

Module description: Artificial Intelligence and Data Science for Insurance

Module Code	w.BA.XX.AIDSI-IMA.25HS	
ECTS Credits	6	
Language of Instruction/Examination	English	
Module Description	This module provides students with a practice-oriented introduction to quantitative modeling and AI-supported working methods in an insurance business context. Building on basic data-handling skills, students learn to apply and critically assess regression models and simulation techniques for decision-making under uncertainty, and to use large language models and APIs productively and critically in their day-to-day work. Throughout the module, these methods are applied to authentic insurance-related problems, so that students develop the judgment to know when a data-driven or AI-generated result can be trusted and when it needs further scrutiny.	
Organizational Unit	Institut für Risk & Insurance	
Module Coordinator	Johannes Gerd Becker	
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); towards the end of the semester, familiarity with applied statistics.	
Contribution to Learning Objectives (by the concerned Module)	• Professional Competence • Methodological Competence • Social Competence • Self-Competence	
Contribution to 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...

- structure, clean, and analyze data using spreadsheets and Python.
- import and prepare data from diverse sources (web, JSON, APIs) for analysis.
- build dashboards and communicate analytical insights clearly to a non-technical audience.
- apply linear, exponential, and polynomial regression models and interpret them in business terms.
- recognize under- and overfitting and judge when a model generalizes versus merely fits the training data.
- model uncertainty using probability distributions and Monte Carlo simulation.
- interpret simulation results (e.g., quantiles, extreme scenarios) to support decisions under uncertainty.
- use large language models and APIs productively for coding assistance, research, and text analysis.
- critically evaluate AI-generated output, distinguishing source-based evidence from AI-generated inference.
- know where to start if they face a business problem for which data-driven or AI-based methods are needed.
- can find appropriate resources for self-study and for deepening their knowledge in a particular field.
- collaborate effectively in project teams, using a team charter and structured reflection to clarify roles and address conflicts.

Module Content

- Spreadsheet fundamentals: formulas, dynamic arrays, pivot tables
- Power BI and Power Query: data import, ETL, dashboard design
- Introduction to Python/Jupyter: data loading, inspection, Pandas, visualization
- Regression: linear, exponential, and polynomial models; over- and underfitting
- Simulation and scenario analysis: probability distributions, Monte Carlo methods, simplified solvency modeling
- Use of LLMs/APIs: coding assistance, information research, critical evaluation of AI output
- Insurance applications throughout (case-based, e.g., SME market analysis)

Links to other modules

Linked Module

w.BA.XX.PricePS-IMA.25HS / Pricing of Products and Services

Prerequisite Module

w.BA.XX.2Stat.XX / Statistics

w.BA.XX.ABM1.25HS / Applied Business Mathematics 1

w.BA.XX.ABM2.25HS / Applied Business Mathematics 2

Digital Learning Resources

- Teaching Videos
- Practice and Application Exercises (with Key)
- Case Studies (with Key)
- Multiple Choice Tests
- Interactive explainer widgets

Methods of Instruction

- Problem-Oriented Teaching
- Project Work
- Exercises
- Interactive Instruction
- Case Studies
- Application Tasks
- Peer teaching / peer presentations

Social Settings Used:

- Group Work
- Individual Work
- Pair Work

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Type of Instruction		Classroom Instruction	Guided Self-Study	Autonomous Self-Study	
	Lecture	-	-		
	Excercise	28 h	62 h		
	Project Work	-	-		
	Seminar	-	-		
	Large Class	-	-		
	Small Class	-	-		
	Group Instruction	-	-		
	Practical Work	-	-		
	Seminar	-	-		
	Total	28 h	62 h	90 h	
Performance Assessment	End-of-module exam		Form	Length (min.)	Weighting
	-				
	Permitted Resources				
		Assessment	Format	Length (min.)	Weighting
	Graded short tests 5 tests, worst one dropped, 15 minutes each	Grade	Individual work	15	15.00%
	Mid-term assessment internet and AI use permitted	Grade	Individual work	90	40.00%
	End-of-semester project video presentation	Grade	Group work	0	40.00%
	Teamwork/collaboration reflection	Grade	Individual work	0	5.00%
	Classroom Attendance Requirement	None			
Recommended Reading	Hull, J. (2021). Machine Learning in Business: An Introduction to the World of Data Science. 3 Edition. Leipzig: GFS Press/Amazon Distribution. ISBN 9798508489441. The 2nd edition can also be used.				

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Comments

The module grade is composed of four components: graded short tests (15%, five tests of ~15 minutes each, held at the start of the classroom sessions in Weeks 3, 5, 9, 11, and 13; the lowest of the five results is dropped, so the best four count), a mid-term exam (40%, 90 minutes, Week 7, covering Weeks 1–6, with internet and AI use permitted), an end-of-semester project with video presentation (40%, Week 14, covering an applied data/AI/analytics question with at least one substantial methodological component from the second half of the semester), and a teamwork/collaboration reflection (5%, based on a team charter and structured reflection for group work, or an individual process reflection for individual work).

If a student misses or fails (< 4.0) one or two of the five short tests, the tests missed due to an excused absence can be made up through a single 10-minute oral exam covering the corresponding material. If a student misses or fails (< 4.0) more than two of the five short tests, the entire short-test component is replaced by a mandatory 20-minute oral exam covering the material of all five tests. In case of an excused absence in the mid-term exam, there is a replacement oral exam of 20 min with 20 min preparation time.

No supplementary exams are offered beyond the oral make-up exams described above, and graded work cannot be resubmitted for improvement.

Supplementary examinations may not be set, and assessed work may not be resubmitted.