

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Plates and Shells		Code 1010102111010113718
Field of study Civil Engineering Second-cycle Studies	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 1
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: 15 Laboratory: - Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art		ECTS distribution (number and %)
Responsible for subject / lecturer: dr inż. Ewa Oleszkiewicz email: ewa.oleszkiewicz@put.poznan.pl tel. 616652107 Faculty of Civil and Environmental Engineering ul. Piotrowo 5 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basis of strengths of materials, mechanics of building, theory of elasticity, numerical methods and mathematics.
2	Skills	Student can determine stresses and strains in any structural members.
3	Social competencies	The student is aware of the responsibility that lies with the person conducting the structural calculations.
Assumptions and objectives of the course: The main aim of this course is to provide students with basic analytical and numerical methods of plates and shells computation. Also focusing on design and practical problems of these types of constructions is the scope. Systematising of ideas and individual realization of exercises will help in making easy and proper design decisions in the students' future engineering practice.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Student knows the basis of the theory of plates and shells. - [K_W01] 2. Student knows the most important analytical methods of calculating plates and shells in the elastic range. - [K_W03] 3. Student knows basic numerical methods used in plates and shells static calculations. - [K_W04]		
Skills:		
1. Student can calculate internal forces in plate and shell members for a given loading and boundary conditions. - [K_U01, K_U04] 2. Student can describe stress and strain state and deflection of an analysed plate or shell element. - [K_U04] 3. Student can create discrete model appropriate for the chosen numerical method of solving plates and shells. - [K_U06, K_U07]		
Social competencies:		
1. Student is aware of the responsibility that lies on the person conducting the structural calculations. - [K_K02, k_K05] 2. Student uses different computational methods to eliminate any errors. - [K_K02]		
Assessment methods of study outcomes		
Two tests and two projects.		

Course description		
<p>Lectures</p> <ol style="list-style-type: none"> 1. Preliminary Information, Assumptions and Problems Appearing in Plates and Shells 2. Bending of Long Rectangular Plates to a Cylindrical Surface 3. Pure Bending of Plates 4. Different Tapes of Load of Simply Supported Rectangular Plates 5. Symmetrical Bending of Circular Plates 6. Small Deflections of Laterally Loaded Plates 7. Continuous Rectangular Plates and Plates Resting on Elastic Foundation 8. Bending of Plates under the Combined Action of Lateral Loads and Forces in the Middle Plane of the Plate And Large Deflections of Plates 9. Plates of Various Shapes 10. Numerical Analysis of Strength of a Rectangular Plate 11. Deformation of Shells without Bending 12. General Theory of Cylindrical Shells 13. Shells Having the Form of a Surface of Revolution 14. Application of Numerical Methods in Shells 15. General Remarks on the Multilayered Plates and Shells <p>Example classes</p> <ol style="list-style-type: none"> 1. Repetition of Mathematical and Mechanical bases 2. Solving Examples of Plates 3. Discussion on Individual Projects 4. First Test 5. Solving Example of Shells 6. Discussion on Individual Projects 7. Second Test 		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. Theory of Plates and Shells, S. Timoshenko, S. Woinowsky-Krieger, McGraw- Hill, Singapore, 1959. 2. Stresses in Shells, W. Flugge, Springer-Verlag, Berlin, 1960. 3. Płyty ? obliczenia statyczne, Z. Kączkowski Wyd. Arkady, W-wa, 1980. 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. Theory of Elastic Stability, S.P. Timoshenko, J.M. Gere, Dover Publications, 2009 2. Theory and Analysis of Elastic Plates, J.N. Reddy, CRC Press, 1999. 3. The Finite Element Method: A Practical Course, G.R. Liu, S.S. Quek, Elsevier Science Ltd., Oxford, 2003. 4. Mechanika Budowli ? ujęcie komputerowe, Z. Waszczyszyn, i M. Radwańska, Rozdz. 9. 5. Podstawowe równania i metody obliczania sprężystych dźwigarów powierzchniowych, Z. Waszczyszyn, i M. Radwańska, T3, Wyd. Arkady, W-wa, 1995. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Lectures	30	
2. Example classes	15	
3. Preparation for classes	10	
4. Preparation of homework assignments	10	
5. Literature studies	15	
6. Consultation	5	
Student's workload		
Source of workload	hours	ECTS
Total workload	85	3
Contact hours	45	2
Practical activities	0	0