<table>
<tr><td>Course code</td><td></td></tr>
<tr><td>Type and description</td><td>PD – elective course from a different discipline</td></tr>
<tr><td>ECTS credit</td><td>1</td></tr>
<tr><td>Course name</td><td>Hydrogen Safety Technologies</td></tr>
<tr><td>Course name in Polish</td><td>Technologie bezpieczeństwa wodorowego</td></tr>
<tr><td>Language of instruction</td><td>English</td></tr>
<tr><td>Course level</td><td>8 PRK</td></tr>
<tr><td>Course coordinator</td><td>Dr hab. inż. Dorota Brzezińska, prof. PŁ</td></tr>
<tr><td>Course instructors</td><td>Dr hab. inż. Dorota Brzezińska, prof. PŁ</td></tr>
<tr><td>Delivery methods and course duration</td><td>
<table>
<tr><th></th><th>Lecture</th><th>Tutorials</th><th>Laboratory</th><th>Project</th><th>Seminar</th><th>Other</th><th>Total of teaching hours during semester</th></tr>
<tr><td>Contact hours</td><td>15</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>15</td></tr>
<tr><td>E-learning</td><td>No</td><td>No</td><td>No</td><td>No</td><td>No</td><td>No</td><td></td></tr>
<tr><td>Assessment criteria (weightage)</td><td>0,00</td><td></td><td></td><td></td><td></td><td>0,00</td><td></td></tr>
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<tr><td>Course objective</td><td>1. Acquisition of knowledge concerning methods of hydrogen passive and forced ventilation.

2. Acquisition of knowledge on the regimes, pressure and thermal effects of indoor hydrogen fires.

3. Acquisition of knowledge on the regimes, pressure and thermal effects of indoor hydrogen explosions.</td></tr>
<tr><td>Learning outcomes</td><td>After the course a PhD student will be able to:

1. understand and apply notions, theorems and methods of hydrogen passive and forced ventilation: effects W1, W3, U3, K2;

2. understand and study problems of indoor hydrogen fires and explosions – effects

3. understand and apply methods of the indoor hydrogen fires and explosions effects mitigation: effects W1, K2

4. apply the acquired knowledge in order to study various hydrogen safety problems in concrete mathematical problems: effects U3, K2</td></tr>
<tr><td>Assessment methods</td><td>WIKAMP test of theory and practical abilities</td></tr>
<tr><td>Prerequisites</td><td>The contents of the master degree course on the differential and integral calculus</td></tr>
<tr><td>Course content with</td><td>Lecture and exercises</td></tr>
</table>

delivery methods	1: Principles of hydrogen safety 2: Hydrogen ventilation passive ventilation 3: Hydrogen ventilation forced ventilation 4: Pressure and thermal effects of indoor hydrogen fires 5: Pressure effect of hydrogen explosions 6: Mitigation of fire and explosion effects 7: Pressure peaking phenomenon in case of hydrogen release
Basic reference materials	Brzezińska, D. (2021a) 'Hydrogen Dispersion and Ventilation Effects in Enclosures under Different Release Conditions', Energies, 4029(14), pp. 1–11. doi: 10.3390/en14134029. Brzezińska, D. (2021b) 'Hydrogen dispersion phenomenon in nominally closed spaces', International journal of hydrogen energy, 46, pp. 28358–28365. doi: 10.1016/j.ijhydene.2021.06.061. Diáguez, P. M. et al. (2013) 'Hydrogen Hazards and Risks Analysis through CFD Simulations', in Renewable Hydrogen Technologies: Production, Purification, Storage, Applications and Safety. doi: 10.1016/B978-0-444-56352-1.00018-0. Molkov, V., Shentsov, V. and Quintiere, J. (2014) 'Passive ventilation of a sustained gaseous release in an enclosure with one vent', International Journal of Hydrogen Energy. Elsevier Ltd, 39(15), pp. 8158–8168. doi: 10.1016/j.ijhydene.2014.03.069. Ng, H. D. and Lee, J. H. S. (2008) 'Comments on explosion problems for hydrogen safety', Journal of Loss Prevention in the Process Industries, 21(2), pp. 136–146. doi: 10.1016/j.jlp.2007.06.001. Prasad, K. (2014) 'High-pressure release and dispersion of hydrogen in a partially enclosed compartment: Effect of natural and forced ventilation', International Journal of Hydrogen Energy. Elsevier Ltd, 39(12), pp. 6518–6532. doi: 10.1016/j.ijhydene.2014.01.189.
Other reference materials	
Average student workload outside classroom	25 h
Comments	
Last update	27.04.2023