

## Subject card

Risk Processes, PG_00044138							
Mathematics							
October 2024		Academic year of realisation of subject			2024/2025		
second-cycle studies		Subject group					
Full-time studies		Mode of delivery			at the university		
1		Language of instruction			Polish		
2		ECTS credits			5.0		
general academic profile		Assessment form			exam		
Divison of Dynamical Systems -> Institute of Applied Mathematics -> Faculty of Applied Physics and Mathematics							
Subject supervisor		dr hab. Sergey Kryzhevich					
Teachers		dr hab. Sergey Kryzhevich					
Lesson type	Lecture	Tutorial	Laboratory	Project		Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0		30.0	60
E-learning hours included: 0.0							
Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study		SUM
Number of study hours	60	5.0			60.0		125
Introduction of basic mathematical tools related to risk modeling in terms of stochastic (Markov) processes and stochastic differential equations.							
Course out	Subject outcome			Method of verification			
Markovian processes with discrete time. Elements of the Itô integral. Stochastic differential equations. Standard risk models in terms of stochastic differential equations. The Heath, Jarrow and Morton model. Reduced insolvency risk model. During the seminars accompanying the lecture, students will present issues related to survival analysis.							
Assessment in the following subjects: probability calculus, stochastic processes							
Subject passing criteria		Passing threshold			Percentage of the final grade		
Project					50.0%		
Exam		51.0%			50.0%		
Basic literature		<ol> <li>Steven E. Shreve, Stochastic Calculus for Finance II. Continuous-Time Models. Springer, 2004.</li> <li>Robert A. Jarrow, Continuous-Time Asset Pricing Theory. A Martingale-Based Approach. Springer, 2018.</li> <li>D.G. Kleinbaum, M. Klein, Survival Analysis, A Self-Learning Text, (3rd Edition), Springer</li> </ol>					
	Mathematics October 2024  second-cycle studies Full-time studies 1 2 general academic production of Dynamical Mathematics Subject supervisor Teachers  Lesson type Number of study hours E-learning hours included and stochastic difference out Markovian processes Standard risk models Reduced insolvency related to survival and Assessment in the formal suppression of Subject passin Project Exam	Mathematics  October 2024  second-cycle studies  Full-time studies  1  2  general academic profile  Divison of Dynamical Systems -> Institute Mathematics  Subject supervisor  Teachers  Lesson type  Lecture  Number of study hours  E-learning hours included: 0.0  Learning activity  Participation in classes included plan  Number of study hours  Introduction of basic mathematical to and stochastic differential equations  Course outcome  Markovian processes with discrete to Standard risk models in terms of sto Reduced insolvency risk model. Dur related to survival analysis.  Assessment in the following subjects  Subject passing criteria  Project  Exam	Mathematics  October 2024  Second-cycle studies  Subject gro Full-time studies  Mode of de  Language of ECTS cred general academic profile  Divison of Dynamical Systems -> Institute of Applie Mathematics  Subject supervisor  Teachers  Lesson type  Lecture  Lesson type  Lecture  Number of study hours  E-learning hours included: 0.0  Learning activity  Participation in didactic classes included in study plan  Number of study hours  Introduction of basic mathematical tools related to rand stochastic differential equations.  Course outcome  Subj  Markovian processes with discrete time. Elements of Standard risk models in terms of stochastic differential equations.  Course outcome  Subj  Markovian processes with discrete time. Elements of Standard risk models in terms of stochastic differential equations.  Subject passing criteria  Pass Project  Subject passing criteria  Pass Project  Exam  51.0%  Basic literature  1.  Steven E Time Model  2.  Robert A Martingal  3.  D.G. Klein	Mathematics  October 2024  Academic year of realisation of subject  second-cycle studies  Subject group  Full-time studies  Mode of delivery  1 Language of instruction  2 ECTS credits  general academic profile  Assessment form  Divison of Dynamical Systems -> Institute of Applied Mathematics  Mathematics  Subject supervisor  Teachers  Lesture  Lesture  Tutorial  Laboratory  Number of study hours  E-learning hours included: 0.0  Learning activity  Participation in didactic classes included in study plan  Number of study hours  Lesture  Mathematical tools related to risk modeling it and stochastic differential equations.  Course outcome  Markovian processes with discrete time. Elements of the Itô integ Standard risk models in terms of stochastic differential equations.  Reduced insolvency risk model. During the seminars accompanyi related to survival analysis.  Assessment in the following subjects: probability calculus, stocha  Subject passing criteria  Passing threshold  Project  Steven E. Shreve, Stoch Time Models. Springer, 2.  Robert A. Jarrow, Contin Martingale-Based Appro-	Mathematics  October 2024  Academic year of realisation of subject  second-cycle studies  Mode of delivery  1 Language of instruction  2 ECTS credits  general academic profile  Divison of Dynamical Systems -> Institute of Applied Mathematics -> Fact Mathematics  Subject supervisor  Teachers  Lesson type  Lecture  Number of study hours  E-learning hours included: 0.0  Learning activity  Participation in didactic classes included in study plan  Number of study hours  Number of study hours  E-learning hours included: 0.0  Learning activity  Participation in didactic classes included in study plan  Number of study hours  Course outcome  Markovian processes with discrete time. Elements of the Itô integral. 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Mathematics  October 2024  Academic year of realisation of subject second-cycle studies  Subject group  Full-time studies  Mode of delivery  1 Language of instruction 2 ECTS credits 5.0 general academic profile  Assessment form  Divison of Dynamical Systems -> Institute of Applied Mathematics -> Faculty of A Mathematics  Subject supervisor  Teachers  dr hab. Sergey Kryzhevich  Lesson type  Lecture  Tutorial  Laboratory  Project  Number of study hours  Learning hours included: 0.0  Learning activity  Participation in didactic classes included in study plan  Number of study hours  Number of study hours  Divison of Dynamical Systems -> Institute of Applied Mathematics -> Faculty of A Mathematics  Lesson type  Lecture  Tutorial  Laboratory  Project  Number of study hours  Learning hours included: 0.0  Learning activity  Participation in didactic classes included in study plan  Number of study hours  Divison of Dynamical Systems -> Institute of Applied Mathematics -> Faculty of A Mathematics  Course outcome  Subject outcome  Markovian processes with discrete time. Elements of the Itô integral. Stochastic clifferential equations. The Heath, Jan Reduced insolvency risk model. During the seminars accompanying the lecture, related to survival analysis.  Assessment in the following subjects: probability calculus, stochastic processes  Subject passing criteria  Passing threshold  Pere Project  Subject passing criteria  Passing threshold  Pere Project  Subject passing criteria  Passing threshold  Pere Project  Subject A. Jarrow, Continuous-Time As Martingale-Based Approach. Springer, 2004.  2.  Robert A. Jarrow, Continuous-Time As Martingale-Based Approach. Springer, 3.  D.G. Kleinbaum, M. Klein, Survival Ana	Mathematics  October 2024  Academic year of realisation of subject  second-cycle studies  Subject group  Full-time studies  Mode of delivery  1 Language of instruction  2 ECTS credits  5.0  general academic profile  Assessment form  Divison of Dynamical Systems -> Institute of Applied Mathematics -> Faculty of Applied Physic Mathematics  Subject supervisor  Teachers  dr hab. 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During the seminars accompanying the lecture, students will related to survival analysis.  Assessment in the following subjects: probability calculus, stochastic processes  Subject passing criteria  Passing threshold  Percentage of the Project  Steven E. Shreve, Stochastic Calculus for Finance II Time Models. Springer, 2004.  2.  Robert A. Jarrow, Continuous-Time Asset Pricing Th Martingale-Based Approach. Springer, 2018.  3.  D.G. Kleinbaum, M. Klein, Survival Analysis, A Self-I

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	Supplementary literature	Olav Kallenerg, Foundations of Modern Probability. Springer, 2002.				
		Ioannis Karatzas and Steven E. Shreve. Brownian Motion and				
		Stochastic Calculus. Springer, 1991.				
		3. Tomasz R. Bielecki, Marek Rutkowski, Credit Risk: Modeling,				
		Valuation and Hedging, Springer, 2004.				
	eResources addresses	Podstawowe				
		https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38042 - The Risk Processes course at e-nauczanie platform				
		Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed						
Work placement	Not applicable					

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