

Data:	STOMATE. MA. 3221 / Examination number: -	Version: 21.05.2023 	Start Year: WiSe 2023
Module Name:	Stochastic Methods for Materials Science		
(English):	Stochastic Methods for Materials Science		
Responsible:	van den Boogaart, Gerald / Prof. Dr. Sprungk, Björn / Prof. Dr.		
Lecturer(s):	van den Boogaart, Gerald / Prof. Dr. Sprungk, Björn / Prof. Dr.		
Institute(s):	Institute of Stochastics Faculty of Mathematics and Computer Science		
Duration:	1 Semester(s)		
Competencies:	The students understand the fundamental concepts of probability theory and statistics. They can apply basic statistical tools to analyze given data sets. Moreover, they know important stochastic models for random materials, stochastic algorithms to simulate them for computational purposes, and are able to select and use appropriate stochastic models in an applied context		
Contents:	• Concepts of probability theory (e.g., random variables, common distributions, limit theorems) • Fundamentals of statistics (empirical characteristics, statistical graphics, parameter estimation, and hypothesis testing) • Regression analysis (linear and nonlinear regression) • Stochastic models for random materials (e.g., random fields, Poisson point process, Boolean models, random packings, and mosaics)		
Literature:	• D. Montgomery, G. C. Runger: <i>Applied Statistics and Probability for Engineers</i>. Wiley, 2018. • J. Ohser, F. Mücklich: <i>Statistical Analysis of Microstructures in Materials Science</i>. Wiley, 2000. • S. N. Chiu et al.: <i>Stochastic geometry and its applications</i>. Wiley, 2013 • J. Ohser, K. Schladitz: <i>3D Images of Materials Structures</i>. Wiley, 2009.		
Types of Teaching:	S1 (WS): Lectures (2 SWS) S1 (WS): Exercises (1 SWS)		
Pre-requisites:			
Frequency:	yearly in the winter semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP*: Oral exam [20 to 30 min] AP: Programming Project * In modules requiring more than one exam, this exam has to be passed or completed with at least "ausreichend" (4,0), respectively. Voraussetzung für die Vergabe von Leistungspunkten ist das Bestehen der Modulprüfung. Die Modulprüfung umfasst: MP*: Mündliche Prüfung [20 bis 30 min] AP: Programmierprojekt * Bei Modulen mit mehreren Prüfungsleistungen muss diese Prüfungsleistung bestanden bzw. mit mindestens "ausreichend" (4,0) bewertet sein.		
Credit Points:	5		
Grade:	The Grade is generated from the examination result(s) with the following weights (w):		

	MP*: Oral exam [w: 1] AP: Programming Project [w: 1] * In modules requiring more than one exam, this exam has to be passed or completed with at least "ausreichend" (4,0), respectively.
Workload:	The workload is 150h. It is the result of 45h attendance and 105h self-studies.