COURSE DESCRIPTION CARD - SYLLABUS

Course name
Strategic simulations in safety management [S2IBiJ1-BiZK>SSwZB]

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
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
15

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The student formulates opinions on the basis of group discussion, brainstorming, implemented SWOT and PEST analyzes, explain their applications and summarize and recommend corrective actions. The student formulates opinions on the basis of group discussion, brainstorming, implemented SWOT and PEST analyzes, explain their applications and summarize and recommend corrective actions.

Course objective

The aim of the course is to acquaint students with the theoretical and practical foundations of strategic simulations used in security analysis and management. Students will learn about systems and network approaches, selected analytical methods (DEMATEL, FCM, game theory), as well as issues related to decision-making processes and the mental models of decision-makers. The course aims to develop the ability to model complex security systems, conduct scenario-based simulations, and critically evaluate results in the context of supporting strategic decision-making in organizations.

Course-related learning outcomes

Knowledge:
1. The student has structured knowledge of the following concepts: decisions, decision-making process,

decision-making rules, barriers to decision-making, game theory, simulation games, serious simulation games, management games [K2_W08].
2. The student knows in depth the psychological aspects taken into account in professional activity in the field of safety engineering in the field of: decisions, decision-making process, decision-making rules, barriers to decision-making, conflicts in decision-making processes [K2_W10].

Skills:
1. The student is able to implement the assumptions of project management, including: organizing a decision-making team and assigning responsibilities [K2_U09].
2. The student is able to communicate in the field of recommendations to improve decision-making [K2_U11].

Social competences:
1. The student is critical of his knowledge, is ready to consult experts when solving decision-making problems [K2_K01].
2. The student is prepared to reliably perform professional roles resulting from current economic and social needs in the field of decision-making [K2_K06].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures
Written final test – 70 points
Final essay – 30 points

Workshops / Exercises
Final group report – 70 points
Oral defense of the report – 30 points

Programme content

The essence of the systems approach in management, modeling of complex security systems, and examples of applications in organizations and states. Networks as models of relations and connections, identification of nodes and critical paths, disruption simulations, and resilience analysis of systems. Basic concepts and assumptions of game theory, models of cooperative and non-cooperative games, applications of game theory in the analysis of conflicts and security processes. Analysis of cause–effect relationships in complex systems, identification of key and dependent factors, integration of DEMATEL with other simulation methods. Cognitive maps as a tool of strategic analysis, fuzzy models and system dynamics, scenario simulations of security developments. Models and theories of decision-making under risk and uncertainty, simulations as a tool to support decision-making processes, case studies of decision-making in crisis management. Definition and significance of mental models in management, shaping and modification of decision-makers' mental models, simulations as a tool for testing and validating mental models.

Course topics

Lecture:
1.Systems approach in strategic security simulations
2. Network methodology in security analysis and simulations
3. Elements of game theory in strategic security analysis
4. The DEMATEL method in identifying and assessing security risks
5. Fuzzy Cognitive Maps (FCM) in security scenario simulations
6. Decision-making processes in strategic simulations
7. Mental models in strategic security simulations

Workshops / Exercises:
1. Introduction and topic selection
2. Identification of factors and problem structuring
3. Building cause–effect relationships and networks
4. DEMATEL method as preparation for simulations

5. Introduction to Fuzzy Cognitive Maps (FCM)
6. Scenario simulations with FCM
7. Group report defense and summary

Teaching methods

1. Discussion, presentation, group work
2. The lecture is conducted using distance learning techniques in synchronous mode or on-site.
3. Workshops are conducted on-site.
Permitted platforms: eMeeting, Zoom, Microsoft Teams.

Bibliography

Basic:
1. Więcek-Janka, E. (2011), Games and Decisions, Poznań: Wydawnictwo Politechniki Poznańskiej.

Additional:
1. Opracowania Szkoły Symulacji Systemów Gospodarczych (w latach 2000-2010), Wydawnictwo Politechniki Wrocławskiej, Wrocław (lata 2000-2010).
2. Mierzwiak R., Nowak M., Modele decyzyjne w teorii systemów szarych, Polskie Towarzystwo Ekonomiczne, 2020.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00