DEPARTMENT OF MECHATRONIC ENGINEERING
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
MEC112	1			SoSe
Title	**T**	**A**	**L**	**ECTS**
Strength of Materials	3	2		6

Language	German					
Level	**Undergraduate**	✓	**Graduate**		**Postgraduate**	
Department / Program	Mechatronic Engineering					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**	✓	**Elective**			
Objectives	The students are able to perform the stress analysis for beams of any cross section under normal and shear forces as well as bending and torsional moments. They know the relationships between cross-sectional geometry, normal and shear stresses. You are able to independently calculate the axial and polar surface moments of inertia and section modulus for simple and composite cross sections, or to evaluate them using approximate formulas. They know the relationships between the two-dimensional Mohr circle and the concept of the comparative stresses. Fundamentals of the finite elements of linear elastic bodies are taught and applied to the problems just mentioned. Based on what they have learned, the students are able to familiarize themselves independently with other areas of technical mechanics and to take the aspects of technical mechanics into account in future projects.					
Content	First half of the semester: • concept of tension; Shear and normal stresses; statically determined and undetermined rod systems; Bending stress; Parallel axis theorem Second half of the semester: • The differential equation of the bending line; MOHR's circle; Superposition principle; Twisting and torsion; 3-D Hooke's law					
Prerequisites	-					
Coordinator	Asst. Prof. Dr. Ali Can KAYA					
Lecturer(s)	Asst. Prof. Dr. Ali Can KAYA					
Assistant(s)	M. Sc. Ali KORUCU					
Work Placement	-					

Recommended or Required Reading	
Books / Lecture Notes	Albrecht Bertram: Magdeburger Vorlesungen zur Technischen Mechanik, http://www.redaktion.tuberlin.de/fileadmin/fg49/publikationen/bertram/Bertram_Magdeburger_Vorlesungen_2016.pdf Wolfgang H. Müller, Ferdinand Ferber, Technische Mechanik für Ingenieure, 4. Auflage, Hanser Verlag / Fachbuch Verlag Leipzig. Russell C. Hibbeler: Technische Mechanik/2 - Festigkeitslehre 8. aktualisierte Aufl. München: Pearson Studium 2013 (insges. 3 Bände).

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	Martin Mayr: Technische Mechanik. Übungsbeispiele und Aufgaben. 2. stark erw. Auflage. München: Hanser 2000. James M. Gere, Mechanics of Materials, 5th Edition , Thomson Brooks/Cole
Other Sources	-

Additional Course Material	
Documents	
Assignments	
Exams	

Course Composition		
Mathematics und Basic Sciences	35	%
Engineering	60	%
Engineering Design	5	%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	30
Quiz		
Assignments		
Attendance	1	5
Recitations		
Projects	1	25
Final Exam	1	40
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14		84
Self-Study			
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1		10
Recitations	14		56
Laboratory			

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Projects	1		10
Final Exam	1		10
		Total Work Load	**170**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes	
1	The students are able to perform the stress analysis for beams of any cross section under normal and shear forces as well as bending and torsional moments.
2	They know the relationships between cross-sectional geometry, normal and shear stresses.
3	They are able to independently calculate the axial and polar surface moments of inertia and section modulus for simple and composite cross sections, or to evaluate them using approximate formulas.
4	They know the relationships between the two-dimensional Mohr circle and the concept of the comparative stresses
5	Students are able to familiarize themselves independently with other areas of technical mechanics and to take the aspects of technical mechanics into account in future projects.
6	
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Weekly Content	
1	Introduction; Terms
2	Tensile and compressive stress and HOOKE's law
3	Parallel axis theorem
4	Shear stress and HOOKE's law Exercise: internal forces, tension and compression in bars
5	Bending stress on the beam
6	Shear stresses on the beam
7	The elastic line of the bending beam (bending line)
8	The elastic line of the bending beam (bending line) Exercise: calculation of the bending line
9	Midterm Exams
10	Mohr’s Circle
11	Axial rotation / torsion
12	Axial rotation / torsion
13	3-D Hooke’s Law

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14	Compound stress
15	Repetition and exam preparation

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
1	5	4	-	-	-	-	-
2	5	4	-	-	-	-	-
3	5	4	-	-	-	-	-
4	5	4	-	-	-	-	-
5	5	4	-	-	-	-	-

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=5946	
Compiled by:	Ali Korucu
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