

Institute of Applied Mathematics			Semester 2. of the curriculum 2025-26-2			
Name of the subject:	Code of the subject:	Credits:	Weekly hours:			
				lec	sem	lab
Fourier analysis and series	NMXFA1EMNF	4	full-time	2	0	0
Responsible person for the subject: Prof. Dr. TAR József			Classification: professor			
Subject lecturer(s): Dr. Léka Zoltán						
Prerequisites:	NMXAN1EMNF	Analysis				
Way of the assessment:	exam					
Course description						
Goal:	Acquiring the foundations and applications related to Fourier analysis					
Course description:	Fourier expansion of periodic functions, convergence of Fourier series. Hilbert space and its orthonormal basis. Fourier method and its application to PDEs, boundary value problems. Wavelets. Fourier transform, inversion formula and PDEs.					

Lecture schedule	
Education week	Topic
1.	Fourier expansion of periodic functions
2.	Fourier expansion of even and odd functions, examples
3.	Convergence of Fourier series, Dirichlet and Fejér kernel
4.	Hilbert space of square integrable functions
5.	Least-squares approximation in Hilbert spaces
6.	Orthogonal functions, Parseval formula
7.	1st midterm
8.	Fourier method and the heat equation
9.	Fourier method and the wave equation
10.	Fourier transforms on the real line
11.	Fourier inversion formula, Plancherel theorem
12.	Heat equation on the real line
13.	2nd midterm
14.	Summary, evaluation
Mid-term requirements	
Conditions for obtaining a mid-term grade/signature	50% home assignments
Assessment schedule	
Education week	Topic
7	1st midterm: 1-6 weeks
13	2nd midterm: 8-12 weeks
14	Resit exam
Method used to calculate the <i>mid-term grade</i> (to be filled out only for subjects with mid-term grades)	
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Type of the replacement	
Type of the replacement of written test/mid-term grade/signature	Written exam
Type of the exam (to be filled out only for subjects with exams)	

Written exam of 120 mins

Calculation of the exam mark (to be filled only for subjects with exams)

0-50 fail (1)
51-62 pass (2)
63-75 satisfactory (3)
76-88 good (4)
89-100 excellent (5)

Final grade calculation methods:

30% midterms + 70% exam

References

Obligatory:	A. Vretblad, Fourier Analysis and Its Applications, Springer, 2003
Recommended:	N. Ashmar, Partial Differential Equations with Fourier series and Boundary Value Problems, 3rd Edition, Dover Books, 2016
Other references:	Lecture notes uploaded to the e-learning system of the university