COURSE DESCRIPTION CARD - SYLLABUS

Course name
Modeling in safety systems [S2IBiJ1>MwSB]

Course

Field of study
Safety and Quality Engineering

Year/Semester
1/2

Area of study (specialization)
Safety and Crisis Manangement

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Student has a basic knowledge of safety. He knows the selected safety systems. Understands system dependencies in organizations.

Course objective

Consolidating knowledge and acquiring skills in building models of life-threatening and safety- threatening situations. Acquisition of competences necessary to develop and organize safety management systems in the organization.

Course-related learning outcomes

Knowledge:
1. Student knows in-depth the mechanisms of functioning of complex social and technical systems characteristic of security engineering [K2_W02].
2. Student knows in depth the methods and theories used in solving the problems of modern safety engineering, quality, ergonomics and occupational safety and in safety management [K2_W03].
3. Student has structured and theoretically founded knowledge in the field of computer-aided design and decision-making systems in the field of safety engineering, quality, ergonomics and occupational

safety and safety management [K2_W07].

Skills:
1. Student is able to properly select sources, including literature, and information derived from them, as well as to evaluate, critically analyze, synthesize and creatively interpret this information, formulate conclusions and comprehensively justify the opinion during the presentation of the results [K2_U01].
2. Student is able to develop and properly apply methods and tools for solving complex problems characteristic of the area of safety engineering, quality, ergonomics and work safety as well as safety management, or select and apply existing and known methods and tools [K2_U03].
3. Student is able to select and apply computer-aided tools for solving problems characteristic of security management in organizations [K2_U08].

Social competences:
1.Student correctly identifies and resolves dilemmas related to broadly understood security, understands the need to make the public aware of the need to shape security in various areas of the organization's functioning [K2_K02].
2. Student is ready to initiate activities related to improving safety [K2_K03].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: The knowledge acquired during the lecture is verified by one 45-minute test carried out during the 7th lecture. The test consists of 15 to 20 questions (test and / or open-ended), with different scores. Passing threshold: over 51% of points.
Tutorials: The skills acquired during the exercises are verified on the basis of the current assessment of the assigned tasks and on the basis of the activity in the classroom. Passing threshold: over 51% of points.
Grading scale in accordance with part C of the Regulations of First and Second Degree Studies adopted by the Academic Senate of the Poznań University of Technology.

Programme content

Lecture: Outline of systems theory. Characteristics of the modeling process. Hazards in the work and life environment. Models of accidents and incidents. Simple sequential / linear models eg Hienrich's domino theory, Root Cause Analysis (RCA), Fault Tree Analysis (FTA), Cause and Effect Analysis. Epidemiological models / complex linear models eg Reason's Model, SHELL, TRIPOD, MORT, HFACS. System / dynamic models, eg Accimap, STAMP and FRAM. Modeling an accident using energy transfer. Modeling an accident using the method of analysis of changes. Models of events and causal factors. Models used in safety management systems. Determining the requirements for the safety system for a given map of safety hazards in the area of its responsibility.
Tutorials: The aim of the tutorials is to solve cognitive tasks that allow to apply and develop in practice the knowledge acquired during the lectures.

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the blackboard.
The lecture is conducted using distance learning techniques in a synchronous mode. Acceptable platforms: eMeeting, Zoom, Microsoft Teams.
Tutorials: a multimedia presentation, illustrated with examples given on the board, constituting the basis for the implementation of the tasks given by the teacher. The class uses the classic problem method, as well as the method of cases and exercises.

Bibliography

Basic:
1. Kołodziński E. (ed.) (2015), Modeling in safety engineering, Publishing House of the Military University of Technology, Warsaw.
2. Sienkiewicz P. (2015), Security systems engineering, Polskie Wydawnictwo Naukowe, Warsaw.
3. Klich E. (2011). Flight Safety, Scientific Publisher of the Institute of Sustainable Technologies, National Research Institute, Radom.
4. Ficoń K. (2007), Crisis management engineering, Wydawnictwo BEL Studio Sp. Z.o.o, Warsaw,

5. Skorupski J. (2018), Ilościowe metody analizy incydentów w ruchu lotniczym, Oficyna wydawnicza Politechniki Warszawskiej, Warsaw.

Additional:
1. Szymonik A. (2011), Organization and functioning of security systems. Security management, Difin Publishing House, Warsaw.
2. Kępka P. (2015), Design of security systems, BEL Studio Sp. z o.o., Warsaw.
3. Zawiła- Niedwiecki J. (2013), Operational risk management in ensuring business continuity of the organization's activity, Edu-Libri Publishing House, Kraków.
4. Legal regulations and standards relating to the issues discussed.
5. Ewertowski T. Nowakowski M., Zieja M., Żyluk A. (2016), Study of the participation of the human factor using the developed model of the taxonomy of the causes of air incidents, Buses: technology, operation, transport systems No. 12 pp. 339-347.
6. Sławińska M., Derbich M., Ewertowski T., Król I., Berlik M., (2019) Effectiveness of operational management based on the operational information base, Scientific Papers of the Poznań University of Technology. Series: Organization and Management, 80, 235-251.
7. AGK - airframes, systems and emergency equipment : EASA ATPL (A) theory training. Bristol Groundschool, (2020).

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	0,50