Course title: Strength of Materials I

Course Basic Information	
Academic Unit:	**Faculty of Civil Engineering**
Course title:	**Strength of Materials I**
Level:	**Bachelor**
Course Status:	**Compulsory**
Year of Study:	**2nd Year | 3rd Semester**
Number of Classes per Week:	**3+2**
ECTS Credits:	**9**
Time /Location:	**According to the timetable**
Teacher:	**Professor assistant Arton D.Dautaj**
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Course Description:	Strength of materials is a branch of applied mechanics that deals with the behaviour of solid bodies subjected to various types of loading. Furthermore, it studies deformations, strain and displacement of deformable bodies and their components. Understanding these sizes for different levels of forces provides a picture of the behaviour of these structures and a safe design of various structures such as: buildings, dams, bridges, ships, planes, etc. The bodies consider are subject to axial loads, torsion and bending. Other important issues that are addressed are: Stress and strain Transformation, Review of Centroids and Moments of Inertia, combined loading, design of beams and shafts, deflections of beams and shafts.
Course Goals:	Main aim of Strength of Materials I is determination stress and strain of beams, subjected to tension, compression, torsion, and bending assignment of shear and moment diagrams, determination of cross-sections of beams, and solving of statically indeterminate beams and shafts.
Expected Learning Outcomes:	After completing this course, students will be able to determine the type and quality of material, the static scheme of the building structures, and what is most important the dimensions and shape of the cross-section of bearing elements of the structure so that the structure to be as rational and stable.

Student Workload (should be in compliance with student's Learnign Outcomes)			
Activity	**Hours**	**Day/ Week**	**Total**
Lectures	3	15	45
Theory/ Lab Work/Exercises	2	15	30
Practical Work	2	15	30
Preparation for intermediate exam	1	10	10
Consultations with the teacher	1	15	15
Field Work			
Test, seminar paper	2	10	20
Homework	1	6	6
Self-study (library or home)	2	15	30
Preparation for final exam	2	15	30
Assessment time (test, quiz, final exam)	2	5	10
Projects, presentations, etc.			

Total			**225**
Teaching Methods:	Lectures, exercises during class using different materials, one project work in group of 2-3 students (independent work), individual homework, laboratory works.		
Assessment Methods:	Limit course passing higher than 60%; Student attendance 5%; Individual assignments completed in class 5%; Individual assignments completed at home 5%; Evaluation from the tests 35%; Final Exam 60%		
Primary References:	[1]Strength of materials ,first part. author: Fetah Jagxhiu [2] Solved problem in strength of materials I, authors: Fetah Jagxhiu dhe Arton D.Dautaj		
Additional References:	[3]. R.C.Hibbeler: Mechanics of Materials, [4].William A. Nash : Strength of Materials, New York, London...Melbourne, Toronto, Otava.. 1998 [5].Fetah J. Mechanic I(Static), Prishtinë, 1997 [6]. ROY R. CRAIG, JR.: MECHANICS OF MATERIALS , John Wiley & Sons, Inc,USA		

Designed teaching plan	
Week	**Title of the Lecture**
Week 1:	**Introduction, 1.**, Basic Assumptions and meanings. The Fundamental Equations of Deformable-Body Mechanics General Definitions and fundamentals of calculation**,** Internal Forces[1,6] **Stress analysis:** Concept of Stress, Normal, Shear and Bearing stress Under Axial Loading.Example, Equality of Shear Stresses on perpendicular planes, Stresses on Inclined Sections.
Week 2:	Design Concepts: Introduction, Allowable Stress Design,Example,LIMIT STATE DESIGN (Load and Resistance Factor Design),Example Strain Analysis, Displacement and deformation, strain and shear strain. Relation between displacement and deformation components. [1]
***Week 3*:**	**Stress–Strain Relations**, Mechanical properties of materials, the tension and compression test, Stress strain behaviour of ductile and brittle materials. Hooke's Law. Summary of Basic theory elasticity's equations [1].
Week 4:	**Stress–Strain Relations,** Solutions for Problems in the Linear Theory of Elasticity and strength of materials. Beltarmi and Lami's equations. Semi invers method of Saint Venant, experimental method. [1]
Week 5:	**Shear, axial and moment diagrams**, Introduction, Definitions of section forces, Sign Conventions, procedure to determine the diagrams and differential equations. [1]
***Week 6*:**	**Shear, axial and moment diagrams,** Diagram and function control of section forces, Method to determine the section forces. [1]

Week 7:	**Axial Load,** Determination of axial load, stress, strain, displacement of member loaded axially. Statically indeterminate members, thermal and assembly stress, Displacement-Method Solution of Axial-Deformation Problems, Force-Method Solution of Axial-Deformation Problems, Aplication of displacement Method to Analysis of Planar Trusses, Inelastic axial deformations [1,6]
Week 8:	**Geometric properties of cross sections of a member**, Centroids, Moments of inertia, Principal Moments of Inertia, the polar moment of inertia, radius and ellipse Inertia, composites area. [1]
Week 9:	**Torsion,** Torsional deformation of a Circular shaft, exact and simple solutions, Angle of twist, stress and shear strain. Torsion of non circular shafts [1,3,6]
Week 10:	**Torsion,** The **Prandtl's** Membrane Analogy to the Torsion Problem, Torsion of thin walled members with opened and closed cross sections. Statically Indeterminate Torque loaded Members, [1,3,6]
***Week 11*:**	**Bending,** Bending with moment, Normal stress, shear stress, shear and normal stress diagram for circular, prismatic, rectangular member, for I and C sections, Shear centre for open Thin walled Members. [1,3]
***Week 12*:**	**Stress transformations**, The force equilibrium equations, Reciprocity shear force's law, Stresses on Inclined Sections, General Equations of Plane Stress Transformation, Mohr's Circle-Plane stress. Principal stresses. [1,3,6]
***Week 13*:**	**Strain Transformations,** Principal and volume strain, Plain strain, General Equations of Plane Strain, Mohr's Circle for Plane Strain Transformation, Strain Measurement and Strain Rosettes, Generalized Hooke's Law for Isotropic Materials [1,3,6]
***Week 14*:**	**Bending,** The elastic curve, Angle of rotation, The Differential Equation of Elastic curve, Deflection by Integration, Mohr's Method.[1,3]
***Week 15*:**	**Bending,** Statically indeterminate beams, Method of integration, Mohr Maxwell method, Clayperon method, redundant displacement, **Bending,** Bending of curved beams. [1,3]

Academic Policies and Code of Conduct
We start and finish class on time. *Tools used during class must be cleaned and stored away at the end of class.* *Mobile/smart phones, and other electronic devices (e.g. iPods) must be turned off (or on vibrate) and hidden from view during class time.* *Laptop and tablet computers are allowed for quiet use only; other activities such as checking personal e-mail or browsing the Internet are prohibited.*

Note | If a student has more than 3 class assignments evaluated below 50% he/she loses the right on taking the final exam. Evaluation is done from 0-100 %.