COURSE DESCRIPTION CARD - SYLLABUS

Course name

INITIAL STABILITY ANALYSIS OF THIN PLATES IN TERMS OF THE FINITE DIFFERENCE METHOD

Course

Proposed by Discipline
Civil engineering, geodesy and transport

Year/Semester
II/4, III/6

Type of studies
Doctoral School

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture	Tutorials	Projects/seminars
4		

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Knowledge: Foundations of differential and difference calculus and algebra.

Skills: A PhD student the student is able to perform operations of differentiation and integration of elementary function.

Social competencies: the student is able to develop their skills and build differential relationships for more complex problems.

Course objective

The aim of the course is to familiarize students with the numerical method of solving partial differential equations, reduced to a system of difference equations.

Course-related learning outcomes

Knowledge

A PhD student who graduated from doctoral school knows and understands:
1) General application of numerical methods in mechanics, especially the Finite Difference Method (FDM) [P8S_WG/SzD_W01]
2) knows how to refer to the available literature in his own research, how to embed his own research in it. [P8S_WG/SzD_W01].

Skills

A PhD student who graduated from doctoral school can:
1) develop numerical procedures for classical problems of structural mechanics using the FDM and the FEM approaches, especially [P8S_UW/SzD_U01].
2) consciously use scientific and commercial numerical computing packages (e.g.: Maple, Matlab, etc.). [P8S_UW/SzD_U01].

Social competences

A PhD student who graduated from doctoral school is ready to:
1) develop the independent research work in the field of mechanics of materials and structures, [P8S_KK/SzD_K01], [P8S_KK/SzD_K02].
2) critical evaluation of the results of own scientific research [P8S_KK/SzD_K02]
3) formulating and solving scientific problems in the field of mechanics of materials and structures [P8S_KK/SzD_K01], [P8S_KK/SzD_K02].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

PQF code	Methods for verification of learning outcomes	Assessment criteria
W01	a short test or development of a selected simple problem related to the use of differential schemes	40% - 50% sufficient, 50%- 65% average, 65%-80% good, 80%-95% very good, 95%-100% excellent.
U01	a short test or development of a selected simple problem related to the use of differential schemes	40% - 50% sufficient, 50%- 65% average, 65%-80% good, 80%-95% very

		good, 95%-100% excellent.
K01, K02	a short test or development of a selected simple problem related to the use of differential schemes	40% - 50% sufficient, 50%- 65% average, 65%- 80% good, 80%-95% very good, 95%-100% excellent.

Programme content

1. Introduction: Differential equation for plate bending problems.

2. Static analysis of plates. The overview of methods used to solve it. Assembling of set of algebraic equations for analytica, finite element and finite difference methods.

3. Dynamic analysis of thin (Kirchhoff-Love) plate. using the Finite Difference Method. Assembling of set of algebraic equation and the standard eigenvalue problem.

4. Initial stability analysis of thin (Kirchhoff-Love) plate using the Finite Difference Method. Assembling of set of algebraic equation and the standard eigenvalue problem.

Teaching methods

Lecture: clasic bench, chalk and blackboard approach and multimedia presentation including illustrations and examples.

Bibliography

Basic

1. R. J. LeVeque, Finite Difference Methods for Ordinary and Partial Differential Equations. Steady-State and Time-Dependent Problems. Society for Industrial and Applied Mathematics, Philadelfia, USA, 2007.

2. H. Levy, F. Lessman, Finite Difference Equations. DOVER PUBN INC, 1992.

Additional

1. J. Orkisz, Finite Difference Method. In M. Kleiber (Ed.), Handbook of Computational Solid Mechanics (Part III). Berlin: Spriger-Verlag, (1998).

Breakdown of average student's workload

	Hours	ECTS
Total workload	20	1.0
Classes requiring direct contact with the teacher	4	0.5
Student's own work (literature studies, preparation for tutorials, project preparation) [1]	16	0.5

[1] delete or add other activities as appropriate