Module description: Statics Strength of Materials Physics 3

Module Code	t.BA.EUP.STFL.19HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IMES
Module Coordinator	Robert Eberlein
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 3a 2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class
Module Description	A major objective of this module is to present the basic concepts and principles of statics for rigid and deformable bodies to engineering students.
Module Content	**Basic conepts of statics** • Overview Engineering Mechanics • Repetition Physics 1: force, moment and vector • Rigid vs deformable bodies • Free body diagram, actio=reactio **Special and general forces** • General terms • Decomposition of forces in a plane • Equilibrium in a plane • Application examples **Support structures** • General terms • Determination of the Internal Forces • Statically determinate systems **Truss frameworks** • Basic principles • Determination of truss forces **Static and kinetic friction** • General terms • Coulomb theory of friction **Stress resultants in beams I** • General terms • Determination of stress resultants in plane and 3D beam structures **Stress resultants in beams II** • Exercises **Basic concepts in elasticity** • General terms • Consitutive law for linear elasticity • Tension and compression in rods **Beam bending I**

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- Stress distribution in beams

Beam bending II

- Moments of inertia
- Bending deformation

Beam bending III

- Exercises

Torsion I

- General terms
- Shear stress and rotation due to torque I

Torsion II

- Shear stress and rotation due to torque II

Strength of materials

- Strength hypotheses
- Semester review

Prerequisite Knowledge	Physics 1, analysis 1 & 2, algebra and statistics 1 & 2
Learning Objectives (Competences)	

Students...	Competencies	Taxonomies
Understanding of basic concepts in statics	F	K2
Analyzing interaction of forces and moments on rigid bodies	F	K3
Determination of static and kinetic friction forces	F, M	K3
Identification of support and reaction forces	F, M	K2, K4
Definition of statically determinate systems	M, F	K4
Deriving equilibrium conditions for general systems of forces	F, M	K3, K4
Analytical solution of plane truss frameworks for relevant practical applications	M, F	K3, K4
Calculation of stress resultants in beams and frames	F, M	K3
Stress and strain concept in linear elasticity	F	K2
Stresses in simple structures (rods, beams, torsional shafts)	F, M	K3, K4
Explaination of concept limitations	F	K2

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Performance Assessment	End-of-module exam	Assessment	Length (min.)	Weighting	Form
	written exam	Grade	90	60	acc. to module agreement

	Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
	written exam	Grade	30	20	acc. to module agreement
	written exam	Grade	30	20	acc. to module agreement

Classroom Attendance Requirement	None
Learning material	- optional separate script - Class notes by lecturer - Gross, D. & Hauger, W. & Schröder, J. & Wall, W. (2017). Technische Mechanik 2: Elastostatik. 13 Edition. Heidelberg: Springer Vieweg Berlin. ISBN 978-3-662-53679-7.
Comments	Deviations from the proof of performance during the lectures can be made if the lecturer announces this in writing in a module agreement during the first week of the study semester.