COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Mechanical Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	MY3300	**SEMESTER**	9th
COURSE TITLE	Structural Mechanics		

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**
Lectures and Exercises	5	6
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Specialization of general knowledge
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (lecturing)
COURSE WEBSITE (URL)	https://www.mie.uth.gr/?page_id=18503

(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 course is addressed to undergraduate students (4th – 5th year) and consists of a continuation of courses on Statics and Strength of Materials I and II. The basic principles of Strength of Materials are applied to structural components and systems, with emphasis on the issue of strength against structural instability and buckling. In parallel, the course introduces modern computational methods and simplified approximate methods.

In the first part of the course, the main principles of structural stability are presented, and their application to simple structural components (bars and columns), extending the basic notions of Strength of Materials. In the second part of the course, the basic principles are extended to more complex structural systems (rings, plates and shells) with direct applications to mechanical structures, offshore structures and in aeronautics.

Upon successful completion of this course, the students should

- Know the basic features of structural stability in simple and more complex structural systems
- Understand the physical meaning of structural behavior of mechanical systems subjected to strong compressive loading
- Apply a systematic methodology for computing the critical load and the the corresponding buckling shape of a mechanical system
- Employ simple numerical methods for estimating the buckling strength of a mechanical system.

To follow this course, the student is required to have the basic knowledge of Linear Algebra, Mathematical Analysis, Statics and Strength of Materials.

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 *Respect for difference and multiculturalism* *Decision-making* *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment ……*	*Project planning and management* *Adapting to new situations* *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* *Production of new research ideas* *Others…*
• Search for, analysis and synthesis of data and information, with the use of the necessary technology • Working independently • Production of free, creative and inductive thinking • Showing professional and ethical responsibility • Production of new research ideas	

(3) SYLLABUS

- Equilibrium of discrete systems
- Stability of single-degree-of-freedom systems
- Stability of multi-degree-of-freedom systems
- Buckling of bars-columns
- Buckling of rings
- Buckling of plates
- Buckling of shells

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY ***Face-to-face, Distance learning, etc.***	Classroom Lectures
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of computer technology for some selected exercises of the course and for communication purposes (e-mails)
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	70
Exercises	30
Independent Study	50
Course total (25 hours per credit unit)	***150***

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.*	I. Final exam (80%): II. Exercises (20%) The evaluation criteria are disclosed to the student in the beginning of the semester, and are stated in the website of the course.

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Class notes (in Greek)

1. *Σ. Α. Καραμάνος (2005), ΜΗ ΓΡΑΜΜΙΚΗ ΑΝΑΛΥΣΗ ΚΑΤΑΣΚΕΥΩΝ – ΕΥΣΤΑΘΕΙΑ, Μέρος Α, Σημειώσεις Μαθήματος, Εκδόσεις Π.Θ., Βόλος.*
2. *Σ. Α. Καραμάνος (2005), ΜΗ ΓΡΑΜΜΙΚΗ ΑΝΑΛΥΣΗ ΚΑΤΑΣΚΕΥΩΝ – ΕΥΣΤΑΘΕΙΑ, Μέρος Β, Σημειώσεις Μαθήματος, Εκδόσεις Π.Θ., Βόλος.*
3. *Σ. Α. Καραμάνος (2005), ΜΗ ΓΡΑΜΜΙΚΗ ΑΝΑΛΥΣΗ ΚΑΤΑΣΚΕΥΩΝ – ΕΥΣΤΑΘΕΙΑ, Μέρος Γ, Σημειώσεις Μαθήματος, Εκδόσεις Π.Θ., Βόλος*

Bibliography in Greek

1. *Α. Ν. Κουνάδης, Γραμμική Θεωρία Ελαστικής Ευστάθειας, Εκδ. Συμεών, Αθήνα, 1997.*
2. *Α. Ν. Κουνάδης, Εισαγωγή εις την Μη-γραμμική Θεωρία της Ελαστικής Ευστάθειας, Εκδ. ΕΜΠ, Αθήνα, 1984.*

Bibliography in English

1. *D. O. Brush & B. O. Almroth, Buckling of Bars, Plates and Shells, McGraw-Hill, 1975.*
2. *S. P. Timoshenko & J. M. Gere, Theory of Elastic Stability, McGraw-Hill, 1960.*
3. *Z. P. Bazant & L. Cedolin, Stability of Structures. Elastic, Inelastic, fracture, and Damage Theories, Oxford University Press, 1991.*

- Related academic journals:

- *International Journal of Nonlinear Mechanics*
- *International Journal of Solids and Structures*
- *ASME Journal of Applied Mechanics*
- *ASCE Journal of Engineering Mechanics*
- *International Journal of Structural Stability and Dynamics*