GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Resource security and critical infrastructure protection, PG_00073970		
Field of study	Engineering Management		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	English English
Semester of study	4	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Philosophy and Science Methodology -> Faculty of Management and Economics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Izabela Borucińska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	30.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	5.0	15.0	50

Subject objectives

The aim of this module is to prepare students to identify, analyse and critically assess threats to resource security and critical infrastructure arising from geopolitical, economic, technological and organisational factors. It also aims to develop students' ability to design and justify management measures that enhance the resilience of enterprises to disruptions in raw material supplies and the operation of critical infrastructure.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K03] is prepared to critically assess the knowledge they possess, which is necessary for solving cognitive and practical problems, and to supplement any gaps with opinions from external experts.	Students will be prepared to critically evaluate their existing knowledge and information concerning threats to resource security and critical infrastructure, recognise the limitations of analyses and uncertainty in decision-making, and address gaps in their knowledge through the informed selection of reliable information sources and expert opinions.	[SK5] Assessment of ability to solve problems that arise in practice
[K6_U05] designs innovative solutions for complex management processes by utilizing appropriate methods and techniques.	Students will be able to analyse and assess threats to the security of raw material supplies and critical infrastructure affecting different organisations, particularly enterprises, and to propose and justify management measures that strengthen organisational resilience to disruptions, using appropriately selected methods.	[SU1] Assessment of task fulfilment

Subject contents	Course content – exercises 1. Introduction: The nature and determinants of resource security and critical infrastructure security 2. The organisation of raw material production and supply as a source of international economic interdependence 3. Dependence on raw material processing technologies as a threat to industrial security 4. The importance of critical raw materials for the development of the modern economy 5. The role of critical infrastructure in safeguarding the modern economy 6. Critical infrastructure protection and resilience 7. Energy security under conditions of import dependence and vulnerability in supply infrastructure 8. Secondary raw materials as an alternative source of industrial supply when primary resources are scarce 9. Transport bottlenecks as a threat to the continuity of international trade in raw materials 10. Risk assessment as a component of resource security and critical infrastructure security management 11. Methods of strengthening enterprise resilience to raw material supply crises 12. Methods of strengthening enterprise resilience to critical infrastructure disruptions 13. Managing resource and critical infrastructure crises: Simulations of managerial decision-making 14. Managing resource and critical infrastructure crises: Simulations of managerial decision-making 15. Managing resource and critical infrastructure crises: Simulations of managerial decision-making
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
In-class tasks addressing fundamental problems	60.0%	40.0%
In-class complex problem-solving assignment and presentation, including a reflective commentary on sources	60.0%	40.0%
Simulations of managerial decision-making	60.0%	20.0%

Recommended reading	Basic literature	Ivanov, D. (2022). Viable supply chain model: Integrating agility, resilience and sustainability perspectives—Lessons from and thinking beyond the COVID-19 pandemic. *Annals of Operations Research*, 319, 1411–1431 Ouyang, M. (2014). Review on modeling and simulation of interdependent critical infrastructure systems. *Reliability Engineering & System Safety*, 121, 43–60 Schrijvers, D., Hool, A., Blengini, G. A., Chen, W.-Q., Dewulf, J., Eggert, R., i in. (2020). A review of methods and data to determine raw material criticality. *Resources, Conservation and Recycling*, 155, 104617. Wietschel, L., Helbig, C., Hillenbrand, M., Thorenz, A. (2025). Integrated conceptual framework for resilience and criticality assessments for raw material supply chains. *Resources, Conservation and Recycling*, 218, 108249
	Supplementary literature	Cherp, A., Jewell, J. (2014). The concept of energy security: Beyond the four As. *Energy Policy*, 75, 415–421 Graedel, T. E., Harper, E. M., Nassar, N. T., Nuss, P., Reck, B. K. (2015). Criticality of metals and metalloids. *Proceedings of the National Academy of Sciences*, 112(14), 4257–4262 Harper, G., Sommerville, R., Kendrick, E., Driscoll, L., Slater, P., Stolk, R., Walton, A., Christensen, P., Heidrich, O., Lambert, S., Abbott, A., Ryder, K., Gaines, L., Anderson, P. (2019). Recycling lithium-ion batteries from electric vehicles. *Nature*, 575, 75–86 Hosseini, S., Barker, K., Ramirez-Marquez, J. E. (2016). A review of definitions and measures of system resilience. *Reliability Engineering & System Safety*, 145, 47–61
	eResources addresses	
Example issues/ example questions/ tasks being completed	How can a company's dependence on imported critical raw materials threaten its business continuity, and what management strategies can be implemented to mitigate this risk? How can disruptions to one critical infrastructure system affect other systems and business operations, and what measures should be taken to mitigate their consequences? How should a company respond to disruptions in international raw material supplies caused by a geopolitical conflict, taking into account security of supply, costs and the need to ensure business continuity?	
Practical activites within the subject	Not applicable	

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