Valid from 2024.HS

Module description: Statics

Module Code	t.BA.MT.ST.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 2a 4 consecutive lecture lessons per semester week and class
Module Description	This module sets out to show engineering students the basic concepts and principles of statics in a clear and concise manner. Students systematically develop their problem-solving skills for static issues.

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Module Content	**Basic Concepts of Statics** • Short repetition of Newtonian Force and Force Vector • Representation of a Force • The Rigid Body • Classification of Forces • Free-Body Diagram • Law of Action and Reaction **Forces with a Common Point of Application** • Addition of Forces in a Plane • Decomposition of Forces in a Plane • Equilibrium in a Plane • Application Examples **General Systems of Forces** • Couple and Moment of a Couple • Moment of a Force • Resultant of Systems of Coplanar Forces and Equilibrium Conditions • Application Examples • General Systems of Forces in Space • - The Moment Vector • - Equilibrium Conditions • - Application Examples • Summary of Equilibrium Conditions **Truss Frameworks** • Support Reactions • Statically Determinate Trusses • Determination of the Internal Forces • Application Examples **Static and Kinetic Friction** • Coulomb Theory of Friction • Belt Friction **Center of Gravity** • Center of Forces • Center of Gravity and Center of Mass • Centroid of an Area **Beams, Frames, Arches** • Plane Structures • Support Reactions and Statically Determinate Plane Structures • Stress Resultants in Straight Beams • Relationship between Loading and Stress Resultants
Prerequisite Knowledge	Analysis 1, algebra und statistics 1

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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
Deriving equilibrium conditions for general systems of forces	F, M	K3
Determination of static and kinetic friction forces	M, F	K3
Calculation of center of gravity, center of mass and centroid of an area	F, M	K3
Calculation of stress resultants in beams, frames and arches	F, M	K3
Analytical solution of plane truss frameworks for relevant practical applications	M, F	K4

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

- Class notes by lecturer
- optional separate script
- Gross, D. & Hauger, W. & Schröder, J. & Wall, W. (2017). Technische Mechanik 3: Kinetik. 13 Edition. Heidelberg: Sringer 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.