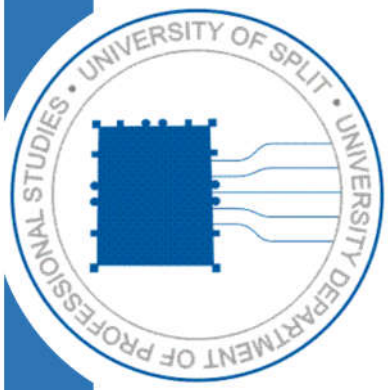
Course syllabus

Mechanics of Materials



COURSE DETAILS		
Type of study programme	Undergraduate professional study programme- 180 ECTS	
Study programme	MECHANICAL ENGINEERING	
Course title	Mechanics of Materials	
Course code	SKS008	
ECTS (Number of credits allocated)	7	
Course status	Core	
Year of study	First	
Course Web site	https://moodle.oss.unist.hr/course/category.php?id=21	
Total lesson hours per semester	Lectures	45
	Auditory exercises	30
	Seminars	15
Prerequisite(s)	None	
Lecturer(s)	Department of Mechanical Engineering: Ado Matoković, Ph.D., college professor	

COURSE DESCRIPTION	
Course Objectives:	• calculation of stresses and design for different cases of loads, • training students to use software program MDSolids for calculation stresses and displacements due to different cases of loads.
Learning outcomes ***On successful completion of this course, student should be able to:***	1. define basic terms of strength of materials: stress, strain and stress-strain diagram, 2. determine displacements and stresses for axial loads, 3. calculate shear stresses due to torsion and design of circular bars, 4. determine normal and shear stresses in beams and design of beams, 5. explain failure theories, 6. calculate stresses due to combined loads, 7. explain buckling of columns, 8. control software package MDSolids in calculating stresses and displacements for trusses and beams
Course content	Introduction into Mechanics od deformable solids. Definition of stress and strain. Hooke´s law for axial loads. Constants of elasticity: Young's modulus, shear modulus, Poisson's ratio. Axial load: calculation of stress and strain, design of bars for axial load. Statically indeterminate structures. Thermal effects on axial deformation and geometric "misfits". Shear stress and shear strain. Geometric properties of plane areas: first moments of area; centroid, moments of inertia of an area, product of inertia of an area, parallel-axis theorems, moments of inertia of an area about inclined axes, principal moments of inertia. Torsion of circular bars: computation of shear stress; Hooke's law for shear; design of circular bars. Bending: flexural stress in linearly elastic beams; design of beams for strength; differential equations of the deflection curve; computation of slope and deflection; unsymmetric bending. Plane stress: stress transformation for plane stress, principal stresses and maximum shear stress, Mohr's circle for plane stress. Plane strain: transformations of strains in a plane; principal strains; Mohr's circle for strain; measurement of strain; strain rosettes. Hooke's law for plane stress. Generalized Hooke's law for isotropic materials. Combined loading. Failure theories: maximum-shear-stress theory; maximum-distortion-energy theory (HMH); equivalent stress. Thin-wall pressure vessels: axial (longitudinal) stress; hoop stress. Buckling of columns: the ideal pin-ended column; Euler buckling load; the effect of end conditions on column buckling.

CONSTRUCTIVE ALIGNMENT – Learning outcomes, teaching and assessment methods

Alignment of students activities with learning outcomes		
Activity	**Student workload ECTS credits**	**Learning outcomes**
Lectures	45 hours / 1,5 ECTS	1,2,3,4,5,6,7
Auditory exercises	30 hours / 1 ECTS	2,3,4,7
Seminars	15 hours / 0,5 ECTS	4,8
Homework	12 hours / 0,4 ECTS	2,3,4,7
Short tests	12 hours / 0,4 ECTS	2,3,4,7
Self-study	96 hours / 3,2 ECTS	1,2,3,4,5,6,7,8
TOTAL:	**210 hours / 7 ECTS**	**1,2,3,4,5,6,7,8**

CONTINUOUS ASSESSMENT		
Continuous testing indicators	**Performance A_i (%)**	**Grade ratio k_i (%)**
Class attendance and participation	70 - 100	10
Seminars	100	10
Homework	0-100	10
Short tests	0-100	10
First mid-term exam	50-100	30
Second mid-term exam	50-100	30

FINAL ASSESSMENT		
Testing indicators – final exam (first and second exam term)	**Performance A_i (%)**	**Grade ratio k_i (%)**
Written exam	50 - 100	45
Oral exam	50 - 100	45
Seminars	100	10
Testing indicators – makeup exam (third and fourth exam term)	**Performance A_i (%)**	**Grade ratio k_i (%)**
Written exam	50 - 100	45
Oral exam	50 - 100	45
Seminars	100	10

PERFORMANCE AND GRADE		
Percentage	**Criteria**	**Grade**
50% - 61%	*basic criteria met*	sufficient (2)
62% - 74%	*average performance with some errors*	good (3)
75% - 87%	*above average performance with minor errors*	very good (4)
88% - 100%	*outstanding performance*	outstanding (5)

ADDITIONAL INFORMATION

Teaching materials for students (scripts, exercise collections, examples of solved exercises), teaching record, detailed course syllabus, application of e-learning, current information and all other data are available by MOODLE system to all students.