COURSE DESCRIPTION CARD - SYLLABUS

Course name
Modeling the effects of crisis events [N2IBiJ1-BiZK>MSZK]

Course

Field of study
Safety and Quality Engineering

Year/Semester
1/2

Area of study (specialization)
Safety and Crisis Management

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
10

Laboratory classes
10

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The student should have the knowledge to classify security threats, which are characterized, among others, by the first degree of studies in the Security Threat Monitoring classes.

Course objective

The aim of this course is to teach methods and tools for analysing the effects of crisis events with a significant impact on critical infrastructure and large groups of people.

Course-related learning outcomes

Knowledge:
1. Student has knowledge of the determination of fire, explosion, chemical and natural hazard zones [K2_W03].
2. Student is familiar with formal models of calculating selected parameters of fire, explosion, chemical and natural hazards [K2_W05].
3. Student knows the principles of organising the modelling process for fire, explosion, chemical and natural hazards [K2_W06].

Skills:
1. Student is able to apply knowledge of the impact of fire, explosion, chemical and natural hazards to determine hazard maps and risk maps [K2_U02].
2. Student is able to calculate the range of impact of fire, explosion, chemical and selected natural hazards using computer applications and tools [K2_U03].
3. Student is able to collect data necessary for the application of methods and tools for determining fire, explosion, chemical and selected natural hazards [K2_U05].

Social competences:
1. Student is aware of the need to use formal models for threat analysis to support security management decisions [K2_K02].
3. Student is aware that decisions made by people with low competence in threat analysis require detailed supervision and support by specialists [K2_K06].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formal evaluation:
a) for laboratory classes: on the basis of two written colloquia and reports;
b) for lectures: on the basis of a colloquium in the last lecture class.
Summary evaluation:
a) in laboratory classes: on the basis of the arithmetic mean of grades from two written colloquia, where 5 tasks have to be solved in each of them; these tasks are scored on a scale from 0 to 1; a positive grade is given to the Student after solving 51% of the tasks; the condition of passing is a positive grade in the reports from all laboratory classes.
b) in the scope of lectures: assessment of the credit colloquium on a scale from 2 to 5 (passing threshold 50% of the points).

Programme content

Formal models in internal fire analysis. Modelling the effects of chemical contamination in establishments with an increased or high risk of a major industrial accident. Formal modelling of evacuation conditions with special emphasis on mass events. Modelling of evacuation conditions in transport. Modelling of the effects of flood events. Modelling of the effects of critical infrastructure failures.

Course topics

Formal models in internal fire analysis. Modelling the effects of chemical contamination in establishments with an increased or high risk of a major industrial accident. Formal modelling of evacuation conditions with special emphasis on mass events. Modelling of evacuation conditions in transport. Modelling of the effects of flood events. Modelling of the effects of critical infrastructure failures.

Teaching methods

Lecture supported by a multimedia presentation. The lecture is conducted using distance learning techniques in a synchronous mode. Acceptable platforms: eMeeting, Zoom, Microsoft Teams.
During laboratory classes, students solve individually prepared problem tasks requiring work with a computer and specialized computer software. During part of the classes they carry out tasks using computer applications.

Bibliography

Basic:
1. Dahlke G. (2022). Modele formalne pożarów i wybuchów w przygotowaniu infrastruktury krytycznej na sytuacje awaryjne, w: Nauka dla obronności. Bezpieczeństwo infrastruktury krytycznej. Tom 1; red. Michał Ciałkowski, Tomasz Łodygowski, Andrzej Żyluk, Wydawnictwo Instytutu Technicznego Wojsk Lotniczych, Warszawa, 2022, s. 133-151

Additional:
1. Łukasik Z. Nowakowski W. Kuśmińska-Fijałkowska A., 2014, Zarządzanie bezpieczeństwem

infrastruktury krytycznej, Logistyka, nr 14
2. H. Martin and L. Ludek, Conceptual design of the resilience evaluation system of critical infrastructure elements and networks in selected areas in Czech republic, 2012 IEEE Conference on Technologies for Homeland Security (HST), Waltham, MA, 2012, pp. 353-358
3. Yi-Ping Fang, 2015, Critical Infrastructure Protection by Advanced Modelling, Simulation and Optimizattion for Cascading Failure Mitigation and Resilience. Electric power. Ecole Centrale Paris
4. Jonkeren, O., Azzini, I., Galbusera, L. et al., 2015, Analysis of Critical Infrastructure Network Failure in the European Union: A Combined Systems Engineering and Economic Model. Netw Spat Econ 15, 253-270

Breakdown of average student's workload

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