Module: Intermediate Mechanics of Materials

Level	Bachelor	**Short Name**	IMM
Responsible Lecturers	Kral, Roland, Prof. Dr.-Ing.		
Department, Facility	Mechanical Engineering and Business Administration		
Course of Studies	Mechanical Engineering, Bachelor		
Compulsory/elective	Compulsory	**ECTS Credit Points**	4
Semester of Studies	5	**Semester Hours per Week**	4
Length (semesters)	1	**Workload (hours)**	120
Frequency	WiSe	**Presence Hours**	60
Teaching Language	English	**Self-Study Hours**	60

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	Students • understand the assumptions inherent in approximated theories of stress and strain • are familiar with several failure criteria (static and dynamic) and are able to apply an appropriate criterion for a given material / stress state • are able to calculate beam deflections using discontinuity functions or bending deflection tables • know how to find solutions for thin-walled members under transvers loading • know how to find solutions for thin-walled members under torsional loading • are able to solve statically overdetermined problems • are familiar with column design codes (steel, aluminium, and timber) and are able to design compression members • are familiar with stress and strain/deflection measurements including the reduction of strain rosette data • have completed design exercises in which iterations were required to find and acceptable solution.
Participation Prerequisites	To write the exam the practical training has to be passed (lab and lab reports). Recommended are: • Statics, basic strength of materials • Integral and differential calculus • ME-207 (according to MSOE standard) or an equivalent course

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	
Remarks	This course continues the study of the mechanics of deformable bodies. The theoretical background is enlarged by introducing the more general concepts of three dimensional stress/strain as well as energy methods. Failure theories allow to handle multi-axial loadings on deformable bodies.

TECHNISCHE HOCHSCHULE LÜBECK

Module Course: Intermediate Mechanics of Materials (lecture)

(of Module: Intermediate Mechanics of Materials)

Course Type	Lecture	**Form of Learning**	Presence
Mandatory Attendance	no	**ECTS Credit Points**	3
Participation Limit		**Semester Hours per Week**	3
Group Size	12	**Workload (hours)**	90
Teaching Language	English	**Presence Hours**	45
Study Achievements ("Studienleistung", SL)		**Self-Study Hours**	45
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	• Review of fundamental mechanics of material topics
	• Basic theory of elasticity
	  • Concept of stress
	  • Concept of strain
	  • Material laws
	  • Elastic strain energy
	• Failure theories
	• Selected topics of mechanics of materials including:
	  • Axial loads to members with varying cross-sections
	  • Curved beams
	  • Beam deflections
	  • Torsion in members with solid non-circular cross-sections
	  • Torsion in members with thin-walled, non-circular cross-sections
	  • Pressure vessels
	  • Statically overdetermined structures
	• Introduction to energy methods
	  • Impact loadings
	  • Principle of virtual work
	  • Method of virtual forces
	• Stability problems: Column design

Literature	• Handouts to lecture, to exercises and to labs • Mechanics of Materials, 4th edition or newer, Hibbeler, Prentice Hall

	• Additional literature according to the list given out in class
Remarks	

Module Course: Intermediate Mechanics of Material (Practical Training)

(of Module: Intermediate Mechanics of Materials)

Course Type	Practical Training	**Form of Learning**	Presence
Mandatory Attendance	yes	**ECTS Credit Points**	1
Participation Limit		**Semester Hours per Week**	1
Group Size	6	**Workload (hours)**	30
Teaching Language	English	**Presence Hours**	15
Study Achievements ("Studienleistung", SL)	(Flexible)	**Self-Study Hours**	15
SL Length (minutes)		**SL Grading System**	Pass

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	Lab 1: Stresses, strains and deflections in a beam Lab 2: Failure theories Lab 3: Torsion in shafts Lab 4: Buckling of columns
Literature	Notes to the lab experiments.
Remarks	I lab experiments are on an acceptable level with respect to content and format the practical training is passed.