



## Subject card

Subject name and code	Modern Applications of Functional Programming, PG_00054419						
Field of study	Informatics, Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	February 2025	Academic year of realisation of subject			2025/2026		
Education level	second-cycle studies	Subject group			Optional subject group Specialty 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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Algorithms and Systems Modelling -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Krzysztof Manuszewski					
	Teachers	dr inż. Krzysztof Manuszewski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	15.0	45
	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	45		6.0		24.0	75
Subject objectives	Making students familiar with functional paradigm. Learning of idiomatic programming in selected functional languages. Learning of particular applications and benefits of using functional approach						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U08] while identifying and formulating engineering tasks specifications and solving these tasks, can: - apply analytical, simulation and experimental methods, - notice their systemic and non-technical aspects, - make a preliminary economic assessment of suggested solutions and engineering work	Student is able to assess and justify the usefulness of the functional approach to specific issues	[SU5] Assessment of ability to present the results of task
	[K7_W04] knows and understands, to an increased extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or other elements or programmable devices specific to the field of study, and organization of work of systems using computers or such devices	Student knows and understands practical possibilities of application of functional approach to development of software solutions (e.g. functional modeling of domain etc.)	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
	[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	Student understands functional design patterns	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
	[K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it	Student is able to practical application of functional patterns	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
Subject contents	<ul style="list-style-type: none"> <li>• Wprowadzenie do wybranego języka programowania funkcyjnego</li> <li>• Porównanie podejścia deklaratywnego oraz imperatywnego, rekurencja</li> <li>• Idea niezmiennych wartości</li> <li>• Porównanie funkcji operujących na niezmiennych wartościach do obiektów z metodami modyfikującymi ich stan</li> <li>• Czystość oraz pierwszorzędność funkcji</li> <li>• Adaptacja technik funkcyjnych w nowoczesnych językach obiektowych</li> <li>• Wybrane zaawansowane zagadnienia jak np. Monady oraz ich zastosowania, obsługa błędów, wstrzykiwanie zależności, currying, funkcje wyższego rzędu, dopasowanie wzorca, przetwarzanie współbieżne i programowanie zorientowane na dane</li> <li>• Przegląd języków funkcyjnych i ich cech charakterystycznych</li> <li>• Wybrane aplikacje podejścia funkcyjnego np. efektywne przetwarzanie równoległe, eksploracja danych, aplikacje finansowe</li> <li>• Wybrane narzędzia pozwalające np. równoległe przetwarzać dane / wykonywać obliczenia, tworzyć rozwiązania aplikacyjne itp.</li> </ul>		
Prerequisites and co-requisites	<ul style="list-style-type: none"> <li>• high level programming language</li> <li>• course about algorithms and datastructures</li> </ul>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	40.0%	30.0%
	laboratory	50.0%	40.0%
	seminar-participation	50.0%	30.0%
Recommended reading	Basic literature	• Becoming Functional, Joshua Backfield, O'Reilly 2014	
	Supplementary literature	Functional Thinking, Neal Ford, O'Reilly 2014	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			

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