Module description: Data Science and Technology for Insurance

Module Code	w.BA.XX.3DSTI-RI.XX
ECTS Credits	6
Language of Instruction/Examination	English
Module Description	The primary aims of this module are to ensure that students acquire a thorough introduction into the theory and practice of data analysis and machine learning, and the use of automation methods in a business context. Students acquire an advanced understanding of the collection and summarizing of data and the presentation of information in a manner suited to a business environment. Students understand and apply quantitative techniques used in business decision-making.
Organizational Unit	Institut für Risk & Insurance
Module Coordinator	Johannes Gerd Becker
Deputy Module Coordinator	Mario Amrein
Program and Specialization	• Business Administration - Specialization in Insurance Management
Legal Framework	Academic Regulations BSc dated 29.01.2009, for the degree programs in Business Administration, International Management, Business Information Technology, Business Law, Business Law and Applied Law, first adopted on 12.05.2009

Module Category	**Module Type** Compulsory	**Program Phase** Main Study Period

Prerequisite Knowledge	Mathematical knowledge (lectures on Mathematics 1 and 2); towards the end of the semester, familiarity with applied statistics; familiarity with spreadsheets (Excel).
Contribution to Program Learning Objectives (by the concerned Module)	• Professional Competence • Methodological Competence • Social Competence • Self-Competence
Contribution to Program Learning Objectives	**Professional Competence** • Knowing and Understanding Content of Theoretical and Practical Relevance • Apply, Analyze, and Synthesize Content of Theoretical and Practical Relevance • Evaluate Content of Theoretical and Practical Relevance **Methodological Competence** • Problem-Solving & Critical Thinking • Scientific Methodology • Work Methods, Techniques, and Procedures • Information Literacy • Creativity & Innovation **Social Competence** • Written Communication • Oral Communication • Teamwork & Conflict Management **Self-Competence** • Self-Management & Self-Reflection • Ethical & Social Responsibility • Learning & Change

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Module Learning Objectives	Students... • automate simple tasks in Python. • clean datasets and explore as well as analyze data. • explain how ML methods are applied in business and insurance contexts. • present data using appropriate diagrams. • explain the basic ideas behind supervised and unsupervised learning methods and explain the problems connected with model selection, such as over- and underfitting. • analyze data using one- and multidimensional regression. • are familiar with the concepts of modern ML approaches. • know where to start if they face a business problem for which ML methods are needed. • can find appropriate resources for self-study and for deepening their knowledge in a particular field. • can explore datasets using dashboard applications. • understand how the requirements for data management, data storage, data quality, and data validity depend on the intended use cases.
Module Content	• Introduction to Jupyter and Python, programming basics, data formats and handling, and automation • Spreadsheets • Data preparation and cleaning • Data visualization and presentation • Basic data analysis • Introduction to machine learning: supervised versus unsupervised learning, under- and overfitting, error measures • Regression: linear models in one and several dimensions, polynomial regression • Insurance applications • Dashboard applications • Data management for reporting and auditing purposes
Links to other modules	This module is linked to the following modules: • w.BA.XX.3GRI-RI.XX • w.BA.XX.3MmPd-RI.XX • w.BA.XX.3AMP-RI.XX • w.BA.XX.2Stat.XX • w.BA.XX.2Mathe2.XX • w.BA.XX.2Mathe1.XX
Digital Learning Resources	• Teaching Videos • Teaching Materials • Practice and Application Exercises (with Key)
Methods of Instruction	• Application Tasks • Lecture • Interactive Instruction • Exercises • Problem-Oriented Teaching • Computer exercises Social Settings Used: • Group Work • Individual Work

Type of Instruction		Classroom Instruction	Guided Self-Study	Autonomous Self-Study
	Large Class	28 h	22 h	
	Small Class	28 h	22 h	
	Group Instruction	-	-	
	Practical Work	-	-	
	Seminar	-	-	
	Total	**56 h**	**44 h**	**80 h**

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Performance Assessment	End-of-module exam		Form	Length (min.)	Weighting
	-				
	Permitted Resources				

	Others	Assessment	Format	Length (min.)	Weighting
	Mid-semester exam	Grade	Einzelarbeit	60	40.00
	End-of-semester exam	Grade	Einzelarbeit	60	60.00

Classroom Attendance Requirement	None
Compulsory Reading	• Hull, J. (2021). Machine Learning in Business: An Introduction to the World of Data Science. 3rd edition. Leipzig: GFS Press/Amazon Distribution. ISBN 9798508489441. The 2nd edition can be used as well.
Recommended Reading	
Comments	