GDAŃSK UNIVERSITY OF TECHNOLOGY

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

- 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

- Good knowledge of probability, statistics and stochastic processes.

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>2 x homework</td><td>51.0%</td><td>40.0%</td></tr>
<tr><td>Project at the end of the semester</td><td>51.0%</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>• 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).</td></tr>
<tr><td>Supplementary literature</td><td>• S. Klugman, H. Panjer, G. Willmot, Loss Models: From Data to Decisions
• R. Hogg, S. Klugman, Loss distributions</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">• 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?</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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