COURSE DESCRIPTION CARD - SYLLABUS

Course name
Theory of surface girders [S2Bud1-KB>TDP]

Course

Field of study
Civil Engineering

Year/Semester
2/3

Area of study (specialization)
Structural Engineering

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

- student knows the mathematical foundations of differential and integral calculus - student knows the analytical methods of calculation of ofrces and displacements in bar structures, statically determinate and indeterminate - student has basic knowledge on computer methods in structural mechanics - student has basic knowledge related to stress and strain states as well as physical law in plates - student can describe the carried out calculations

Course objective

- extension of knowledge related to classical methods of analysis of surface girders - getting acquaianted with numerical methods of analysis of surface girders

Course-related learning outcomes

Knowledge:
1. Student knows analytical and numerical methods of calculation of displacements and internal forces in plates and shells
2. Student knows the foundations of theory of plates and shells

Skills:
1. Student can compute displacements and internal forces in plates and shells using various methods
2. Student can apply with understanding the modern computer programs for analysis of surface girders, can describe the carried out computations and draw conclusions
3. Student is prepared to write individual computer programs and procedures

Social competences:
1. Student is responsible for correctness of computations
2. Student is prepared to continue the studies in Doctoral School

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture - a test comprising 3-5 problems verifying the learning outcomes. Mark 3 for solving half of the problems, mark 4 - for 70%, mark 5 - for 90%.
Projects - the final mark is the mean from partial maks for two exercises:
- finite strip method in plates
- finite element method in plates
Each exercise is marked based on oral test. The partial mark can be modified:
- decreased for delay (1 point per each week of delay)
- increased in the case of additional activity of the student

Programme content

Lecture
Theory of plates - kinematic relations, physical law and equilibrium - 2h
Theory of axisymmetric shells - membrane state and its disturbations - 2h
Foundations of the finite strip method for plates - 2h
Foundations of the finite element method for plates - 2h
Foundations of the boundary element method for plates - 2h
Application of the finite strip method for plates - 2h
Foundations of the finite element method for shells - 2h
Projects
- finite strip method in plates
-finite element method in plates

Course topics

none

Teaching methods

Lecture - informative monographic, projects - project method

Bibliography

Basic
1. Timoshenko S., Teoria płyt i powłok, Arkady, Warszawa, 1959
2.Cheung Y K, Finite Strip Method in Structural Analysis, Pergamon Press, Oxford, 1976
3. Bathe K-J, Finite Element Procedures, Prentice Hall, Pearson Education, 2006
4. Girkmann K, Dźwigary powierzchniowe, Arkady, Warszawa 1957
Additional
1. Z. Waszczyszyn i in., Mechanika budowli -ujęcie komputerowe, t. 3, Arkady, Warszawa, 1995
2.Radwańska M, Ustroje powierzchniowe. Podstawy teoretyczne oraz rozwiązania analityczne i numeryczne, Wydawnictwo Politechniki Krakowskiej, Kraków, 2009
3. Fleming J E, Computer Analysis of Structural Systems, Mc Graw -Hill, Book Company, New York, 1989
4. Cook R D, Malkus D S, Plesha M E, Witt R J, Concept and Application of Finite ElementAnalysis, J. Wiley
& Sons, Inc., 1974, 1981, 1989, 2002
5. Guminiak M, Metoda elementów brzegowych w analizie płyt, Wyd. Politechniki Poznańskiej, 2016

6. Litewka P, Sygulski R , Wybrane zagadnienia zaawansowanej mechaniki budowli, Wyd. Politechniki Poznańskiej, 2012

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00