1.1.1 Strength of Materials

GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΔΟΜ009	**SEMESTER**	4th
COURSE TITLE	Strength of Materials		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Scientific Field
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

- Evaluation of materials according to the laws of behavior.
- Understanding the response and behaviour due to various loads.
- Ability to dimension structural elements. Selection of critical sections.
- Calculation of deformations - displacements.
- Assessment of structural material failure.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Decision-making
Working independently
Team work
Working in an international environment
Project planning and management
Respect for difference and multiculturalism
Respect for the natural environment
Showing social, professional and ethical responsibility and sensitivity to gender issues
Criticism and self-criticism
Production of free, creative and inductive thinking

Working in an interdisciplinary environment *Production of new research ideas*	*……* *Others…* *…….*

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SYLLABUS

• Classification of materials. Behavior law of structural steel. Proportional limit, elasticity, and yield point. Strengthening. Necking phenomenon. Behavior law of ductile materials.
• Bending theory: Moment of inertia. Pure bending. Bending with axial force. Biaxial bending. Neutral axis. Cross-section core.
• Pure shear. Shear due to bending of symmetrical sections. Distribution of shear stresses along the height.
• Elastic line of a beam. Calculation of the elastic line - deflection of beams using the method of double integration.
• Torsion theory: Torsion of beams of circular cross-section and cross-section of circular ring. Torsion of beams with rectangular cross-section.
• Buckling of rods and columns. Combined stress of a beam with axial and transverse loads. Large deformations of structures subjected to bending, second-order phenomena.
• Applications of deformation compatibility conditions.
• Material failure: Density theory of the rotational energy of deformations (Mises), maximum shear stress theory (Tresca), internal friction theory (Mohr - Coulomb).
• Cyclic loads. Material fatigue.
• Creep and relaxation of materials.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Powerpoint presentations, E-learning platform for educational material.
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	***Semester workload***
Lectures	52
Individual study	78
Course total (26 hours workload per ECTS credit)	***130***

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure*	1. Assignment of tasks aimed at exploring the understanding of the concepts taught.

Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed.

ATTACHED BIBLIOGRAPHY

http://users.teilar.gr/~p.lokkas/Ant_Yl.pdf

R. L. Mott, «Applied Strength of Materials», CRC Press, 2015.

Vouthounis P.: «Strength Materials and Mechanics of Deformable Bodies», Vouthounis publ., 2017 (in Greek).

Vardoulakis I., «Mechanics of Deformable Solids Bodies II», Symmetry publ., 1999 (in Greek).

Tsamasfyeos G., «Mechanics of Deformable Bodies I», Symmetry publ., 1990 (in Greek).

Velaoras G. «Strength of Materials». 2nd ed. Ion publ., 1997 (in Greek).

Beer F. - Johnston R. - DeWolf J. - Mazurek D., «Mechanics of Materials», Tziolas, 2015.