COURSE DESCRIPTION CARD - SYLLABUS

Course name
Measurement methods in occupational safety and ergonomics [S2IBiJ1-JiEwBP>MPwB]

Course

Field of study
Safety and Quality Engineering

Year/Semester
1/2

Area of study (specialization)
Quality and Ergonomics in Work Safety

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

4,00

Coordinators

dr inż. Grzegorz Dahlke
grzegorz.dahlke@put.poznan.pl

Lecturers

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 has structured and theoretically based knowledge and knows the facts and phenomena characteristic of management and quality science, mechanical engineering and safety engineering in the context of measurement methods in terms of occupational safety and ergonomics [K2_W01].
2. The student knows in-depth measurement methods used in solving the problems of modern safety engineering, ergonomics and work safety [K2_W03].

3. The student knows in-depth development trends and good practices regarding safety management in organizations on a local and global scale in terms of measurement methods used in occupational safety and ergonomics [K2_W04].

Skills:
1. The student is able to properly select sources, including literature and information derived from them, as well as to evaluate, critically analyze, synthesize and creatively interpret this information, formulate conclusions and comprehensively justify the opinion during the presentation of the results of work environment measurements [K2_U01].
2. The student is able to use methods and tools for solving complex and unusual problems as well as advanced information and communication techniques characteristic of the professional environment related to security management in organizations in terms of the working environment [K2_U02].
3. The student is able to identify and recognize hazards in the work environment, assess their impact on the individual, organization and its stakeholders, and indicate methods of conduct aimed at minimizing the effects of hazards, taking into account pro-ecological solutions [K2_U10].

Social competences:
1. The student is critical of his knowledge, is ready to consult experts when solving cognitive and practical problems related to safety management in organizations in terms of work environment measurements and their results [K2_K01].
2. The student correctly identifies and resolves dilemmas related to broadly understood safety, understands the need to raise public awareness of the need to shape security in various areas of the organization's functioning, with special emphasis on the work environment [K2_K02].
3. The student is ready to perform tasks related to safety management in the organization in an ethical manner, to persuade others to observe the principles of professional ethics and to develop professional values in this area [K2_K05].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

.Formal evaluation:
- for laboratory classes: on the basis of the implementation of exercises requiring the solution of 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:
- for laboratory classes: average of test grades and reports,
- 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

The programme content includes learning about the methods, tools and measuring apparatus that make it possible to diagnose the parameters of the environment, the way work is carried out and the psychophysical capabilities of the worker.

Course topics

Lecture:
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;
Laboratory:
Measurements of worker exposure to selected work environment factors. Measurements in diagnostics of the human physical performance. Measurements of physical activity in the work environment. Measurements of psychophysiological ability.
Project:
1. Design of a methodology for the study of the worker's exposure at the workplace, taking into account selected criteria;
2. Development of the research methodology in the form of a flow chart;
3. Selection of apparatus and measuring tools used in the study of selected criteria;
4. Identify standards and legal documents that are the basis of the research (methods and requirements);
5. Development of the research schedule, determination of the size of the research team and division of responsibilities taking into account the apparatus used;
6. Development of samples of measurement protocols.

Teaching methods

Lecture supported by multimedia presentation and performance of measurement experiments. The lecture is conducted using distance learning techniques in a synchronous mode. Acceptable platforms: eMeeting, Zoom, Microsoft Teams. During laboratory classes, students use handouts for exercises involving the preparation and execution of measurements in the work environment and in the analysis of product ergonomics, and they solve calculation tasks. During design classes, students design the process of testing and analysing the ergonomics of a workstation for given assessment 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, 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	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00