COURSE OUTLINE

(1) GENERAL

SCHOOL	**UNIVERSITY OF THESSALY**		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**ΓΚ0402**	**SEMESTER**	3ο
COURSE TITLE	Strength of Materials I		

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	6
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, specialized general knowledge, skills development*	General background
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uth.gr/courses/CIV_U_343/

(2) 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*

The purpose of this course is to introduce students to the fundamental concepts of Mechanics of Materials, specifically the concepts of deformations and stresses, as well as the methodology for calculating them in structural elements subjected to different types of loading. The Strength of Materials course is fundamental to the education of engineers and serves as a foundation for the majority of structural engineering courses in the Civil Engineering curriculum.

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking Working in an interdisciplinary environment*
Production of new research ideas	*……*
	Others…
	…….

The objective is to promote both deductive and inductive thinking regarding the application of Strength of Materials knowledge to Civil Engineering structures. During the lectures, critical thinking questions are posed to encourage free, creative, and analytical reasoning among students.

(3) **SYLLABUS**

1. Uniaxial Stress of Rods

In the first section of the course, the problem of the one-dimensional stress is examined, and the concepts of stress and strain are introduced. Examples of statically determinate and indeterminate structures are solved.

2. Stress

In the second section, the concept of stress is generalized to two and three dimensions. The two-dimensional plane stress problem is analyzed, and the calculation of the maximum stresses in a body is developed computationally or graphically (Mohr's circle). Finally, the equilibrium equations of stress in a body under deformation are presented.

3. Strain

In the third section, the concept of strain is generalized to two and three dimensions. The two-dimensional problem of plane strain is analyzed, and the calculation of the maximum strains in a body is developed.

4. Elastic Behavior

In this section, the relationships connecting stress and strain in two and three dimensions for isotropic elastic materials are briefly generalized.

5. Bending Theory

The technical theory of bending of beam structures concerns the elastic design of structural members and is based on simple kinematic assumptions (Euler-Bernoulli). This section is fundamental, as the majority of constructions in civil engineering bend when loaded.

6. Torsion Theory

The technical theory of torsion complements the picture of a general loading condition. The simple problem of torsion in rods with circular cross-sections will be examined, and the basic equations of the problem will be formulated.

(4) 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, Communication with students, Use of E-class
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	56 hrs
Study	25 hrs
Tutorials	25 hrs
Non-directed study	25 hrs
Exam preparation	30 hrs
Exams	3 hrs
Course total	164 hrs

STUDENT PERFORMANCE EVALUATION ***Description of the evaluation procedure*** *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.*	Language of evaluation: Greek The evaluation is conducted through a written exam at the end of the semester. **Evaluation Criteria** The candidate is assessed on whether they have: • Understood physical quantities such as the stress tensor, the torsion tensor, and the constitutive equations. • The ability to correctly calculate the stresses that develop in civil engineering structures. • The ability to solve problems related to beam bending and beam torsion. The evaluation criteria are discussed in class at the beginning of the semester.

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

1. E. Papamichos, N.C. Charalampakis, «Strength of Materis», Tziola publishing, (in Greek).
2. Beer F., Johnston R., DeWolf J., Mazurek D., «Mechanics of Materials», 7th edition., 2015, McGraw Hill
3. I. Vardoulakis, «Technical Mechanics II», Symmetria publishing (in Greek).
4. G. Tsamasfyros, «Mechanics of deformable bodies», Vol I & II , Symmetria publishing (in Greek)..
5. N. Aravas «Mechanics of Materials», Vol I, Tziola publishing, (in Greek).
6. R. Hibbeler, «Mechanics of Materials», 9η ed., Pearson.
7. D. Gross, W. Hauger, « Engineering Mechanics 2: Mechanics of Materials», 2nd ed., Springer.

- Related academic journals: