Data:	CPTA MA Nr. 3658 / Examination number: 44509	Version: 16.02.2022	Start Year: SoSe 2019
Module Name:	**Crystal Plasticity, Texture and Anisotropy**		
(English):	Crystal Plasticity, Texture and Anisotropy		
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 be exposed to the materials scientific fundamentals of plasticity in single and polycrystals. They will learn mathematical and conceptual concepts concerning orientation distributions, texture and anisotropy and will be able to apply this knowledge for understanding material properties. They will learn about experimental methods for synthesis of polycrystalline materials, for testing and characterization. Students will be introduced to different types of representing the particular deformation behaviour in polycrystalline materials, i.e., mean field and full field approaches. They will be able to understand positive and negative aspects of these models and can transfer their knowlege to new models. An other emphasis is on fundamental concepts of grain boundaries together with approaches towards modeling them. The students will get acquainted with various tools for data analysis and simulations and will be able to apply them to new problems.		
Contents:	• Mathematical concepts of orientation distributions, description and characterization of grain distributions • Texture: Definition, typical textures • Experimental methods for synthesis, testing and characterization • Basics of most commonly used crystal plasticity models • Grain boundaries, 5-parameter description, experimental and modeling aspects The above topics will be extended in the hands-on tutorial/exercise/programming sessions, where the emphasis will be on applying the methods learnt in the lecture.		
Literature:	1. Crystal Plasticity Finite Element Methods: In Materials Science and Engineering; F. Roters, P. Eisenlohr, T. Bieler and D. Raabe, 2010, Wiley Publishers 2. Texture and Anisotropy; U.F. Kocks, C. Tomé and H.-R. Wenk, 1998, Cambridge University Press 3. The measurement of grain boundary geometry; V. Randle, 1993, CRC Press 4. Texture Analysis in Materials Science, H.-J. Bunge, 1983, Elsevier 5. Grain Boundary and Crystalline Plasticity, L. Priester, 2013, Wiley Publishers		
Types of Teaching:	S1 (SS): Lectures (2 SWS) S1 (SS): Exercises (1 SWS)		
Pre-requisites:	**Recommendations:** Mechanics of Materials, 2022-02-16 Minimum requirements are scientific programming skills (as, e.g., aqcuired during "Software Tools for Computational Materials Scientists 1") and a basic understanding of plasticity (as, e.g., aqcuired from "Fundamentals of Microstructures").		
Frequency:	yearly in the summer semester		
Requirements for Credit	For the award of credit points it is necessary to pass the module exam.		

Points:	The module exam contains: PVL: Calculation and simulation MP/KA (KA if 6 students or more) [MP minimum 30 min / KA 90 min] PVL have to be satisfied before the examination.
Credit Points:	4
Grade:	The Grade is generated from the examination result(s) with the following weights (w): MP/KA [w: 1]
Workload:	The workload is 120h. It is the result of 45h attendance and 75h self-studies. Der Zeitaufwand beträgt 150h und setzt sich zusammen aus 60h Präsenzzeit und 90h Selbststudium.