Attachment No. 5 to Rector's ordinance No. 22/2020

DESCRIPTION OF THE COURSE OF STUDY

Course code	0541.6.MAT2.C.TMC	
Name of the course in	Polish	**Teoria Miary i Całki**
	English	**Measure and Integral Theory**

1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

1.1. Field of study	mathematics
1.2. Mode of study	full-time studies
1.3. Level of study	Graduate (Master)
1.4. Profile of study*	general academic profile of studies
1.5. Person/s preparing the course description	dr hab. Volodymyr Mykhailiuk
1.6. Contact	volodymyr.mykhailiuk@ujk.edu.pl

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	Polish and English
2.2. Prerequisites*	Mathematical Analysis III, Linear Algebra and Geormetry, Topology I

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes		lectures and classes
3.2. Place of classes		classes in the UJK teaching room
3.3. Form of assessment		Exam (lectures), graded credit (classes)
3.4. Teaching methods		Lecture, talk, problem solving
3.5. Bibliography	**Required reading**	1. S.Hartman, J. Mikusinski, Teoria Miary i Całki Lebesgue'a. Państwowe Wydawnictwo Naukowe, Warszawa, 1957 2. G. Plebanek, Miara i calka, Wroclaw, 2018 3. Bruce D. Craven, Lebesgue measure and integral
	Further reading	1. P.Billingsley, Prawdopodobienstwo i miara, PWN, Warszawa, 1987. 2. Terence Tao: An Introduction to Measure Theory

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

4.1. Course objectives ***(including form of classes)***

Lecture

C1 – introducing students to the theory and basic methods of abstract measure theory and the Lebesgue integral

C2 – presentation of basic properties of objects being the subject of real analysis research

Classes

C1 – acquisition of basic skills in using the methods of measure and integral theory

C2 – recognizing the concepts of measure theory in other areas of mathematics

C3 – getting acquainted with the basics of proper self-assessment of a student

4.2. Detailed syllabus ***(including form of classes)***

Lectures

Sigma-algebra, Borel algebra, additive set function, measure and outer measure, Lebesgue measure, measurable functions, Lebesgue integral and integrable functions, monotonne convergence theorem and dominated convergence theorem, L^p-spaces, product measure, Fubini theorem. Cavalieri's principle.

Classes

Sigma-algebra, measure, measurable functions, simple functions, convergence everywhere and convergence in measure of function sequences, Lebesgue integration ant its comparison with Riemann integration.

4.3 Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of **KNOWLEDGE:**		
W01	to know the concepts of sigma-algebra, measurable function, positive measure, and their properties	MAT2A_W02
W02	to know the construction of the Lebesgue measure on the real line	MAT2A_W02
W03	to know the relations between the Reimann and Lebesgue integral theory	MAT2A_W02
W04	to know Fubini theorem	MAT2A_W02
W05	to know the monotonne convergence theorem and the dominated convergence theorem	MAT2A_W02

W06	to know the concept of a signed measure	MAT2A_W02
W07	to know the basic properties of integrable functions	MAT2A_W02
W08	to know the definition of the Borel set	MAT2A_W02
W09	to know the relations between Borel sets and measurable sets	MAT2A_W02
within the scope of **ABILITIES:**		
U01	to able to compute the Lebesgue integral of simple and measurable functions with respect to the Lebesgue measure on the real line	MAT2A_U04
U02	to able to apply the Fubini theorem and the Cavalieri's principle	MAT2A_U01 MAT2A_U02
U03	to able to apply the convergence theorems and the completeness of the Lp spaces	MAT2A_U01
U04	to able to construct Borel sets in real line and study their properties	MAT2A_U01
U05	to able to compute the Lebesgue integral of measurable functions with respect to an abstract measure	MAT2A_U04
U06	to able to compute the Lebesgue measure of Borel sets	MAT2A_U04
within the scope of **SOCIAL COMPETENCE:**		
K01	to formulate questions to deepen one's own understanding of a given topic	MAT2A_K04

4.4. Methods of assessment of the intended learning outcomes

Teaching outcomes *(code)*	**Method of assessment (+/-)**								
	Exam oral/written*			**Test***			**Self-study***		
	Form of classes			***Form of classes***			***Form of classes***		
	L	*C*	*...*	*L*	*C*	*...*	*L*	*C*	*...*
W01	+								
W02	+								
W03	+								
W04	+								
W05	+								
W06	+								
W07	+								
W08	+								
W09	+								
U01					+			+	
U02					+			+	
U03					+			+	
U04					+			+	
U05					+			+	
U06					+			+	
K01					+			+	

delete as appropriate

4.5. Criteria of assessment of the intended learning outcomes

Form of classes	**Grade**	**Criterion of assessment**
lecture (L) (including e-learning)	3	at least 50% and no more than 60% of the total number of points possible
	3,5	more than 60% and no more than 70% of the total number of points possible
	4	more than 70% and no more than 80% of the total number of points possible
	4,5	more than 80% and no more than 90% of the total number of points possible
	5	more than 90% of the total number of points possible
classes (C)* (including e-learning)	3	at least 50% and no more than 60% of the total number of points possible
	3,5	more than 60% and no more than 70% of the total number of points possible
	4	more than 70% and no more than 80% of the total number of points possible
	4,5	more than 80% and no more than 90% of the total number of points possible
	5	more than 90% of the total number of points possible

5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT

Category	Student's workload	
	Full-time studies	**Extramural studies**
NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/	***62***	
*Participation in lectures**	30	
*Participation in classes, seminars, laboratories**	30	
*Preparation in the exam/ final test**	2	
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	***38***	
*Preparation for the lecture**	14	
*Preparation for the classes, seminars, laboratories**	14	
*Preparation for the exam/test**	10	
TOTAL NUMBER OF HOURS	***100***	
ECTS credits for the course of study	***4***	

delete as appropriate

Accepted for execution *(date and legible signatures of the teachers running the course in the given academic year)*

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