



Subject card

Subject name and code	Mathematical methods of physics and technics II, PG_00037303						
Field of study	Technical Physics						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
Education level	first-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Atomic, Molecular and Optical Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor						
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		5.0		35.0	100
Subject objectives	Acquaint students with mathematical methods of physics and technology.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W03] has systematized knowledge of higher mathematics, including algebra, analysis, probability theory and numerical methods, allowing for basic description, understanding and modelling of physical phenomena and some technical processes		Students are familiar with selected mathematical methods used in physics and technology.		[SW1] Assessment of factual knowledge		
	[K6_U02] analyzes and solves simple scientific and technical problems, based on possessed knowledge, using analytical, numerical, simulation and experimental methods		Students know how to apply selected mathematical methods in description of physical processes.		[SU4] Assessment of ability to use methods and tools		

Subject contents	<ol style="list-style-type: none"> 1. The Dirac delta. 2. Matrix eigenvalue problems. 3. Sturm-Liouville problems. 4. The Green's function of a self-adjoint differential operator. 5. The generalized Green's function of a self-adjoint differential operator. 6. Applications of Green's functions. 7. Introduction to functions of a complex variable functions. 8. The Cauchy-Riemann conditions. 9. Complex sequences and series. 10. Contour integrals of complex functions. 11. The Cauchy-Goursat integral theorem. 12. The Cauchy integral formula. 13. The Taylor series of a complex function. 14. The Laurent series of a complex function. 15. Residuuum of a complex function. 16. Evaluation of contour integrals by residues. 17. Evaluation of real definite integrals by residues. 18. Summation of series by residues. 											
Prerequisites and co-requisites												
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Subject passing criteria</th> <th style="width: 33%;">Passing threshold</th> <th style="width: 33%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Grade of exam</td> <td>50.0%</td> <td>50.0%</td> </tr> <tr> <td>Grade of exercises (2 control works)</td> <td>37.5%</td> <td>50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Grade of exam	50.0%	50.0%	Grade of exercises (2 control works)	37.5%	50.0%
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Recommended reading	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 40%;">Basic literature</td> <td colspan="2">G. B. Arfken, H. J. Weber, Mathematical methods for physicists, 5th ed., Academic, San Diego, 2001</td> </tr> <tr> <td>Supplementary literature</td> <td colspan="2">None.</td> </tr> <tr> <td>eResources addresses</td> <td colspan="2">Adresy na platformie eNauczanie:</td> </tr> </tbody> </table>			Basic literature	G. B. Arfken, H. J. Weber, Mathematical methods for physicists, 5th ed., Academic, San Diego, 2001		Supplementary literature	None.		eResources addresses	Adresy na platformie eNauczanie:	
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Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Finding of eigenvalues and eigenvectors of given matrices. 2. Finding Green's functions for given differential operators. 3. Applications of the residuum theorem. 											

Work placement	Not applicable
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