

## 1.1.1 Plates Shells – Special issues in Finite Element Analysis

### GENERAL

<b>SCHOOL</b>	Engineering		
<b>ACADEMIC UNIT</b>	CIVIL ENGINEERING		
<b>LEVEL OF STUDIES</b>	Undergraduate		
<b>COURSE CODE</b>	ΔOM020	<b>SEMESTER</b>	7th
<b>COURSE TITLE</b>	Plates Shells – Special issues in Finite Element Analysis		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <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>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
	4	5	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Specialization Course		
<b>PREREQUISITE COURSES:</b>			
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	No		
<b>COURSE WEBSITE (URL)</b>			

### LEARNING OUTCOMES

<p><b>Learning outcomes</b></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"> <li>• Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</li> <li>• Descriptors for Levels 6, 7 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</li> <li>• Guidelines for writing Learning Outcomes</li> </ul>		
<p>The course aims to understand the behavior of plates - shells - disks using analytical and approximate methods and the application of the finite element method to planar structures.</p>		
<p><b>General Competences</b></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;">                 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 international environment                  Working in an interdisciplinary environment                  Production of new research ideas             </td> <td style="width: 50%; border: none;">                 Project planning and management                  Respect for difference and multiculturalism                  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...                  .....             </td> </tr> </table>	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 international environment Working in an interdisciplinary environment Production of new research ideas	Project planning and management Respect for difference and multiculturalism 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... .....
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- 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

Introduction to the mathematical theory of elasticity. The differential equation of the disc in Cartesian and polar coordinates.  
Thin plates. The differential equation of plates. Analytical and approximate solutions. Orthogonal - circular plates.  
Introduction to the Finite Element Method. Finite elements of plates (Kirchhoff). Finite elements of plates (Mindlin).  
Shells. Loads, physical quantities and equations of shell theory. Shell membrane theory. Shell bending theory.  
Modelling of planar structures.

## TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i>	Face to face.	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i>		
<b>TEACHING METHODS</b> <i>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</i>	<b>Activity</b>	<b>Semester workload</b>
	Lectures	52
	Individual study	78
		<b>130</b>
<b>STUDENT PERFORMANCE EVALUATION</b> <i>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>	<ol style="list-style-type: none"> <li>1. Assignment of tasks aimed at exploring the understanding of the concepts taught.</li> <li>2. Final written exam at the end of the semester (in Greek).</li> <li>3. Each student is given the opportunity to review their written exam and have their mistakes analyzed.</li> </ol>	

## **ATTACHED BIBLIOGRAPHY**

Sapountzakis E., Plates Theory, NTUA publ., 2005 (in Greek)

Valiasis Th., Planar structural systems, Zitis publ., 2000 (in Greek)

Makarios Tr. Manolis G., Planar structural systems, Tziolas publ., 2018 (in Greek)

J. Katsikadelis, The Boundary Element Method For Plate Analysis, 2014, Academic press, Elsevier

Tsamasfyros G., Theotokoglou E., Finite Element Method vol. I, Symmetry publ., 2005 (in Greek)

Provatidis Ch., Finite Elements in the Analysis of Structures, Tziolas publ., 2016 (in Greek)