8.15 CE0841 – Experimental Strength of Materials

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**CE0841**	**SEMESTER**	**8**
COURSE TITLE	**Experimental 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*	Specialisation Course
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/modules/auth/opencourses.php?fc=69

(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*

Upon successful completion of the course, students will have:

- In-depth knowledge of the different types of stress as well as the type of failure that they can cause in different types of materials.
- Knowledge and critical understanding of calculating the stresses and deformations for the various stresses whose experiments are performed.
- Familiarity with the experimental determination of mechanical constants of materials with the ultimate goal of the necessary and in-depth knowledge of the Mechanics of deformable bodies.

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

Respect for difference and multiculturalism

Adapting to new situations *Decision-making* *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*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* *……* *Others…*

The course aims at the following general skills:

- Search, analysis and synthesis of data and information on the use of the necessary elements of experimental strength of materials.
- Adaptation to new situations: Evaluation of deformations that occur in materials and evaluation and comparison of results based on the literature
- Decision Making: Formulation and expression of a substantiated opinion when some consistently deviates in value from the bibliographic
- Work in an interdisciplinary and international environment, given the multidimensional nature of the materials Durability issues
- Autonomous work: Knowledge of regulations and specifications during the process of analysis and implementation of experiments
- Teamwork: Ability to dialogue, critique - self-criticism and collaboration to compare results • Production of new research ideas based on international practice on durability of materials especially "new"
- Design projects using new materials
- Respect for the natural environment with the knowledge of the effects of production of each and their long-term durability
- Exercise criticism and self-criticism
- Promoting free, creative and inductive thinking

(3) SYLLABUS

Experimental measurements are performed and the mechanical constants of various materials under different types of forces are calculated, as follows:

1. Tensile strength of steel of circular cross-section
2. Tensile strength of rectangular cross-section of steel with strain gages,
3. Tensile strength of brass and aluminum cross-sections,
4. Compression for aluminum and wood cross-sections,
5. Experimental three-axis stress test with a thin-walled cylindrical experimental device under internal pressure,
6. Bending for steel cross-section,
7. Torsion steel and brass cross-sections,
8. Buckling for steel cross-section
9. Fatigue for steel cross-section
10. Dynamic stress test failure due to resonance
11. Axial stress test, with experimental grid layout,
12. Experimental three-axis intensive experiment with a thick-walled cylinder under internal pressure,
13. Impact

(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 as well as conducting experimental tests depending on the subject to be examined • Posting of educational material, provision of digitized material and laboratory measurements to students.

	Contact: Announcements and educational material on the respective website and communication by email - notified to students on the website of the Department - or Teams, depending on the requirements of the subject to be examined
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*	
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 Short Written Examination provided the student has delivered 75% of the Laboratory Exercises.

Activity	***Semester workload***
Lectures/Experiments	26
Classwork & Literature review	24
Preparation for Individual Projects	20
Projects work	20
Course total	**120**

(5) ATTACHED BIBLIOGRAPHY

Greek Bibliography:

1. Βουθούνης Π. (2002), Αντοχή Των Υλικών, Εκδότης Βουθούνης Παναγιώτης
2. Χαρώνης Π. (2002), Αντοχή των Υλικών, Σύγχρονη Εκδοτική.

Foreign Bibliography:

1. Popov, E. (1990), Engineering Mechanics of Solids, Prentice Hall, Englewood Clifts, New Jersey, USA.
2. Gere, J.M., Timoshenko, S.P. (1984), Mechanics of Materials, Brooks/Cole (Monterey, CA)
3. Morin, D. (2008), Introduction to Classical Mechanics, with Problems and Solutions, Cambridge University Press.