GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Eco-innovations in Construction. Social and Cultural Perspectives, PG_00065191		
Field of study	Technical Physics		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	e-learning
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Katedra Wytrzymałości Materiałów -> Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marzena Kurpińska	
	Teachers	dr inż. Marzena Kurpińska mgr inż. Lucyna Grabarczyk	

Lesson types and methods of instruction							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 30.0						

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	2.0	18.0	50

Subject objectives	The aim of the course is to develop and implement sustainable construction practices that take into account social and cultural aspects, while enriching the technical education of construction students with a humanistic and social perspective, with the aim of increasing the awareness and responsibility of future engineers.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U71] is able to apply knowledge from humanistic, social, economic or legal sciences in order to solve problems	Developing design skills with consideration of social and environmental aspects. Through design workshops and practical assignments, students will learn to integrate the principles of sustainable development with innovative design thinking. They will gain practical skills in creating solutions that are not only technologically advanced, but also socially responsible and environmentally friendly. This will prepare students to work in multidisciplinary design teams and to lead projects that benefit both people and the natural environment.	[SU1] Assessment of task fulfilment
	[K7_K71] is able to explain the need to apply knowledge from humanistic, social, economic or legal sciences in order to function in a social environment	Ability to critically analyze and evaluate construction projects. Students will learn how to evaluate different construction projects in terms of their innovation, compliance with ecological principles and impact on society. They will gain tools for critical analysis of cases from Poland and around the world, allowing for identification of best practices and potential areas for improvement in future projects.	[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work [SK1] Assessment of group work skills
	[K7_W71] has general knowledge in humanistic, social, economic or legal sciences, including their fundamentals and applications	Understand the relationship between construction and sustainability. Students will gain knowledge of how construction technologies and practices impact the natural environment and society. They will learn to evaluate the design and implementation of buildings and infrastructure in terms of their durability, energy efficiency, and impact on the quality of life of people. This understanding will be the basis for creating more sustainable and ecological solutions in future.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation

Subject contents

1. Introduction to Sustainability in Construction. Discussion of concepts related to sustainable development, sustainable construction, and their importance for the future of the industry.2. Principles of Ecological Design, Manufacturing of Building Materials, and Construction. Review of principles and practices of ecological design, manufacturing of building materials, and technologies used in construction, including passive heating and cooling systems, green roofs, and water and energy management systems.3. Carbon Footprint Building Materials. Analysis of building materials from the perspective of their life cycle, environmental impact, and recycling potential, with particular emphasis on the use of innovative materials such as ecological concrete and recycled aggregates.4. Energy Efficiency and Renewable Energy Sources in Construction. Analysis of methods for reducing energy consumption in buildings and integrating renewable energy sources such as solar panels and wind turbines.5. Water and Waste Management on Construction. Discussion of strategies for effective management of water resources and waste.6. Bioclimatic and Adaptive Design Approaches. Presentation of design methods that use natural environmental conditions to maximize thermal comfort and energy efficiency.7. Social and cultural dimensions of sustainable construction. Analysis of the impact of construction on local communities and cultural aspects of design, including accessibility of housing and public spaces, protection of historical monuments.8. Technological innovations in sustainable construction. Discussion of new construction technologies and methods that promote sustainable development, such as 3D printing in construction and smart buildings.9. Sustainable management of construction projects. Discussion of methods and tools for managing construction projects in a sustainable manner, including assessment of environmental and social impact.10. Case studies of sustainable construction projects. Analysis of real construction projects that use the principles of sustainable design and construction, from Poland and around the world.11. The future of sustainable construction. Discussion of future trends in sustainable construction, including the role of innovation and technology in shaping future construction practices.12. Designing for climate change in construction. Discussion of design and construction strategies that can help adapt to climate change and mitigate its effects, including managing the risks associated with extreme weather events.

Prerequisites and co-requisites	Prerequisites: 1. Basic knowledge of construction. Understanding of basic concepts related to design, building materials and construction processes. 2. Understanding of basic principles of sustainable development. Knowledge of general principles of ecology and sustainable development. 3. Analytical and critical thinking skills. Ability to analyze, evaluate and think critically. 4. Basic science. Basic knowledge of physics, chemistry and mathematics. Additional requirements: 1. Interest in environmental issues. Motivation and interest in issues of sustainable development, environmental protection and the impact of construction on the natural environment and society. 2. Willingness to work in a team. 3. Research skills. Ability to independently search, analyze and synthesize information from various sources. 4. Knowledge of basic CAD tools or other design visualization programs.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
paper, presentation	60.0%	100.0%

Recommended reading	Basic literature	[1] M. Janiszek, Green Innovations and Their Town Applications, Pr. Nauk. Uniw. Ekon. we Wrocławiu, no. 502, pp. 8594, 2018, doi: 10.15611/pn.2018.502.08.[2] A. López-Malest, M. R. Gabor, M. Panait, A. Brezoi, and C. Veres, Green Innovation for Carbon Footprint Reduction in Construction Industry, Buildings, vol. 14, no. 2, 2024, doi: 10.3390/buildings14020374.[3] T. Ahmad, Innovation in Green Building Projects: An Exploratory Inquiry, Buildings, vol. 13, no. 9, 2023, doi: 10.3390/buildings13092359.[4] J. Pakulska and M. Rutkowska, Ecological innovations as an element of the organization strategy, Ekon. i Sr., vol. 1, no. 68, pp. 5766, 2019, doi: 10.34659/9y46-6p57.
	Supplementary literature	[1] P. Antuña Rozado, Carmen Huovila, A. Huovila, and Á. Corredor Ochoa, Eco-innovative construction business models for social development, Proc. 24th Annu. RESER Conf., no. September, 2014.[2] J. Markiewicz, Sustainable Solutions in Construction from the Perspective of Innovation Activity, Eur. Res. Stud. J., vol. XXV, no. Issue 4, pp. 241252, 2022, doi: 10.35808/ersj/3079.[3] United Nations Environment Programme (UN Environment), Eco i Manual, p. 376, 2017.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	(mandatory)I Written work (sample topic). Considering the case study X EcoDom, identify key design elements that contribute to its environmental, economic, and social sustainability. What lessons can be learned from this project for future construction projects?(selected works)II Presentation (selected works). Discussion of the impact of globalization on sustainable construction, both in terms of the movement of technologies and materials and urbanization patterns. Does globalization have a positive or negative impact on the pursuit of sustainability in the construction sector?III Test, multiple choice questions (optional). 1.Which of the following practices most effectively contributes to reducing the carbon footprint in construction? a) use of local building materials, b) use of advanced energy management systems in buildings, c) use of prefabricated building elements, d) all of the above;2. Which of the following building materials is considered the most sustainable?: a) concrete, b) steel, c) certified wood, d) plastic;3. What is the main assumption of passive construction?: a) minimizing the building's operational energy consumption, b) maximizing solar heat gains, c) using only renewable energy sources, d) a and b are correct;4. Which of the following strategies is NOT considered part of sustainable design:? a) increasing natural light in the building, b) using highly processed materials with low durability, c) collecting and using rainwater, d) using high-efficiency HVAC systems;5. Which of the following is an example of a bioclimatic approach to design?: a) designing a building with the local climate in mind, to maximize the use of natural heating, cooling, and ventilation, b) installing air conditioning in every room, c) using only artificial lighting for interior lighting, d) building in places where the climate does not have a major impact on buildings;	
Work placement	Not applicable	

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