FACULTY OF PURE AND APPLIED MATHEMATICS

SUBJECT CARD

Name in Polish: Funkcje Specjalne
Name in English: Special Functions
Main field of study (if applicable): MATHEMATICS
Specialization (if applicable):
Level and form of studies: 2nd level, full-time ~~/ part-time~~*
Kind of subject: obligatory ~~/ optional~~ / ~~university-wide~~*
Subject code MAT001379
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)	150				
Form of crediting	Examination				
For group of courses mark (X) final course	X				
Number of ECTS points	5				
including number of ECTS points for practical (P) classes	3				
including number of ECTS points for direct teacher-student contact (BK) classes	3				

*delete as applicable

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of analysis of functions of several variables
2. Knowledge of complex analysis

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SUBJECT OBJECTIVES

C1 Recognition of definitions and basic properties of special functions
C2 Recognition of asymptotics of special functions

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:
PEK_W01 Knows basic special functions
PEK_W02 Knows basic asymptotics of special functions

relating to skills:
PEK_U01 Knows how to use special functions

relating to social competences:
PEK_K01
PEK_K02

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours**
Lec 1	Gamma, Beta and Zeta functions	4
Lec 2	Differential equations of second order	2
Lec 3	Orthogonal polynomials: Hermite, Laguerre, Jacobi polynomials (including Legendre polynomials).	2
Lec 4	Discrete orthogonal polynomials	2
Lec 5	Cylindrical functions: Bessel functions of first, second and third order, their asymptotics, zeroes and recurrence properties.	4
Lec 6	Hypergeometric functions: definition, recurrence properties, associated differential equation, integral representation.	4
Lec 7	Confluent hypergeometric functions: definition, recurrence properties, associated differential equation, integral representation.	4
Lec 8	Asymptotics	4
Lec 9	Elliptic functions	4
	Total hours	**30**

Form of classes - class		**Number of hours**
Cl 1	Solving problems illustrating subjects from lectures	
	Total hours	30

TEACHING TOOLS USED
N1. Lecture – classic method. N2. Exercises, computational and others – classic method.

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F-forming (during semester), P – concluding (at semester end)	Educational effect number	Way of evaluating educational effect achievement
F1	PEK_W1, PEK_W2, PEK_K1	Examination
F2	PEK_U1, PEK_K1	Oral answers, partial exams
C=0.5*F1+0.5*F2		

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] N. N. Lebedev, Special functions, 1968.
[2] B. C. Carlson, Special functions of applied mathematics, Academic Press, 1977.

SECONDARY LITERATURE:

[3] I. M. Ryzhik, I. S. Gradhsteyn, Tables of integrals, series and products , Alan Jeffrey and Daniel Zwillinger (eds.) 2007.
[4] R. Beals, R. Wong, Special functions, Cambridge University Press, 2011.
[5] G. N. Watson, A treatise on the theory of Bessel functions, Cambridge Univ. Press, 1922

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

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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT

Special functions

AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY 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 number***
PEK_W01 (knowledge)	K2MAT_W03	C1	Lec 1-9	1
PEK_W02	K2MAT_W09	C1	Lec 1-9	1
PEK_U01 (skills)	K2MAT_U15	C1	Cl 1	2
PEK_K01 (competences)	K2MAT_K06	C1	Lec 1-9, Cl 1	1,2

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

*** - from table above