Number of Module	Name of Module	Lecturer
VW-ATL-31b	Theoretical Multivariate Statistics	Prof. Ostap Okhrin ostap.okhrin@tu-dresden.de
Qualification Aim	Students can describe multivariate data and analyze it using practical methods. They are familiar with regression analysis, simple analysis of variance, general and specific multivariate distributions in particular, the theory of the multivariate normal distribution copulas, estimation theory, and hypothesis testing, and can apply these concepts. Students are proficient in applying mathematical concepts such as linear algebra and integral calculus to statistical problems. They are able to formulate statistical hypotheses and test them correctly, as well as understand the fundamentals of estimation theory and the properties of the estimators discussed therein, even outside the context of the normal distribution.	
Content	The content of the module are 1. Linear Algebra, 2. Theory of Multinormal Distribution, 3. Copulas, 4. Estimation Theory, 5. Hypothesis Testing, 6. EM Algorithm, and 7. Markov Chains.	
Teaching and Learning Methods	2 SWS lecture, 2 SWS tutorial, and independent study.	
Requirements for Participation	Bachelor's level knowledge of mathematics and statistics is required. The following literature is suitable for preparation: Sydsaeter, K.; Hammond, P.: Essential Mathematics for Economic Analysis, Financial Times Prentice Hall, Harlow, newest edition. Härdle, W., Okhrin, O., Okhrin, Y.: Basic Elements of Computational Statistics, Springer, current edition.	
Usability	This module is one of 27 elective modules in the master's degree program Air Transport and Logistics, which must be chosen according to § 32 paragraph 3 of the examination regulations. It provides the prerequisite for the modules Applied Multivariate Statistics, Data-Driven Multivariate Statistics, and Vocational Internship.	
Requirements for the Award of Credits	Credit points are awarded upon passing the module exam. If more than 20 students are registered, the module exam consists of a 120-minute written exam. If 20 or fewer students are registered, it consists of a 30-minute closed-door oral exam administered individually; if applicable, registered students will be notified of this in writing at the end of the registration period. The exam language for the written exam is English.	

Credit Points and Grades	5 credit points can be acquired through the module. The module grade corresponds to the grade of the examination performance.
Frequency of Module	The module is offered each academic year in the winter semester.
Workload	The total workload is 150 hours.
Duration of the Module	The module lasts one semester.