



Subject card

Subject name and code	Monitoring of both buildings and energy sources, PG_00057326						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional 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			3.0		
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 hab. inż. Mikołaj Miśkiewicz				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	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		8.0		37.0	75
Subject objectives	The goal of the course is to familiarize students with the basic information on diagnostics and monitoring of engineering structures.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W01] has extended and deepened knowledge of mathematics indispensable for describing phenomena related to processes of energy conversion and transfer; uses advanced information technologies		The student has the knowledge and skills required for independent interpretation of data recorded by diagnostic tools and technical monitoring systems of buildings.		[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects		
[K7_U03] has the necessary preparation to work in an industrial environment, is prepared to undertake third degree studies, applies the principles of safety and hygiene		The student has the knowledge and skills required to independently design a technical monitoring system for a building.		[SU3] Assessment of ability to use knowledge gained from the subject [SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information			
Subject contents	1 Fundamentals of structural monitoring.2 Selected applications of monitoring systems.3 Structural damage and diagnostics.4 Maintenance of engineering structures.5 Wind turbine blade diagnostics and monitoring.6 Geodetic monitoring.7 BIM in the maintenance of engineering structures.Development of a monitoring system concept for a selected civil structure						
Prerequisites and co-requisites	The student entering the course should have a basic knowledge of structural mechanics and strength of materials.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Presentation		50.0%		30.0%		
	Development of a structural monitoring system concept		50.0%		70.0%		

Recommended reading	Basic literature	<ol style="list-style-type: none">1. Balageas D., Fritzen C. P., Güemes A, Structural Health Monitoring, Wiley-ISTE, January 20062. Baker J. F., Choice of a Strain Gauge, Geotechnical Instrumentation News, 20073. Beard S., Kumar A., Qing X., Chan H., Zhang Ch., Ooi T., Practical issues in real-word implementation of structural health monitoring systems, Acellent Technologies, Missile Defense Agency, 20054. Boller Ch., Chang F., Fujina Y., Encyclopedia of Structural Health Monitoring, John Wiley & Sons, 2009 (ISBN: 9780470058220)5. Caffrey J., Networked Sensing for Structural Health Monitoring, 4th International Workshhop on Structural Control, Columbia University, New York, June 20046. Furtner P., Wenzel H., Structural Health Monitoring at the Civil Infrastructure: Recent progress & Future Demands, 4th International Conference on SHM of Intelligent Structure, Zurich, 20097. Ustawa Prawo budowlane
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	Supplementary literature	<p>1) Miśkiewicz M., Pyrzowski Ł., Sobczyk B.: Short and long term measurements in assessment of FRP composite footbridge behavior. Materials, SI: Advanced Structural Health Monitoring in Materials . 2020, 13, 525. DOI:10.3390/ma13030525</p> <p>2) Miśkiewicz M.: Structural response of existing spatial truss roof construction based on Cosserat rod theory. Continuum Mechanics and Thermodynamics. Vol. 31, iss. 1 (2019), pp.79+99. DOI:10.1007/s00161-018-0660-8.</p> <p>3) Miśkiewicz M., Meronk B., Brzozowski T., Wilde K.: Monitoring system of the road embankment. Baltic Journal of Road and Bridge Engineering. Vol. 12(4), pp.218+224, 2017. DOI:10.3846/bjrbe.2017.27.</p> <p>4) Miśkiewicz M., Pyrzowski Ł., Wilde K., Mitrosz O.: Technical monitoring system for a new part of Gdańsk Deepwater Container Terminal. Polish Maritime Research. Vol. 24, nr. S1(93), pp.149+155, 2017. DOI:10.1515/pomr-2017-0033.</p> <p>5) Miśkiewicz M., Mitrosz O., Brzozowski T.: Preliminary field tests and long-term monitoring as a method of design risk mitigation: a case study of Gdańsk deepwater container terminal. Polish Maritime Research. Vol. 24, nr. 3(95), pp.106+114, 2017. DOI:10.1515/pomr-2017-0095.</p> <p>6) Miśkiewicz M., Pyrzowski Ł., Wilde K.: Structural Health Monitoring System for Suspension Footbridge. Proceedings 2016 Baltic Geodetic Congress (Geomatics), IEEE, pp.321+325, 2017. DOI: 10.1109/BGC.Geomatics.2017.8.</p> <p>7) Miśkiewicz M., Pyrzowski Ł., Wilde K.: Structural Health Monitoring of Composite Shell Footbridge for Its Design Validation. 2016 Baltic Geodetic Congress (Geomatics), IEEE, pp.228+233, 2016. DOI:10.1109/BGC. Geomatics.2016.48.</p> <p>8) Mariak A., Miśkiewicz M., Meronk B., Pyrzowski Ł., Wilde K.: Reference FEM model for SHM system of cable-stayed bridge in Rzeszów. 3rd Polish Congress of Mechanics (PCM) / 21st International Conference on Computer Methods in Mechanics (CMM), 2016, CRC Press/Balkema, pp.383+387. DOI:10.1201/b20057-82.</p> <p>9) Kaminski W., Makowska K., Miśkiewicz M., Szulwic J., Wilde K.: System of monitoring of the Forest Opera in Sopot structure and roofing. 15th International Multidisciplinary Scientific GeoConference SGEM 2015, Book 2 Vol. 2, 2015, pp.471+482, DOI:10.5593/SGEM2015/B22/S9.059.</p> <p>10) Wilde K., Miśkiewicz M., Chróścielewski J.: SHM System of the Roof Structure of Sports Arena Olivia. 9th International Workshop on Structural Health Monitoring (IWSHM). Vol. II, pp.1745+1752,</p> <p>11) Chróścielewski J., Miśkiewicz M., Pyrzowski Ł., Rucka M., Sobczyk B., Wilde K., Meronk B.: Dynamic Tests and Technical Monitoring of a Novel Sandwich Footbridge. Dynamics of Civil Structures, Volume 2, 2019.</p> <p>12) Miśkiewicz M.: Nieliniowa analiza MES i monitoring konstrukcji prętowo ciągnowych. Wydawnictwo Politechniki Gdańskiej, 2016. 176 s. ISBN 978-83-7348-653-9.</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Construct a monitoring system concept for the indicated building facility.What are inclinometers used for? Describe monitoring strategies for building infrastructure.	
Work placement	Not applicable	