



Subject card

Subject name and code	Actuarial models, PG_00056621						
Field of study	Mathematics						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2023/2024		
Education level	second-cycle studies		Subject group		Optional subject group		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Marcin Styborski				
	Teachers		dr inż. Marcin Styborski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	15.0	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		0.0		0.0	60
Subject objectives	The aim of the course is to familiarize students with the methods used in the daily practice of the ERGO Hestia insurance company and practical training.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_U13		The student is able to implement the algorithms used in actuarial mathematics and verify their effectiveness.		[SU3] Assessment of ability to use knowledge gained from the subject		
	K7_W10		The student is able to use the chain ladder (Mack model) and bootstrap methods in modeling the risk of provisions.		[SW3] Assessment of knowledge contained in written work and projects		
	K7_W07		The student uses the methods (theorems) of statistics and probability in practical problems of actuarial mathematics.		[SW3] Assessment of knowledge contained in written work and projects		
	K7_U08		The student knows and uses the frequency and severity distributions as well as compound distributions in modeling the premium risk.		[SU4] Assessment of ability to use methods and tools		
Subject contents	<ul style="list-style-type: none">• Solvency 2 and the standard formula versus insurance risk management (including risk categorization),• Introduction to the technical calculus,• Chain ladder (Mack model) in reserve risk modeling,• Introduction to one-year risk in provision risk,• Compound distributions in premium risk modeling,• Modeling the impact of reinsurance contracts on the premium risk,• Introduction to catastrophic risk modeling.• Introduction to market and credit risk.						
Prerequisites and co-requisites	<ul style="list-style-type: none">• Good knowledge of probability, statistics and stochastic processes.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	2 x homework	51.0%	40.0%
	Project at the end of the semester	51.0%	60.0%
Recommended reading	Basic literature	<ul style="list-style-type: none">• M. V. Wuthrich, M. Merz, 2008, Stochastic Claims Reserving Methods in Insurance, Wiley.• H. Albrecher, J. Beirlant, J.L. Teugels, 2017, Reinsurance, Actuarial and Statistical Aspects, Wiley.• Rozporządzenie Delegowane Komisji (UE) 2015/35 z dnia 10 października 2014 r. uzupełniające dyrektywę Parlamentu Europejskiego i Rady 2009/138/WE w sprawie podejmowania i prowadzenia działalności ubezpieczeniowej i reasekuracyjnej (Wypłacalność II).	
	Supplementary literature	<ul style="list-style-type: none">• S. Klugman, H. Panjer, G. Willmot, Loss Models: From Data to Decisions• R. Hogg, S. Klugman, Loss distributions	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none">• What is the total solvency capital requirement for the given correlation matrix and the given solvency capital requirements of the sub-modules?• What is the risk structure used in the Solvency Directive II?• How to model provision risk and premium risk for insurance companies?• How to include reinsurance as an effect of risk mitigation?		
Work placement	Not applicable		