New-York, 1996.

[2] J. Koronacki, J. Mielniczuk, „Statystyka dla kierunków technicznych i przyrodniczych", WNT, Warszawa, 2004.

SECONDARY LITERATURE:

[1]   Research papers in the dedicated journals

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

Dr hab. inż. Agnieszka Wyłomańska, agnieszka.wylomanska@pwr.edu.pl