STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Modelling of threats		**1011101261011123036**
Field of study	Profile of study (general academic, practical)	Year /Semester
Safety Engineering - Full-time studies - First-	**(brak)**	**3 / 6**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
First-cycle studies	**full-time**	
No. of hours		No. of credits
Lecture: **15** Classes: **-** Laboratory: **30** Project/seminars: **-**		**3**
Status of the course in the study program (Basic, major, other)	(university-wide, from another field)	
(brak)	**(brak)**	
Education areas and fields of science and art		ECTS distribution (number and %)

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	The student should know the basic types of hazards in the natural environment and in the work environment
2	**Skills**	The student should be able to apply this knowledge in practical situations during laboratory classes
3	**Social competencies**	The ability to make decisions in a situation of protection against threats

Assumptions and objectives of the course:

Acquiring skills of practical application in threat modelling methods within the working environment and human life, for the purpose of carrying out preventive action. Getting acquainted with computer programs which assist with the threat modelling process.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. . Has an ordered, theoretically supported knowledge of risks, their consequences, risk, monitoring, identification and evaluation of events criticality that are occurring in the working environment. - [K1A_W09]
2. Knows the detailed relationship between basic parameters specific to the tested risks - [K1A_W16]
3. Is familiar with the acquired methods to support decision-making process - [K1A_W16]
4. Is familiar with basic mathematical models describing the hazards of fire, explosion and floods. - [K1A_W21]

Skills:

1. Can assess risks caused by fire, explosion and floods - [K1A_U08]
2. Can select and apply appropriate mathematical models for the assessment of risks - [K1A_U09]
3. Can determine the size of the hazard zones - [K1A_U09]
4. Can determine the allowable days in exposure to risk - [K1A_U09]

Social competencies:

1. Can apply threat models to make decisions and solve design problems - [K1A_K01]
2. Is aware of and understands non-technical aspects and consequences of engineering activity, including its impact on the environment and the associated responsibility for decisions - [K1A_K02]
3. Considers hazards in the living and working environment in an interdisciplinary way - [K1A_K03]
4. Can show, among persons taking up irrelevant decisions, lack of competency in a given area - [K1A_K04]

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Assessment methods of study outcomes

Formative assessment:

Laboratories: on the basis of two written test and reports;

Lectures: in the basis of the grade from lab classes

Collective assessment:

Laboratories: an arithmetic average taken from the written tests; after each of them, a student is going to solve 5 problem-solving tasks scored 0-1; positive mark will be given after doing 50% of the tasks, credits will be given after achieving a positive assessment of reports from all of the laboratories.

Lectures: only one grade from lab classes is written in a student?s grade book

Course description

Mathematical-physical models of risks. Threats modelling in the working environment. Forecasting of threats caused by climate anomalies-droughts, hurricanes, heavy snowfall. Flood risk area. Hydrological protection. Modelling of flood danger. Elements of the theory of fires. Balance equations describing the fire. The mass balance and balance of energy in the internal fire. Gas Exchange in the conditions of internal fire. Stationary and transient internal fire. Nonlinear phenomena of fire. Models of fire. Theories of the outbreak. Technical failures. Modelling of release and/or energy. Prediction of biological, chemical and radiological threats. Models of the spread of contamination and a cloud of flammable or toxic substance. Threat modelling in inland, water and air transport.

Basic bibliography:

1. M. Borysiewicz, S. Potempski, Ryzyko poważnych awarii rurociągów przesyłowych substancji niebezpiecznych. Metody oceny, (The risk of major accidents with transmission pipelines of dangerous substances. The method of assessment,)CIOP-PIB, Warszawa 2005

2. PN-IEC 1025: 1994 Analiza drzewa niezdatności (Failure tree analysis)(FTA)

3. Modelowanie wypadków przy pracy (Treat modelling at work), Pietrzak L., Bezpieczeństwo Pracy (Occupational safety), nr 4 i 5, 2002

4. Badanie wypadków przy pracy. Modele i metody (Investigation of accidents at work. Models and methods), Pietrzak L., Wyd. CIOP, Warszawa

5. Maszyny. Metody analizy bezpieczeństwa na stanowisku pracy (Machinery. Methods for the analysis of the safety in the workplace), Wyd. CIOP, Warszawa, 1996

6. Model badania wypadków(Model of accidents investigation), Kowalewski S., Atest, nr 5, 2000

Additional bibliography:

1. Dennis P. Nolan, Handbook of fire and explosion protection engineering principles for oil, gas, chemical, and related facilities, Noyes Publications, Westwood, New Jersey, U.S.A.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Participation in lab classes	30
3. Preparation for lab classes	20
4. Development of calculation results with laboratory activities and the preparation of reports	30
5. Preparation for the final credits	15
6. Overview of the credits and lab reports	4

Student’s workload

Source of workload	hours	ECTS
Total workload	104	4
Contact hours	49	2
Practical activities	30	2

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