Subject card

Subject name and code	Offshore Wind Energy, PG_00119518						
Field of study	Economics						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2024/2025			
Education level	Master's studies		Subject group	Obligatory subject group in the field of study Specialty subject group			
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	1		Language of instruction	Polish			
Semester of study	2		ECTS credits	1.0			
Learning profile	academic		Assessment form	exam			
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Jacek Zaucha				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		0.0		0.0	15
Subject objectives	The aim of the education is to equip the student with knowledge regarding the economic aspects of the development of offshore wind farms in Poland and around the world and acquire the skills and competences necessary to work in the offshore wind farm (OWF) sector.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[EKONMU2_U03] can analyse causes and course of economic and social processes and phenomena, formulate his/her own opinions on the subject, construct research hypotheses, and select and apply methods of their verification	The student is able to analyze the causes and course of economic and social processes and phenomena affecting the development of the OWF, formulate their own opinions on this subject, put forward research hypotheses and select and use methods for their verification.	[SU5] implementation of a problem task
[EKONMU2_W03] has an in-depth knowledge of relations between economic phenomena, entities and organisations as well as public institutions functioning in the national, international and intercultural spheres	The student has in-depth knowledge of the relationships between economic phenomena, entities and organizations in the OWF sector and public institutions operating in the national, international and intercultural spheres that influence the development of the OWF.	[SW4] test/exam - oral or written [SW5] implementation of a problem task
[EKONMU2_W04] knows different types of economic and social ties and regularities governing them; has an in-depth knowledge of economic and financial ties between enterprises	The student knows various types of economic and social ties in the offshore renewable energy sector and the regularities between them, and has in-depth knowledge of economic and financial ties between enterprises serving the OWF.	[SW4] test/exam - oral or written [SW5] implementation of a problem task
[EKONMU2_K03] inspires and organises preparation of economic and social projects, following the idea of sustainable development, reconciling legal, economic, ecological, political and social requirements	The student inspires and organizes the preparation of economic and social OWF projects in accordance with the idea of sustainable development, being able to reconcile legal, economic, ecological, political and social requirements.	[SK5] implementation of a problem task
[EKONMU2_K02] is aware of the level of their knowledge in the area of solving complex problems in economic,; understands the need to extend and update this knowledge throughout his/her life	The student is aware of the level of his knowledge in the field of economics regarding the OWF, understands the need to deepen and update this knowledge throughout his life.	[SK5] implementation of a problem task
[EKONMU2_W02] has an in-depth knowledge of various types of existing economic entities and organisations as well as an extended knowledge of public institutions	The student has in-depth knowledge of various types of existing entities and economic organizations investing in the OWF and extended knowledge of public institutions important from the point of view of the development of the OWF.	[SW4] test/exam - oral or written [SW5] implementation of a problem task
[EKONMU2_U02] can use acquired knowledge to describe and analyse the causes and course of economic and social processes and phenomena, and can formulate his/her own opinions and critically select data and analysis methods based on the achievements of economic and social sciences	The student is able to use the acquired knowledge to describe and analyze the causes and course of economic and social processes and phenomena affecting the development of the OWF and is able to formulate his or her own opinions and critically select data and analysis methods based on the achievements of economic and social sciences.	[SU5] implementation of a problem task
[EKONMU2_U04] can forecast and model complex economic and social processes using quantitative and qualitative methods and tools developed by economic sciences (including statistics and econometrics)	The student is able to forecast and model complex economic and social processes of the OWF using quantitative and qualitative methods and tools created by economic sciences (including statistics and econometrics).	[SU5] implementation of a problem task
[EKONMU2_K01] recognises the importance of knowledge in the field of economics in the process of identifying and solving economic problems and of consulting experts when having difficulties in solving them independently	The student recognizes the importance of knowledge in the field of economics in the process of identifying and solving the economic problems of the OWF and seeking the opinion of experts in the event of difficulties in solving them on their own.	[SK5] implementation of a problem task

	Course outcome	Subject outcome	Method of verification
	[EKONMU2_U01] can creatively interpret and explain economic and social phenomena and relations between them, using acquired knowledge of economics, finance and management sciences	The student is able to creatively interpret and explain economic and social phenomena related to the OWF development and the relationships between these phenomena, using his knowledge of economics, finance and management sciences.	[SU5] implementation of a problem task
Subject contents	1. Causes and effects of climate change in the world. The European Green Deal and other climate action. 2. The importance of offshore wind energy for the energy market in Poland, according to the Polish Energy Policy until 2040. 3. Development and technologies in the field of offshore wind farms. The process of building an offshore wind farm. 4. Conditions for the development of offshore wind farm projects in Poland. Energy potential of the Baltic Sea. 5. Economic aspects of building offshore wind farms. Introduction to local content in the OWF construction supply chain. 6. Spatial and social conflicts resulting from the energy transformation and the development of offshore wind farms in the Baltic Sea. 7. Development of maritime clusters and the labor market for services related to offshore wind farms in Poland. 8. Mechanisms to support the development of offshore wind farms. Capacity market in Poland. Development of offshore wind energy in the world and importance for global energy production by 2050. 9. Analysis of economic costs and benefits for the local economy resulting from the construction of an OWF in the Polish territory of the Baltic Sea. 10. Level of social acceptance for offshore wind farms. The NIMBY and BANANA effect. 11. Threats resulting from the energy transformation. 12. Participation of Polish enterprises in creating a supply chain for offshore wind energy and impact on employment and GDP. 13. The future and importance of offshore wind energy - panel discussion		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	group project	51.0%	25.0%
	exam (written test)	51.0%	75.0%
Recommended reading	Basic literature	1.Klugmann-Radziemska E.,Lewandowski W., Proekologiczne odnawialne źródła energii. Kompendium, Wydawnictwo Naukowe PWN, Warszawa 2017 2. Jastrzębska G., Energia ze źródeł odnawialnych i jej wykorzystanie, Wydawnictwa Komunikacji i Łączności, Warszawa 2017 3. Zaucha J., Gospodarowanie przestrzenią morską, Wydawnictwo Akademickie Sedno, Warszawa, 2018	

Supplementary literature	Aitken, M. (2010). Wind power and community benefits: Challenges and opportunities. *Energy Policy*, *38*(10), 60666075. https://doi.org/10.1016/j.enpol.2010.05.062 Alexander, K. A., Potts, T., & Wilding, T. A. (2013). Marine renewable energy and Scottish west coast fishers: Exploring impacts, Opportunities and potential mitigation. *Ocean and Coastal Management*, *75*(July 2010), 110. https://doi.org/10.1016/j.ocecoaman.2013.01.005 Allan, G., Comerford, D., Connolly, K., McGregor, P., & Ross, A. G. (2020). The economic and environmental impacts of UK offshore wind development: The importance of local content. *Energy*, *199*, 117436. https://doi.org/https://doi.org/10.1016/j.energy.2020.117436 Andrea, N., & Linaje, G. A. De. (2023). *Assessing the wind energy technical potential of the North Sea Final Project Report*. Bailey, H., Brookes, K. L., & Thompson, P. M. (2014). Assessing environmental impacts of offshore wind farms: Lessons learned and recommendations for the future. *Aquatic Biosystems*, *10*(1), 113. https://doi.org/10.1186/2046-9063-10-8 Boniecka, H., Brzeska, P., Czermańska, R., Faściszewski, J., Gajda, A., Gajewski, J., Gorczyca, M., Hac, B., Kalinowski, M., Kałas, M., Kapiński, J., Koba, R., Kordala, I., Kowalczyk, U., Kruk-Dowgiałło, L., Kuczyński, T., Kuszewski, W., Matczak, M., Michałek, M., Woziński, R. (2016). *Study of Conditions of Spatial Development of Polish Sea Areas . March*. www.umgdy.gov.pl/?cat=96, Burgess, M. G., Clemence, M., McDermott, G. R., Costello, C., & Gaines, S. D. (2018). Five rules for pragmatic blue growth. *Marine Policy*, *87*(December 2016), 331339. https://doi.org/10.1016/j.marpol.2016.12.005 Castro-Santos, L., Filgueira-Vizoso, A., Lamas-Galdo, I., & Carral-Couce, L. (2018). Methodology to calculate the installation costs of offshore wind farms located in deep waters. *Journal of Cleaner Production*, *170*, 11241135. https://doi.org/10.1016/J.JCLEPRO.2017.09.219 Cisneros-Montemayor, A. M., Moreno-Báez, M., Reygondeau, G., Cheung, W. W. L., Crosman, K. M., González-Espinosa, P. C., Lam, V. W. Y., Oyinlola, M. A., Singh, G. G., Swartz, W., Zheng, C. wei, & Ota, Y. (2021). Enabling conditions for an equitable and sustainable blue economy. *Nature*, *591*(7850), 396401. https://doi.org/10.1038/s41586-021-03327-3 Connolly, K. (2020). The regional economic impacts of offshore wind energy developments in Scotland. *Renewable Energy*, *160*, 148159. https://doi.org/10.1016/j.renene.2020.06.065 deCastro, M., Salvador, S., Gómez-Gesteira, M., Costoya, X., Carvalho, D., Sanz-Larruga, F. J., & Gimeno, L. (2019). Europe, China and the United States: Three different approaches to the development of offshore wind energy. *Renewable and Sustainable Energy Reviews*, *109*(April), 5570. https://doi.org/10.1016/j.rser.2019.04.025 Dopierała, Ł., Mosionek-Schweda, M., Laskowicz, T., & Ilczuk, D. (2022). Financial performance of renewable energy producers: A panel data analysis from the Baltic Sea Region. *Energy Reports*, *8* (September), 1149211503. https://doi.org/10.1016/j.egyr.2022.09.009 EU Baltic Sea Governments. (2022). *The Marienborg Declaration*. https://www.regeringen.dk/aktuelt/publikationer-og-aftaletekster/the-marienborg-declaration/

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Example issues/ example questions/ tasks being completed	Group project 1: Criteria for shaping the maritime spatial planning map in the Polish zone of the Baltic Sea in relation to the OWF Description: Students analyze various criteria that influence the shaping of the maritime spatial planning map, taking into account the mitigation of conflicts of interest and the preservation of high economic parameters. Tasks: 1. Identification of criteria: Analysis of criteria such as: - Water depth - Wind speed and stability - Proximity to ports and electrical infrastructure - Protection of the natural environment (Natura 2000 zones, migration of birds and marine mammals) - Shipping lanes and fishing areas - Military zones 2. Conflict mitigation analysis: What actions are taken to minimize conflicts with other sea users. 3. Economic assessment: Analysis of the economic parameters of wind farm locations, such as installation costs, operating costs, expected energy production, and impact on the local economy. 4. Map presentation: Presentation of an example maritime spatial planning map with preferred areas for wind farms and conflict areas marked. Group project 2: Offshore wind farm development in the EU and UK: A comparative study Description: Students analyze the development of offshore wind energy in EU countries and the UK, identifying key success factors and challenges faced by these regions. Tasks: 1. Policy overview: Analysis of policies and regulations supporting the development of offshore wind energy in the EU and the UK. 2. Case studies: Analysis of specific wind farms such as Hornsea One in the UK and the North Sea Wind Power Hub in the EU. 3. Economic indicators: Comparison of economic indicators such as cost per MW, number of jobs created, impact on the local economy. 4. Technological innovation: Analysis of the technologies used in these farms and their impact on energy efficiency and operating costs. 5. Conclusions: Identification of best practices and challenges that can be adapted or avoided in Poland. Group project 3: Offshore wind farm development process: The case of Baltic Power Description: Students go through all phases of the development of an offshore wind farm on the example of Baltic Power, implemented by ORLEN and Northland Power, from the development phase to decommissioning. Tasks: 1. Development phase: - Analysis of the process of obtaining permits and licenses. - Conducting environmental and technical research. - Wind farm planning and design. 2. Development phase: - Project financing and investment security. - Selection of suppliers and contractors. - Preparing logistics and planning the work schedule. 3. Construction phase: - Foundation construction process, installation of turbines and submarine cables. - Risk and operational management. - Monitoring work progress and managing the budget. 4. Operation phase: - Farm operations and maintenance. - Performance monitoring and optimization of energy production. - Stakeholder relationship management. 5. Dismantling/decommissioning phase: - Planning the decommissioning process. - Costs and logistics related to dismantling the infrastructure. - Environmental impact and recyclability.
Work placement	Not applicable

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