

1.1.1 Elastoplastic Analysis of Structures

GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΔOM033	SEMESTER	9th
COURSE TITLE	Elastoplastic Analysis of Structures		
INDEPENDENT TEACHING ACTIVITIES <i>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</i>	WEEKLY TEACHING HOURS	CREDITS	
	4	5	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Specialization Course		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)			

LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>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.</i></p> <p>Consult Appendix A</p> <ul style="list-style-type: none"> • 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 		
<p>Upon successful completion of the course, students will be able to:</p> <ol style="list-style-type: none"> 1. understand the basic principles of the plastic behavior of truss structures 2. formulate and solve an elastoplastic loading problem of a medium and calculate stresses and strains 3. select a yield criterion depending on the structural material, 4. analyze collapse mechanisms in truss structures 5. determine manually or using computational tools the collapse load of frames 		
<p>General Competences</p> <p><i>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?</i></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> </td> <td style="width: 50%; border: none;"> <i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> </td> </tr> </table>	<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>
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<i>Team work</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Criticism and self-criticism</i> <i>Production of free, creative and inductive thinking</i> <i>Others...</i>
- 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 interdisciplinary environment - Project planning and management - Criticism and self-criticism - Production of free, creative and inductive thinking	

SYLLABUS

<ul style="list-style-type: none"> • Elastic - elastoplastic analysis. Redistribution of forces. Ductility. • Pure plastic bending. Bending with axial force. Interaction surfaces. Unloading. Influence of shear. • Step by step elastoplastic analysis of statically determinate and indeterminate structures. Displacements. • Application of the Principle of Virtual Work in elastoplastic analysis. Distribution of moments. Kinematically admissible mechanisms. • Plastic limit analysis. • Loads and collapse mechanisms of simple and frame structures. • Concentrated - Distributed Plasticity. Yield criteria. Nonlinear analysis. • Dynamic plastic analysis.
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TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face to face.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>		
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>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.</i> <i>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</i>	Activity	Semester workload
	Lectures	52
	Individual study	78
	Course total (26 hours workload per ECTS credit)	130
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>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</i>	1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 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.	

<i>presentation, laboratory work, clinical examination of patient, art interpretation, other</i>	
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<i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	
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ATTACHED BIBLIOGRAPHY

Papadrakakis M., Statics Courses - Plastic Analysis of Truss Structures, Tsotras publ., 2013, ISBN 978-618-5066-02-4 (in Greek)

Jagabanduhu Chakrabarty: "Theory of Plasticity", 3rd Edition, Butterworth-Heinemann, 2006, ISBN: 9780750666381"