

**FACULTY OF INFORMATICS AND MANAGEMENT****SUBJECT CARD**

**Name in Polish:** Fizyka Środowiska Pracy II  
**Name in English:** Work Environment Physics II  
**Main field of study (if applicable):** Management  
**Specialization (if applicable):** Business Information Systems  
**Level and form of studies:** 2<sup>nd</sup> level, full-time  
**Kind of subject:** obligatory  
**Subject code:** FZZ2513  
**Group of courses:** NO

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	<b>15</b>				
Number of hours of total student workload (CNPS)	<b>60</b>				
Form of crediting	<b>grade</b>				
For group of courses mark (X) final course					
Number of ECTS points	<b>2</b>				
including number of ECTS points for practical (P) classes					
including number of ECTS points for direct teacher-student contact (BK) classes	<b>0,5</b>				

\*delete as applicable

**PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

Basic mathematical and statistical skills (verified by maturity exam or higher).  
A course in physics (or equivalent) completed at 1<sup>st</sup> level of studies.

**SUBJECT OBJECTIVES**

C1.

Acquisition of specialized knowledge and sophisticated skills associated with physical factors of work environment and its impact on humans, which are pivotal to production management and human resource management processes.

C1.1.

Acquirement of knowledge related to physical aspects of work environment, such as why physical factors have influence on workers, how do they affect human body and mind, what are the consequences of this influence and how to minimize its negative effects on worker's health, performance and wellbeing.

C1.2.

Acquisition of skills required to make use of methods and tools for measuring, evaluating and designing a physical work environment in the course of ergonomic optimization of working conditions and with respect to human's physical, mental and sensory capabilities, as well as limitations.

## SUBJECT EDUCATIONAL EFFECTS

### Relating to knowledge:

#### PEK\_W01

A student knows: what are the specific physical factors of work environment, what are the origins of their influence on human (e.g. physical, anatomical, physiological or psychological), how do they affect a working person, what are the methods and tools suitable for measuring, evaluating and designing a physical work environment according to an ergonomic perspective.

#### PEK\_W02

A student is competent at: identifying a physical factor that causes distinct consequences for the worker, choosing the appropriate methods and tools and using them to manage and alleviate these consequences, applying the ergonomic approach to production processes management and human resource management.

## PROGRAMME CONTENT

Form of classes - lecture		Number of hours
Lec 1	Introduction. Physical work environment as a part of the human-machine-environment system. An overview of physical factors affecting human at work. An ergonomic approach to designing and evaluating of work environment.	2
Lec 2	Microclimate. Thermodynamics of human body. Consequences of thermal homeostasis disturbance. Physical- and biochemical-based thermoregulatory mechanisms. Clothing as a barrier between body and thermal environment and its thermal insulation quality. Methods of microclimate evaluation.	2
Lec 3	Lighting. The optical path of human eye. Visual signal processing of the eye's neuronal system. Characteristics of brightness, color and geometric patterns perception. Requirements for creating a proper visual work conditions. Using color models in visual environments design.	2
Lec 4	Noise. Composition of the auditory apparatus and its consequences on hearing abilities. Perception of sound pitch and loudness as an example of phenomena that conform to Weber-Fechner's Law and Stevens' Law. Noise as a damaging factor and a stressor; physiological and psychological effects of noise exposure. Organizational and technical countermeasures to noise exposition at a workplace.	2
Lec 5	Spatial relations between human body and a workplace. Forced body postures as a result of a mismatch between workplace physical dimensions and anthropometric properties of human body - an biomechanical approach. Spatial layout of controls and display instruments. Fitts' Law in designing man-machine interfaces.	2
Lec 6	A methodology for analysing the impact of physical work environment on humans: part 1. The problem of measuring subjectively perceived levels of quantitatively measurable stimuli from the psychophysical perspective. Using questionnaire methods and the Analytic Hierarchy Process (AHP) approach in research and	2

	subjective measurements.	
Lec 7	A methodology for analysing the impact of physical work environment on humans: part 2. Designing a factorial experiment. Using statistical methods for data analysis.	2
Lec 8	Final test	1
	<b>Total hours</b>	15
Form of classes - class		Number of hours
	<b>Total hours</b>	
TEACHING TOOLS USED		
N1. Traditional lecture with multimedia presentations		
N2. Individual consultations		
N3. Self-study: individual at-home readings in selected literature and preparations for the final test		

#### EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT

Evaluation (F – forming (during semester), P – concluding (at semester end))	Educational effect number	Way of evaluating educational effect achievement
P	PEK_W01 PEK_W02	Final test in written form

#### PRIMARY AND SECONDARY LITERATURE

##### **PRIMARY LITERATURE:**

- [1] Barrett K.E., Barman S.M. Boitano S., Brooks H., Ganong's Review of Medical Physiology, 24th Edition, McGraw-Hill, 2012
- [2] Dillon P.F., Biophysics: A Physiological Approach, Cambridge University Press, 2012
- [3] Freedman D., Pisani R. Purves R., Statistics, 4th Edition, W. W. Norton & Company, 2007
- [4] Halliday D., Resnick R., Walker J., Fundamentals of Physics (extended), 10th Edition, Wiley, New Jersey 2014
- [5] Hecht E., Optics, Addison-Wesley, Boston 2002
- [6] Kroemer K.H.E., Grandjean E., Fitting the task to the human. A Textbook of Occupational Ergonomics, 5th Edition, CRC Press, 1997
- [7] Moore B., An Introduction to the Psychology of Hearing, 6th Edition, Brill, 2013
- [8] Proctor R.W., Van Zandt T., Human factors in simple and complex systems. Second Edition, CRC Press, 2008
- [9] Salvendy G., Handbook of Human Factors and Ergonomics, 4th Edition, Wiley, New Jersey 2012
- [10] Sanders M.S., McCormick E.J., Human Factors in Engineering and Design, 7th Edition,

McGraw-Hill, 1993
[11] Taylor J.R., Classical Mechanics, University Science Books, Sausalito, CA 2005
<b><u>SECONDARY LITERATURE:</u></b>
[1] Alton Everest F., Pohlmann K.C., Master Handbook of Acoustics, 6th Edition, McGraw-Hill, 2014
[2] Bell P.A., Greene T.C., Fisher J.D., Baum A., Environmental Psychology, 5th Edition, Psychology Press, 2006
[3] Karwowski W. (red.), International Encyclopedia of Ergonomics and Human Factors, Taylor & Francis, 2001
[4] Marder M.P., Research Methods for Science, Cambridge University Press, 2011
[5] Parsons K., Human Thermal Environments: The Effects of Hot, Moderate, and Cold Environments on Human Health, Comfort, and Performance, 3rd Edition, CRC Press, 2014
[6] Preedy V.R., Handbook of Anthropometry. Physical Measures of Human Form in Health and Disease, Springer, 2012
<b>SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)</b>
Marcin Kuliński, marcin.kulinski@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT  
**Work Environment Physics II**  
 AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY  
**Management**  
 AND SPECIALIZATION **Business Information Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)**	Subject objectives***	Programme content***	Teaching tool number***
PEK_W01	K2_ZARZ_W15	C1.1	Lec 1 – Lec 4	N1 – N3
PEK_W02	K2_ZARZ_W15 K2_ZARZ_W08	C1.2	Lec 5 – Lec 7	N1 – N3