COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NA0ME1219	**SEMESTER**	3nd
COURSE TITLE	**MECHANICS III**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	5
COURSE TYPE *general background, specialbackground, specialised general knowledge, skillsdevelopment*	Specialized General Knowledge		
PREREQUISITE COURSES:	NAOME1103 - MECHANICS I, NAOME1211 - MECHANICS II		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA236/		

(2) COURSE GOALS / LEARNING OUTCOMES

In the first part of the course students will be introduced to the basic principles and equations of the Theory of Linear Elasticity. The second part of the course is an introduction to the Dynamics of Solid Body.

More specifically, students after successfully attending the first part of the course will be able to:

- Analyze structures using the work-energy theorems of mechanics (virtual work principle , Betti-Maxwell theorem, Castigliano theorem).
- Assess the appearance of elastic instability in prismatic beams and plates.
- Understand the types of non-linearity and their effect on nonlinear analysis of structures.
- Analyze structures subject to elastoplastic bending and torsion (Elastic - absolute plastic material)

After successfully completing the second part of the course students will be familiar with the basic concepts of Dynamics of Solid Body and will be able to:

- Analyze the different types of motion of the solid body (translation, rotation about a fixed axis, general plane motion, rotation about a fixed point)
- Construct and solve the differential equation of motion.
- Calculate basic characteristics of motion (momentum, impulse, angular momentum, kinetic energy) applying the theorems of momentum, angular

momentum, and kinetic energy.

- Apply the D'Alembert principle and calculate inertial forces.
- Develop Lagrange equations and apply the Hamilton Principle.
- Solve Mechanical Vibration problems.

(3) COURSE CONTENT / SYLLABUS

A. PART

- Work of external forces and deformation energy.
- Energy theorems of mechanics (virtual work principle , Betti-Maxwell theorem, Castigliano theorem).
- Plane stress condition.
- Elastic instability.
- Introduction to nonlinear analysis (Nonlinearity due to large displacements and nonlinearity due to material).
- Elastoplastic bending - elastoplastic torsion.

B. PART

- Kinematics of point
- Kinematics of rigid bodies
- Differential equation of motion.
- Theorems of momentum change, angular momentume and kinetic energy.
- Conservative forces, dynamic energy, inertia force, principle D; Alembert.
- Lagrange equations.

(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	Training material is distributed in electronic format.
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*	see table below
STUDENT PERFORMANCE	

Activity	***Workload (hours)***
Lectures	52
Personal Study	91
Course total	**143**

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*	Final written examination : 100%

(5) ATTACHED BIBLIOGRAPHY

Books:

- Lurie, A.I., “Theory of elasticity”, Springer 2005
- Timoshenko, Gere “Theory of elastic stability”, McGraw Hill, 17th Ed., 1985.
- Boresi A.P. et al., , “Elasticity in Engineering Mechanics” John Wiley & Sons, 3rd Ed., 2011
- Γιαντές, Χ.Ι., “Μη-γραμμική συμπεριφορά των κατασκευών”, Εκδόσεις Κάλλιπος, 2015
- Beer, Johnston, Mazurek, Cornwell,Self, “Vector Mechanics for Engineers: Statics and Dynamics”, McGraw Hill, 2019.
- Russell C. Hibbeler, “Engineering Mechanics – Dynamics", Prentice Hall, 2006.
- D. G. Gorman, W. Kennedy, “Applied Solid Dynamics”, Butterworth-Heinemann, 1988

Journals:

- Journal of Mechanics, Cambridge University Press.
- European Journal of Mechanics, Elsevier.
- Journal of Applied Mechanics, ASME.