

Institute of Applied Mathematics				Semester 1. of the curriculum				
••				2024-25-1				
Name of the subject:		Code of the	Cradita	Weekly hours:				
		subject:	Credits.		lec	sem	lab	
Analysis		NMXAN1EMNF	4	full-time	2	1	0	
Responsible person for the subject: Dr. VAJDA István Classification: senior l					lecturer			
Subject lecturer(s): Dr. LÉKA Zoltán								
Prerequisites:								
Way of the assessment:		mid-term grade						
Course description								
Goal:	Our goal is to introduce the fundamental concepts of functional analysis and Lebesgue							
	integration. These concepts are crucial in the modern study of probability theory,							
	(partial) differential equations, and quantum theory, for instance.							
Course	The problem of the measure. Lebesgue integral, convergence theorems. Lebesgue and							
description:	Riemann integrals. Study of Hilbert spaces with orthogonal systems, duality.							

Lecture schedule						
Education week	Торіс					
1.	Introduction to measure theory					
2.	Exterior measure and Lebesgue measure of $R^d$					
3.	Measurable functions and their properties					
4.	Lebesgue integral					
5.	Convergence theorems: Fatou lemma, Monotone convergence theorem and Lebesgue's dominated theorem					
6.	1 <sup>st</sup> midterm exam					
7.	General measures and the Lebesgue Lp-spaces					
8.	Differentiation: absolute continuous functions					
9.	Functions of bounded variations					
10.	Introduction to Hilbert spaces, normed spaces					
11.	Geometry of Hilbert spaces, inner product spaces					
12.	Duality, orthogonal basis of L2 spaces, integral operators, kernels					
13.	2 <sup>nd</sup> midterm exam					
14.	Resit exam					
Mid-term requirements						
Conditions for obta	aining	One needs to accomplish at least 50% of the weekly home assignments.				
a mid-term		There will be two written midterms.				
grade/signature						
Assessment schedule						
Education week	Торіс					
6.	Material of the first 5 education weeks					
13.	Material covered after the first midterm					
14. One of the above						
Method used to calculate the <i>mid-term grade</i> (to be filled out only for subjects with mid-term grades)						
		Achieved result	Grade			



		89%-100%	excellent (5)				
		76%-88<%	good (4)				
		63%-75<%	satisfactory (3)				
		51%-62<%	pass (2)				
		0%-50<%	fail (1)				
Type of the replacement							
Type of the re of written tes grade/signatu	ype of the replacement f written test/mid-term rade/signature At the last week of the semester one can have a resit exam. In the first ten days of the examination period, there is a midterm grade retake exam.						
Type of the exam (to be filled out only for subjects with exams)							
Calculation of the exam mark (to be filled only for subjects with exams)							
Final grade of	calculation m	nethods:					
References							
Obligatory: E. Stein: Real Analysis							
Recommen	Recommen						
ded:	Analysis, Manifolds and Physics Revised Edition						
Other	Lecture notes uploaded to the e-learning system of the university						
references:	ices:						