COURSE DESCRIPTION CARD - SYLLABUS

Course name
EXPLORING THE EDGE IN EXPERIMENTAL DYNAMIC

Course

Proposed by Discipline
Civil engineering, geodesy and transport
Type of studies
Doctoral School
Form of study
full-time

Year/Semester
II/4
Course offered in
English
Requirements
elective

Number of hours

Lecture
8

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

Knowledge: Basic and extraordinary knowledge on the dynamic experimentation with the full scale structures under extreme dynamics, i.e. impact, explosion and perforation.

Skills: methodology to accurate validation of the complex experiments.

Social competencies: Knowledge on the structural behaviour caused by dynamic loading.

Course objective

Exposition of principal concepts tied to the intense dynamics, verification, experimentation, and computational design with a focus on both civil and mechanical infrastructures. Display of chosen landmarks in the domain of dynamic weapon impacts on structures. Accomplishments of globally recognized groups in the field of innovative high-velocity load studies.

Course-related learning outcomes

Knowledge

A PhD student who graduated from doctoral school knows and understands:

1) relations between the static vs. dynamic loading on structure and structural mechanics, [P8S_WG/SzD_W01], [P8S_WG/SzD_W02].

2) limitations in validation procedures for real scale structure testing structural design resulting from the available measurement tools and technology restrictions [P8S_WG/SzD_W01], [P8S_WG/SzD_W02].

Skills

A PhD student who graduated from doctoral school can:

1) explore the correlation among dynamic loading effects on structures, material properties, and numerical design through specific case studies investigated by researchers worldwide [P8S_UW/SzD_U01].

Social competencies

A PhD student who graduated from doctoral school is ready to:

1) discuss the problems of dynamic loading on engineering structures and mechanics [P8S_KK/SzD_K01], [P8S_KK/SzD_K03].

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, W02	Compose a concise illustrated narrative focusing on a chosen dynamic experiment, including discussions on the methodologies, materials employed, and the accuracy of validation for high-speed phenomena.	Accurate conclusions and precise discussions focused on the topic presented
U01	Compose a concise illustrated narrative focusing on a chosen dynamic experiment, including discussions on the methodologies, materials employed, and the accuracy of validation for high-speed phenomena.	Accurate conclusions and precise discussions focused on the topic presented
K01, K03	Compose a concise illustrated narrative focusing on a chosen dynamic experiment, including discussions on the methodologies, materials employed, and the accuracy of validation for high-speed phenomena.	Accurate conclusions and precise discussions focused on the topic presented

Programme content

1. Introduction to the key aspects of relations between static vs. dynamic loadings in mechanics and experimental work with numerical design as well as structural materials.
2. Illustrated journey through the history of dynamic experiments in civil engineering.
3. Guest Lecture.

Course topics

Experimental mechanics, explosive and fragment loading on structure, structural damage, material behaviour, measurement techniques.

Teaching methods

Lecture: multimedia presentation including movies, illustrations and case studies.

Bibliography

Basic

1. Field test and probabilistic analysis of irregular steel debris casualty risks from a person-borne improvised explosive device Sielicki, P.W., Stewart, M.G., Gajewski, T., Studziński, R., Sumelka, W.; Defence Technology, 2021, 17(6), pp. 1852–1863
2. Dynamic failure of the aluminium plate under air-blast loading in the framework of the fractional viscoplasticity model - theory and validation; Sumelka, W., Nowak, M., Nassr, A.A., Studziński, R., Sielicki, P.W.; International Journal of Impact Engineering, 2021, 158, 104024
3. Masonry wall behaviour under explosive loading Sielicki, P.W., Łodygowski, T.; Engineering Failure Analysis, 2019, 104, pp. 274–291
4. Numerical assessment of the human body response to a ground-level explosion Sielicki, P.W., Gajewski, T.; Computer Methods in Biomechanics and Biomedical Engineering, 2019, 22(2), pp. 180–205 Experimental study of blast loading behind a building corner Gajewski, T., Sielicki, P.W.; Shock Waves, 2020, 30(4), pp. 385–394
5. Concrete Slab Damage and Hazard from Close-In Detonation of Weaponized Commercial Unmanned Aerial Vehicles Grisaro, H.Y., Turygan, S., Sielicki, P.W.; Journal of Structural Engineering (United States), 2021, 147(11), 04021191

Additional

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Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	8	0
Doctoral student's own work (literature studies, preparation for tutorials, project preparation) [1]	42	2,0

[1] delete or add other activities as appropriate