Data:	TMSMICS. MA. Nr. 3588 / Examination number: 44507	Version: 16.02.2022 📄	Start Year: SoSe 2020
Module Name: (English):	**Theory, Modelling and Simulation of Microstructures**		
Responsible:	Eidel, Bernhard / Prof. Dr.-Ing. habil.		
Lecturer(s):	Prakash, Aruna / Dr.-Ing. Eidel, Bernhard / Prof. Dr.-Ing. habil.		
Institute(s):	Institute of Mechanics and Fluid Dynamics		
Duration:	1 Semester(s)		
Competencies:	Students will get familiar with some of the most relevant simulation methods for microstructures and will develop a fundamental understanding for the role of computer-based simulation methods in modern materials science. They obtain a detailed overview over the applications of most commonly used simulation together with their respective ranges of applicability. They learn the practical realization of simulation tasks based on analysis of materials science problems. Through fundamental understanding of theory they will understand the mechanisms behind simulation methods.		
Contents:	This course provides an overview of simulation methods operating on length scales from the atomistic to the meso scale scale. Simulation methods introduced include, e.g., Molecular Statics and Molecular Dynamics as well as mesoscopic methods such as the Dislocation Dynamics method. The introduction of methods operating on different scales is complemented by a discussion of multiscale approaches, i.e. how models operating on different scales can be linked for increasing the computational efficiency and/or the degree of detail. The lecture is accompanied by hands-on tutorials where the students will implement some simulation methods by themselves.		
Literature:	R. Lesar, Introduction to Materials Science, Cambridge University Press A. R. Leach, Molecular modelling – principles and applications, Pearson Education Ltd., Harlow		
Types of Teaching:	S1 (SS): Lectures (2 SWS) S1 (SS): Exercises (2 SWS)		
Pre-requisites:	**Recommendations:** Fundamentals of Microstructures, 2022-02-16 Knowledge of Python scripting, first Part of the Modul Software Tools for Computational Materials Scientists		
Frequency:	yearly in the summer semester		
Requirements for Credit Points:	For the award of credit points it is necessary to pass the module exam. The module exam contains: MP/KA (KA if 6 students or more) [MP minimum 20 min / KA 90 min] PVL: Home work assignments PVL have to be satisfied before the examination.		
Credit Points:	5		
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]		
Workload:	The workload is 150h. It is the result of 60h attendance and 90h self-studies.		