



## Subject card

Subject name and code	Fire ventilation systems, PG_00057351						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	February 2022	Academic year of realisation of subject			2022/2023		
Education level	second-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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Sanitary Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr inż. Marcin Marcinkowski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	30.0	0.0	75
	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	75		8.0		17.0	100
Subject objectives	The aim of the course is to familiarize with the basic theoretical issues and practical problems related to fire ventilation of buildings, including smoke extraction and smoke prevention systems, current legal regulations and standards related to the subject.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W02] has extended and deepened knowledge of physics, chemistry, thermodynamics, fluid mechanics, material science, necessary to understand and describe basic thermal and flow phenomena occurring in and around power equipment and systems, transmission networks and internal installations	The student uses the terms and specialist language in the field of physics, chemistry, thermodynamics, fluid mechanics and material science, and is able to use knowledge in the field of fire ventilation and smoke removal. Student knows the course of the fire and can describe a smoke flow. Student knows the tasks of ventilation, fire, gravitational and mechanical smoke extraction. Student can explain and give examples of solutions for smoke exhaust in large-volume rooms, at risk of explosion, underground storeys of a building, communication routes in high-rise buildings, escape routes in garages and smoke exhaust in lift shafts. Student can systematically present the fire protection requirements that should be met by mechanical ventilation systems.	[SW1] Assessment of factual knowledge
	[K7_K04] is able to react in emergency situations, health and life threatening when using power equipment	The student knows the health and safety regulations and demonstrates the skills to create security systems and deal with fire situations of power equipment.	[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice
	[K7_K03] is able to think and act creatively and entrepreneurially, is aware of the responsibility for his/her own work and takes responsibility for teamwork	The student is able to describe in an analytical and synthetic way the issues related to fire ventilation. Student is aware of the work performed by a multidiscipline design team.	[SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK1] Assessment of group work skills
	[K7_U06] is able to apply basic and advanced knowledge of power equipment and transmission network and internal installations to the preliminary design of a modern power plant or part thereof	The student uses the terms and specialist language in the field of thermodynamics, ventilation and air conditioning, and uses knowledge in the field of fire ventilation and smoke extraction of buildings. Student is able to prepare design documentation for fire ventilation and smoke removal systems.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
	[K7_K02] is able to work in a group and take on different roles	The student is able to work in a multidisciplinary project team.	[SK1] Assessment of group work skills

Subject contents	<p>Lectures:</p> <p>Smoke properties, characteristic parameters and their calculation methods. Effect of smoke on evacuation. Smoke hazard. Smoke flow in buildings. Escape route protection system in multi-storey buildings. Smoke exhaust systems for large-volume rooms. Garage smoke ventilation. Tunnels. Devices and elements of fire ventilation installation. Legal regulations, standards, technical and construction requirements and fire protection rules.</p> <p>Tutorials:</p> <p>Fire-specific parameters, fire power, fire curve, required evacuation time for the underground garage calculation methods. Smoke prevention systems calculation of the required system capacity while maintaining the boundary conditions in accordance with the PN-EN 12101-6 standard. Selection of the size of fans and other devices, including fire dampers. Guidelines for the execution of design documentation.</p> <p>Design:</p> <p>As part of the project, a conceptual design of the fire ventilation system should be prepared for the selected facility: household, public utility or large-volume.</p>														
Prerequisites and co-requisites	<p>Knowledge of the basics of thermodynamics, fluid mechanics, mechanical ventilation. Ability to create drawings in CAD software. Knowledge of the subject: Heating, ventilation and air-conditioning and Household ventilation and air-conditioning systems.</p>														
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 994 794 1025">Subject passing criteria</th> <th data-bbox="799 994 1141 1025">Passing threshold</th> <th data-bbox="1145 994 1492 1025">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1025 794 1057"></td> <td data-bbox="799 1025 1141 1057">60.0%</td> <td data-bbox="1145 1025 1492 1057">20.0%</td> </tr> <tr> <td data-bbox="453 1057 794 1088"></td> <td data-bbox="799 1057 1141 1088">60.0%</td> <td data-bbox="1145 1057 1492 1088">40.0%</td> </tr> <tr> <td data-bbox="453 1088 794 1120"></td> <td data-bbox="799 1088 1141 1120">60.0%</td> <td data-bbox="1145 1088 1492 1120">40.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade		60.0%	20.0%		60.0%	40.0%		60.0%	40.0%
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Recommended reading	<p>Basic literature</p>	<p>Mizieliński, B., Kubicki, G. Wentylacja pożarowa i oddymianie. Wydawnictwo WNT, 2017.</p> <p>Wojciech Węgrzyński, Krajewski G., Węgrzyński W. Systemy wentylacji pożarowej garaży. Projektowanie, ocena, odbiór. Instrukcje, Wytyczne, Poradniki nr 493/2015. Instytut techniki Budowlanej.</p> <p>Kaiser, K. Wentylacja pożarowa. Projektowanie i instalacja. Dom Wydawniczy Medium, 2012.</p>													
	Supplementary literature	<p>Svensson, Stefan. Fire ventilation. Swedish Civil Contingencies Agency (MSB), Maj 2020. ISBN: 978-91-7927-036-0</p>													
	eResources addresses	<p>Uzupełniające</p> <p><a href="https://www.msb.se/siteassets/dokument/publikationer/englishpublications/fire-ventilation.pdf">https://www.msb.se/siteassets/dokument/publikationer/englishpublications/fire-ventilation.pdf</a> -</p>													
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Determine the pressure difference between the room on fire and the surroundings for the given temperature T and the distance H from the neutral environment.</li> <li>2. Determine the force needed to open an emergency door.</li> <li>3. Given the given boundary conditions, calculate the required time needed to evacuate the underground garage.</li> <li>4. Calculate the required amount of air in the case of ducted smoke exhaust from the garage according to BS, then compare the calculations for the hall according to BS and NFPA.</li> </ol>														
Work placement	<p>Not applicable</p>														