STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Advanced structural mechanics**			Code **1010115111010106020**
Field of study **Civil Engineering Extramural Second-cycle**	Profile of study (general academic, practical) **(brak)**		Year /Semester **1 / 1**
Elective path/specialty **Structural Engineering**	Subject offered in: **Polish**		Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **part-time**		
No. of hours Lecture: **10** Classes: **10** Laboratory: **-** Project/seminars: **10**			No. of credits **4**
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:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	1. Student knows the analytical method for calculating internal forces and displacements in the statically determinate and indeterminate bars, trusses, beams and frames flat systems. 2. Student has a basic knowledge of strut buckling and loss of stability of beam and frame flat systems. 3. Student has knowledge of the state of stress and strain in the selected point of cross section of structures.
2	**Skills**	1. Student can calculate internal forces and displacement in the statically determinate and indeterminate bar, beam and frame flat systems. 2. Student can calculate stress and strain in the selected point of cross section of structure.
3	**Social competencies**	Student is responsible for brought a basic knowledge of general mechanics and strength of materials.

Assumptions and objectives of the course:

Getting acquainted with analysis by matrix methods of statics, dynamics and stability of flat bars, beams and frames. Static analysis of axisymmetric shell structures.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Analytical and numerical methods for calculating internal forces and displacements in the flat bar systems, also taking into account the impact of large axial forces . - [K_W03]
2. Methods of initial stability analysis of the flat bar structures. - [K_W03]
3. Methods of dynamic analysis of bar structures. - [K_W03]

Skills:

1. Calculating internal forces and displacements in the flat bar structute also taking into account the impact of large axial forces using different methods. - [K_U04]
2. Calculating the critical load and determine the form of loss of stability flat bar structures. - [K_U04]
3. Calculating natural frequencies and determinate modes of flat bar structures. - [K_U04]
4. Calculating of internal forces in axisymmetric shell structures. - [K_U04]
5. Critically evaluate the results of the analysis of statics, dynamics and stability of flat bar structures. - [-]

Social competencies:

1. Student is responsible for the correctness of the calculations undertaken. - [K_K02]
2. Student can describe performed calculations and draw conclusions from their results. - [K_K02]
3. The student is aware of the need to systematically supplement and extend their knowledge. - [K_K10]

Assessment methods of study outcomes
1. Written test checking the knowledge and skills in the subject.
2. Two design exercises for individual solutions.
Course description
Informative and monographic lecture.
1. Matrix approach of displacement method.
2. Analysis of bending flat framework.
3. Initial stability analysis of the framework in terms of matrix approach.
4. Dynamic analysis of flat bar structures in terms of matrix approach.
5. Static analysis of axisymmetric shell structures.
Basic bibliography:
1. Wybrane zagadnienia zaawansowanej mechaniki budowli, P. Litewka, R. Sygulski, Wydawnictwo Politechniki Poznańskiej, Poznań, 2012.
2. Mechanika konstrukcji prętowych w ujęciu macierzowym, M. Guminiak, J. Rakowski, Wydawnictwo Politechniki Poznańskiej, Poznań, 2012.
Additional bibliography:
1. Mechanika budowli - ujęcie komputerowe, t. 1, 2 i 3, Z. Waszczyszyn i in., Arkady, Warszawa, 1995.
2. Computer Analysis of Structural Systems, J. F. Fleming, Mc Graw - Hill, 1989.

Result of average student's workload

Activity	Time (working hours)
1. Preparation of the first exercise design.	25
2. Preparation of the second exercise design.	25
3. Preparation of a written test.	20

Student's workload

Source of workload	hours	ECTS
Total workload	150	4
Contact hours	35	1
Practical activities	75	2