

WROCLAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES

FACULTY OF PURE AND APPLIED MATHEMATICS
SUBJECT 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: 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) <u>interdisciplinary course</u> 3) <u>seminar</u> (interdisciplinary, specialized, departmental)
Type of course (obligatory, <u>optional</u>)
Educational effects according to ZW 26/2017 regulations: P8S_WG, P8S_UW, P8S_KK, P8S_KR
Subject code: MAT1315

*delete as applicable

	Lecture
Number of hours of organized classes in University (ZZU)	30
Number of hours of total student workload (CNPS)	90
Form of crediting	Exam
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

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of basic notions in probability theory and stochastic processes..
2. Competence in reaching complementary areas of expertise.

SUBJECT OBJECTIVES

C1	The student will learn selected results on time series analysis
C2	The student will acquire the ability to use methods of time series analysis to engineering problems.
C3	The student will acquire the skills of oral and written presentation of results of scientific work in a form accessible for non-specialists in the field related to the present issue

WROCLAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES

SUBJECT EDUCATIONAL EFFECTS

Relating to knowledge:

PEK_W01 – Student has knowledge in the field of description, modeling and analysis of time series.

PEK_W02 – Student has knowledge of the applications of time series theory in engineering sciences.

Relating to skills:

PEK_U01 – Student has skills related to the methodology and methodology of conducting scientific research.

PEK_U02 – Student can create and conduct research on its own.

Relating to social competences:

PEK_K01 – Student is aware of the role of cooperation, including an international cooperation.

PEK_K02 – Student is aware of the importance of conducting the original scientific activity.

PROGRAM CONTENTS

Form of classes – lecture		Number of hours
Lec 1	Organization of the scientific research process. Signals: basic concepts, classes of signals, one and multi-dimensional signals. Basic tasks and problems.	2
Lec 2	Acquisition and analysis of signals and their mathematical description (basic concepts).	2
Lec 3	Basic properties of time series. Analysis of signals using the regression model.	2
Lec 4	Basic models of time series and their analysis (part I)	2
Lec5	Basic models of time series and their analysis (part II)	2
Lec6	Extensions of the classical time series models (part I)	2
Lec7	Extensions of the classical time series models (part II)	2
Lec8	Gaussian and stable distributions. Time series models based on the stable distribution.	2
Lec9	Anomalous diffusion processes and their applications.	2
Lec10	Applications of signal analysis methods: environmental protection (indoor air quality, radon radiation)	2
Lec11	Applications of signal analysis methods: vibration signals	2
Lec12	Segmentation methods of real signals.	2
Lec13	Applications of signals analysis methods: earth plasma turbulence	2
Lec14	Applications of signals analysis methods: signals from mining machines.	2
Lec15	Exam	2
Total hours		30

TEACHING TOOLS USED

N1	Lecture, multimedia presentations
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WROCLAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES

N2	Open discussion
N3	Consultations

EVALUATION OF ACHIEVED SUBJECT EDUCATIONAL EFFECTS		
Evaluation: F – forming (partial) C – concluding	Educational effect number	Way of evaluating achievement of educational effects
F1	PEK_W01, PEK_K01, PEK_K02, PEK_U01, PEK_U02	Participation in the course, exam
F2	PEK_W02 PEK_K01, PEK_K02, PEK_U01, PEK_U02	Solving tasks and problems
P = 0.5F1+0.5F2		

PRIMARY AND SECONDARY LITERATURE
<u>PRIMARY LITERATURE:</u> [1] P. J. Brockwell, R. A. Davis, “Introduction to Time Series and Forecasting”, Springer, New-York,1996. [2] J. Leśkow, „Prognozowanie i symulacje”, Wydawnictwo-Wyższa Szkoła Biznesu, Nowy Sącz, 2002. [3] J. Koronacki, J. Mielniczuk, „Statystyka dla kierunków technicznych i przyrodniczych”, WNT, Warszawa,2004. <u>SECONDARY LITERATURE:</u> Research papers from the area of applications of time series in different disciplines.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
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WROCLAW UNIVERSITY OF TECHNOLOGY – PHD STUDIES

**MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS
FOR SUBJECT
MATHEMATICAL METHODS IN THE ANALYSIS OF EXPERIMENTAL DATA
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
Doctoral studies at Faculty of Pure and Applied Mathematics**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool □umer***
(knowledge) PEK_W01	P8S_WG	C1	Lec1-Lec8	N1, N2, N3
PEK_W02	P8S_WG	C2	Lec9-Lec14	N1, N2, N3
(skills) PEK_U01	P8S_UW	C1,C2,C3	Lec1-Lec14	N1, N2, N3
PEK_U02	P8S_UW	C1,C2,C3	Lec1-Lec14	N1, N2, N3
(competences) PEK_K01	P8S_KK	C1,C2,C3	Lec1-Lec14	N1, N2, N3
PEK_K02	P8S_KR	C1,C2,C3	Lec1-Lec14	N1, N2, N3

** - enter symbols for main-field-of-study/specialization educational effects

*** - from table above