



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Measurement methods in occupational safety and ergonomics

### Course

Field of study

Safety Engineering

Area of study (specialization)

Security and Crisis Management

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

elective

### Number of hours

Lecture

15

Tutorials

15

Laboratory classes

Projects/seminars

15

Other (e.g. online)

### Number of credit points

5

### Lecturers

Responsible for the course/lecturer:

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### Prerequisites



A student beginning his/her studies should have basic knowledge of measuring technology and physical parameters. He or she is able to recognize basic measuring equipment in the field of ergonomics and work safety. Moreover, he or she is aware of the role and importance of measurements in ensuring safety and shaping ergonomics in the work environment.

### Course objective

Getting to know the methods, tools and measuring equipment that enable the diagnosis of environmental parameters, the way of performing work and the psychophysical capabilities of an employee.

### Course-related learning outcomes

#### Knowledge

1. the student knows the basic methods of sample selection for research and the principles of designing experiments that make it possible to determine the causes of phenomena shaping relations in the work environment and human psychophysical activity [P7S\_WG\_02]
2. the student knows the factors determining the state of safety and ergonomics, as well as the measures that allow to determine its level [P7S\_WK\_03]

The student is familiar with the methodological problems of ergonomic diagnostics, techniques, diagnostic procedures, psychosomatic workload, evaluation of ergonomics and safety, methodology and methodology of measuring body loads resulting from the way of performing work, rules concerning ergonomic conditions of achieving efficiency of human-technical systems [P7S\_WK\_03].

#### Skills

1. the student is able to plan research experiments on the basis of literature sources in order to establish causal relationships in the living and working environment - [P7S\_UW\_01]
2. the student is able to apply various measuring techniques in professional and other environments, also in foreign languages, in order to support decision-making problems - [P7S\_UW\_04].
3. the student is able to prepare in Polish and English a well-documented report (research study of problems) on measured parameters and conclusions resulting from the identified variability of measured features - [P7S\_UW\_05].
4. the student is able to prepare and present an oral presentation concerning measurement methods, measuring apparatus, research methodology and conditions of preparation of measurement experiments in the field of ergonomics and work safety in Polish and foreign languages - [P7S\_UK\_01].
5. the student is able to search for characteristics of measurement methods in the field of ergonomics and work safety and is able to indicate the directions of development of measurement methods - [P7S\_UW\_03].
6. the student is able - when formulating problems requiring measurement identification and during measurements - to notice interaction and/or interdependencies between measured phenomena and parameters - [P7S\_UU\_01].



7. the student is able to develop a proposal of adaptation of measuring techniques and methods (validation) to support decision-making and the level of ergonomics and safety at work - [P7S\_UO\_01].

8 The student has the necessary preparation to work in positions requiring preparation and ordering measurements in the field of ergonomics and diagnosis of the work environment and is able to recognize the correctness and principles of organization and conduct of such studies - [P7S\_UW\_06].

9. the student is able to organize the work of the research team indicating the methodology, selection of measuring equipment, research questionnaires, research schedule, division of work and conditions of preparing a report with conclusions enabling to support the decision on work safety and ergonomics - [P7S\_UW\_02].

#### Social competences

1. the student understands the need for and knows the basic directions of further training in the field of measurements of quantitative characteristics characterizing the level of ergonomics and safety at work [P7S\_KK\_01]

2. the student is aware of the responsibility for the reliable preparation of the equipment and the measurement methodology and the impact of these activities on the health and life of employees [P7S\_KK\_01].

3. the student is able to see the causal-relationships between the measured parameters, select the proper measurement methods and reject unethical measurement activities which treat the object of research superficially and incompletely [P7S\_KK\_01].

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formal evaluation:

- within the scope of exercise classes: on the basis of colloquials requiring solving practical tasks,
- projects: evaluation of the implementation of project tasks,
- for lectures: on the basis of written answers to questions on curriculum content.

Summary evaluation:

- in the scope of the training classes: the average of the grades from the colloquia,
- projects: evaluation of the implementation of the project tasks carried out in the given chapters; a credit after obtaining at least a score of 3.0 (the condition is to prepare the main tasks),
- for lectures: a pass in a colloquium in the form of a test containing open questions and a choice of answers in which at least one answer is correct (the answer is scored as 0 or 1; the pass is obtained after obtaining at least 51% of the possible points.

#### Programme content



Measurement theory and metrology. Measurements of the material working environment, the way of working and psychophysical efficiency. Legal regulations concerning the performance of measurements. Competence of measurement and testing laboratories. Use of measurement results in the field of ergonomics and work safety.

Theme 1: Introduction. Characteristics of measuring ranges in safety and ergonomics. Basic metrological terminology;

Topic 2: Measurement of anthropometric characteristics - apparatus, instruments and principles;

Topic 3: Measurements of physical activity;

Topic 4: Measurements of psychophysiological fitness;

Topic 5: Measurements in diagnosing the way work is done;

Topic 6: Measurement apparatus in the diagnosis of the work environment;

Topic 7: Measurement uncertainty;

### Teaching methods

Lecture supported by a multimedia presentation and measurement experiments. During the training classes, students use outlines for tasks including preparation and execution of measurements in the work environment and during the analysis of product ergonomics, as well as solve calculation tasks. During the design classes, the students design the process of research and analysis of ergonomics of the workplace for the given evaluation criteria.

### Bibliography

Basic

1. Górny A., Dahlke G., Metody pomiarowe w bezpieczeństwie pracy i ergonomii, Wydawnictwo Politechniki Poznańskiej, Poznań 2013
2. Horst W. M., Horst N., Ergonomia z elementami bezpieczeństwa i ochrony w pracy. Wprowadzenie, Wydawnictwo Politechniki Poznańskiej, 2011
3. Horst W. M., Horst N., Ergonomia z elementami bezpieczeństwa i ochrony zdrowia w pracy. Zasady i wymagania związane z indywidualnymi cechami człowieka, Wydawnictwo Politechniki Poznańskiej, 2011
4. Horst W. M., Dahlke G., Górny A., Horst N., Horst W. F., Korchut W., Ergonomia z elementami bezpieczeństwa i ochrony zdrowia w pracy. Zasady i wymagania związane z odbiorem i przetwarzaniem bodźców, Wydawnictwo Politechniki Poznańskiej, 2011
5. Horst W. M., Dahlke G., Górny A., Horst N., Horst W. F., Ergonomia z elementami bezpieczeństwa i ochrony zdrowia w pracy. Zasady i wymagania związane z materialnym środowiskiem pracy, Wydawnictwo Politechniki Poznańskiej, 2011



6. Koradecka D. (red.), *Bezpieczeństwo pracy i ergonomia*, t. I i II, Centralny Instytut Ochrony Pracy, Warszawa 1997

7. *Polskie Normy z zakresu ergonomii*

#### Additional

1. Dahlke G., Horst W., 2008, *Pomiary maksymalnego czasu utrzymania chwytu siłowego ręki - wyniki badań*, W: *Obciążenia układu ruchu : Przyczyny i skutki* / pod red. Palucha R., Jach K., Kulińskiego M., Michalskiego R., - Wrocław : Oficyna Wydawnicza Politechniki Wrocławskiej, 2008. – ss. 57-70,
2. Dahlke G., Repiński M., Śnieżko P., *Ocena ergonomiczności stanowisk pracy motorniczych tramwajów*, w: *Logistyka / Instytut Logistyki i Magazynowania*. - 2014, *Materiały XI Konferencji Naukowo-Technicznej : Logistyka, systemy transportowe, bezpieczeństwo w transporcie LogiTrans*, Szczyrk, 07-10 kwietnia 2014- CD-ROM, ISSN 1231-5478
3. Dahlke G., Kamczyc J., Rakowski R., *Diagnostyka i ocena ergonomiczności kabin samochodów osobowych*, w: *Logistyka / Instytut Logistyki i Magazynowania*. - 2014, *Materiały XI Konferencji Naukowo-Technicznej: Logistyka, systemy transportowe, bezpieczeństwo w transporcie LogiTrans*, Szczyrk, 07-10 kwietnia 2014- CD-ROM, ISSN 1231-5478
4. Dahlke G., *Modelowanie symulacyjne w ergonomii i bezpieczeństwie pracy*, w: *Zeszyty Naukowe Politechniki Poznańskiej, Seria: Organizacja i Zarządzanie*, nr 63, Wydawnictwo Politechniki Poznańskiej, Poznań 2014, ISSN 0239-9415
5. Dahlke G., Ptak T., *Diagnoses of the acoustic perceptions of workers for auditory signal design*, [in:] Pedro M. Arezes, João Santos Baptista, Monica P. Barroso, Paula Carneiro, Patrício Cordeiro, Nelson Costa, Rui B. Melo, A. Sergio Miguel, Gonçalo Perestrelo, *Book chapters from the 6th International Symposium on Occupation Safety and Hygiene (SHO 2018)*, March 26-27, 2018, Guimarães, Portugal, Chapter 70, ISBN 9781351008877
6. Dahlke G., Turkiewicz K., *Postural adjustment for balance in asymmetric work. A practical example*, [in:] Pedro M. Arezes, João Santos Baptista, Monica P. Barroso, Paula Carneiro, Patrício Cordeiro, Nelson Costa, Rui B. Melo, A. Sergio Miguel, Gonçalo Perestrelo, *Book chapters from the 6th International Symposium on Occupation Safety and Hygiene (SHO 2018)*, March 26-27, 2018, Guimarães, Portugal, Chapter 84, ISBN 9781351008877
7. Dahlke G., Drzewiecka-Dahlke M., (2018), *Work Posture Analysis in the Ergonomic Assessment of Products - A Case Study*, [in:] Richard H. M. Goossens (ed.), *Advances in Social and Occupational Ergonomics, Proceedings of the AHFE 2018 International Conference on Social and Occupational Ergonomics*, July 21–25, 2018, Loews Sapphire Falls Resort at Universal Studios, Orlando, Florida, USA, pp. 258-271, [https://doi.org/10.1007/978-3-319-94000-7\\_27](https://doi.org/10.1007/978-3-319-94000-7_27), ISBN 978-3-319-93999-5
8. Koradecka D. (red.), *Bezpieczeństwo pracy i ergonomia*, Wyd. CIOP, Warszawa 1997
9. Pacholski L. (red.), *Ergonomia*, Wyd. Politechniki Poznańskiej, Poznań 1986



### Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	75	3,0

<sup>1</sup> delete or add other activities as appropriate