

FACULTY OF PURE AND APPLIED MATHEMATICS SUBJECT CARD					
Name in Polish WSTĘP DO STOSOWANEJ DYNAMIKI CIECZY					
Name in English INTRODUCTION TO APPLIED FLUID DYNAMICS					
Main field of study (if applicable): APPLIED MATHEMATICS					
Level and form of studies: 1st/ 2nd* level, full-time / part-time*					
Kind of subject: obligatory / optional / university-wide*					
Subject code MAT1374					
Group of courses YES / NO*					
	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30			30	
Number of hours of total student workload (CNPS)	90			90	
Form of crediting	Examination / crediting with grade*				
For group of courses mark (X) final course	X				
Number of ECTS points	3			3	
including number of ECTS points for practical (P) classes				3	
including number of ECTS points for direct teacher-student contact (BK) classes	2			1	

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Student has the standard knowledge of the classical concepts, theorems and methods of real and complex analysis
2. Student has basic knowledge of concepts and methods of the ordinary differential equations

SUBJECT OBJECTIVES

C1 Study of the advanced methods of mathematical analysis in mathematical modeling of the dynamics fluid phenomena.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01 knows advanced theorems of the Real and complex analysis related to the fluid dynamics

PEK_W02 has advanced knowledge concerning mathematical analysis: is able to understand formulations of the studied problems related to the fluid dynamics

relating to skills:

PEK_U01 can construct mathematical models applied in the fluid dynamics

relating to social competences:

PEK_K01 can, without assistance, search for necessary information in the literature, also in foreign languages

PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Reminder of the vector analysis elements	2
Lec 2	Reminder of the vector analysis elements	2
Lec 3	Reminder of the complex analysis elements	2
Lec 4	Conformal mappings	2
Lec 5	Laws of conservation	2
Lec 6	Equations of motion for an ideal fluid	2
Lec 7	Elementary viscous flow	2
Lec 8	Waves	2
Lec 9	Waves	2
Lec 10	Shock waves modelling	2
Lec 11	Classical aerofoil theory	2
Lec 12	Classical aerofoil theory	2
Lec 13	Nonlinear models in diffusion phenomena	2
Lec 14	Boundary layers	2
Lec 15	Computational fluid dynamics (CFD)	2
	Total hours	30

Form of classes - project		Number of hours
Pr 1	Preparation and presentations of projects illustrating theory given in the lectures.	30
	Total hours	30

TEACHING TOOLS USED

- N1. Lecture – traditional method and presentations
- N2. Student partial project presentation and final presentation
- N3. Consultations
- N4. Student's self work – work on the project development

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P –	Educational effect number	Way of evaluating educational effect achievement
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concluding (at semester end)		
F1	PEK_W01 PEK_W02 PEK_K01	exam
F2	PEK_U01 PEK_K01	Partial project presentations, final project presentation
C $P=0.5 \cdot F1 + 0.5 \cdot F2$		
PRIMARY AND SECONDARY LITERATURE		
<u>PRIMARY LITERATURE:</u>		
<p>[1] B. J. Acheson, Elementary Fluid Dynamics. [2] H. Ockendon, A. B. Tayler, Inviscid Fluid Flows.</p>		
<u>SECONDARY LITERATURE:</u>		
<p>[1] J. D. Logan, Applied Mathematics. A Contemporary Approach. [2] K. Ericsson, D. Estep, P. Hansbo, C. Johnson, Computational Differential Equations.</p>		
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)		
<p>Prof. dr hab. Wojciech Okrański (Wojciech.Okrasinski@pwr.edu.pl) Dr inż. Łukasz Płociniczak (Lukasz.Plociniczak@pwr.edu.pl)</p>		

**MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR
 SUBJECT
 INTRODUCTION TO APPLIED FLUID DYNAMICS MAT1374
 AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY
 APPLIED MATHEMATICS
 AND SPECIALIZATION MATHEMATICS FOR INDUSTRY AND COMMERCE**

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 number***
PEK_W01 (knowledge)	K2MIC_W03	C1	Lec1-Lec15	1,3
PEK_W02	K2MIC_W06	C1	Lec1-Lec15	1,3
PEK_U01 (skills)	K2MIC_U15	C1	Pr 1	2,3,4
PEK_K01 (competences)	K2MIC_K06	C1	Lec1-Lec15 Pr 1	1,2,3,4

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

*** - from table above