TECHNISCHE HOCHSCHULE LÜBECK

Module: Mechanics of Solids

Level	Master	**Short Name**	MeSo
Responsible Lecturers	Schieck, Berthold, Prof. Dr.-Ing.		
Department, Facility	Mechanical Engineering and Business Administration		
Course of Studies	Mechanical Engineering, Master		
Compulsory/elective	Elective	**ECTS Credit Points**	5
Semester of Studies	1	**Semester Hours per Week**	4
Length (semesters)	1	**Workload (hours)**	150
Frequency	WiSe	**Presence Hours**	60
Teaching Language	English	**Self-Study Hours**	90
The following section is filled only if there is **exactly one** module-concluding exam.			
Exam Type	Written Exam	**Exam Language**	English
Exam Length (minutes)	120	**Exam Grading System**	One-third Grades
Learning Outcomes	The students know the basics of the mechanics of solids, suitable to finitely large deformations in non-Euclidean geometry suitable for bodies with curved geometry undergoing large deformations. This course is currently not selectable.		
Participation Prerequisites			
The previous section is filled only if there is **exactly one** module-concluding exam.			
Consideration of Gender and Diversity Issues	✘ Use of gender-neutral language (THL standard) ✘ Target group specific adjustment of didactic methods ✘ Making subject diversity visible (female researchers, cultures etc.)		
Applicability	Course on „Selected Topics of the Finite Element Method“		
Remarks	This module iscurrently not selectable.		

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Module Course: Mechanics of Solids

(of Module: Mechanics of Solids)

Course Type	Lecture	**Form of Learning**	Presence
Mandatory Attendance	no	**ECTS Credit Points**	5
Participation Limit		**Semester Hours per Week**	4
Group Size		**Workload (hours)**	150
Teaching Language	English	**Presence Hours**	60
Study Achievements ("Studienleistung", SL)		**Self-Study Hours**	90
SL Length (minutes)		**SL Grading System**	
The following section is filled only if there is a course-specific exam.			
Exam Type		**Exam Language**	
Exam Length (minutes)		**Exam Grading System**	
Learning Outcomes			
Participation Prerequisites			
The previous section is filled only if there is a course-specific exam.			
Contents	Tensor calculus in Riemannian manifolds Differential calculus of tensors in Riemannian manifolds Polar decomposition of the deformation gradient Lagrangean and Eulerian setting Strain tensors for finitely large deformations Stress tensors Pull back and push forward Balance of linear and angular momentum Objectivity: frame indifference, spatial covariance, objective rates Isotropic elastic and nonlinear elastic material The principles of virtual work and minimum of total potential		
Literature	*Textbooks:* **A. Bertram:** Elasticity and plasticity of large deformations. An introduction. Springer, Berlin, Heidelberg, 2005 **G.E. Mase, G.T. Mase:** Continuum mechanics for engineers. London: CRC Press, 1991 **M.E. Gurtin:** An introduction to continuum mechanics. Mathematics in science and engineering vol. 158, Academic Press, Inc. 1981		

	J. Altenbach, H. Altenbach: Einführung in die Kontinuumsmechanik. Stuttgart: Teubner, 1984 *Some recently published papers:* **C. Miehe:** A constitutive frame of elastoplasticity at large strains based on the notion of the plastic metric. Int. J. Solids Structures vol. 35.30 (1998), pp. 3859-3897. **B. Schieck, H. Stumpf:** The appropriate corotational rate, exact formula for the plastic spin and constitutive model for finite elastoplasticity. Int. J. Solids Structures vol. 32.24 (1995), pp. 3643-3667. **B. Schieck, W. Smolenski, H. Stumpf:** A shell finite element for large strain elastoplasticity with anisotropies. Part I: Shell theory and variational principle. Int. J. Solids Structures vol. 36 (1999), pp. 5399-5424. Part II: Constitutive equations and numerical applications. Int. J. Solids Structures vol. 36 (1999), pp. 5425-5451.
Remarks	The present course would be a good preparation for a PhD study of topics that are related to mechanics at a scientific university.