



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Ergonomic Engineering [N2IBIJ1-JiEwBP>IE]

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### 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

part-time

Requirements

elective

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### Number of hours

Lecture

10

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

10

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### Number of credit points

2,00

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### Coordinators

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### Lecturers

### Prerequisites

A student starting this course should have basic knowledge of technology and occupational safety management. The student should be able to use various sources of information, be able to describe systemic relationships, be able to independently propose solutions to a specific problem and carry out the procedure of making decisions in this regard.

### Course objective

Getting to know the theoretical and practical problems related to the assessment and shaping the level of adaptation of technical and organizational requirements to the psychophysical capabilities of the employee. Acquiring the ability to analyze the causes of safety failure and the ability to design ergonomic solutions in the area of human functioning. To familiarize students with the issues of work safety in industrial applications and to familiarize students with the ways of shaping the material working environment, as well as the principles of diagnosing and designing safe technical objects and safe work organization.

### Course-related learning outcomes

Knowledge:

1. The student knows in depth the methods and theories used in solving the problems of modern safety

engineering, quality, ergonomics and occupational safety [K2\_W03].

2. The student knows in-depth development trends and good practices regarding security management in organizations in local and global terms oriented towards ergonomic engineering [K2\_W04].

Skills:

1. The student is able to identify changes in requirements, standards, regulations, innovations and technical progress as well as economic reality and to use them properly in solving problems in the field of safety engineering, ergonomics and occupational safety [K2\_U06].

2. The student is able to make a critical analysis of technical solutions used in the field of safety engineering, ergonomics and work safety [K2\_U07].

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 [K2\_K01].

2. The student is ready to initiate activities related to improving safety, taking into account pro-ecological solutions oriented towards ergonomic engineering [K2\_K03].

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formative assessment:

- project classes: assessment of progress in the implementation of the project task (according to the adopted schedule of the project task implementation) taking into account the activity during the classes according to the following scale of points, from 0 to 5: very good - from 4.6 to 5; good plus - from 4.1 to 4.5; good - from 3.6 to 4.0; sufficient plus - from 3.1 to 3.5; sufficient - from 2.5 to 3.0; insufficient - from 0 to 2.4,

- lectures: the acquired knowledge is verified by questions and answers to posed during the discussion focused on current problems discussed in the lecture.

Summative assessment:

- project classes: evaluation of the completed project, taking into account the assessment of progress in the implementation of the project task and activity during project classes, according to the following scale of points, from 0 to 5: very good - from 4.6 to 5; good plus - from 4.1 to 4.5; good - from 3.6 to 4.0; sufficient plus - from 3.1 to 3.5; sufficient - from 2.5 to 3.0; insufficient - from 0 to 2.4.

- lectures: two 15-minute tests carried out during the 2nd and 5th lecture. Each test consists of 3-5 questions (test and open-ended) with different points (on a scale from 0 to 2); the student receives credit after reaching at least 51% of the possible points.

### Programme content

The program covers the basics of ergonomic engineering in terms of selected design criteria. An interdisciplinary approach is presented, as well as methods for implementing knowledge of human psychophysical capabilities into technical design and work organization.

### Course topics

The lecture program covers the following topics:

Methodological basis of ergonomic engineering;

The initial model of ergonomic diagnostics;

Issues of diagnostic conditions;

The concept of ergonomic information;

Methods of ergonomic design;

Industrial design.

The student performs a project for improving the ergonomics of human operating conditions in a specific organizational unit due to the adopted functional requirements. At subsequent stages of the project, he solves problems in the following areas of knowledge:

Forms of ergonomic information;

The human factor criterion as a value for the designing entity;

Ergonomic diagnostics;

Ergonomic problem list;

Design and implementation of solutions of technical objects with high ergonomic quality,  
Ways to reduce noise emissions;  
Examples of engineering solutions to reduce mechanical vibrations;  
Ergonomic design of workspace and lighting conditions;  
Ergonomic engineering in various areas of business.

## Teaching methods

- lecture classes: problem lecture with elements of collecting premises and the stage of solving the problem,

The lecture is conducted using distance learning techniques in a synchronous mode.

Acceptable platforms: eMeeting, Zoom, Microsoft Teams.

- project: multi-stage cognitive task.

## Bibliography

Basic:

1. Sławińska M., Zwolankiewicz A., (2021). Ergonomic Reengineering of Real-Time Human-Machine Interaction as a Safety Component of Modern Manufacturing Technologies, *European Research Studies Journal* Volume XXIV Special Issue 5, p. 166-178.
2. Tytyk E., *Drgania mechaniczne i hałas w ujęciu inżynierii ergonomicznej*, (2021), Wydawnictwo Politechniki Poznańskiej, Poznań.
3. Sławińska M., (2020), The method of ergonomic design of technological devices [in:] *Advances in manufacturing, production management and process control : Proceedings of the AHFE 2019 International Conference on Human Aspects of Advanced Manufacturing and the AHFE International Conference on Advanced Production Management and Process Control*, July 24-28, Washington D.C., USA, (red.) Waldemar Karwowski, Stefan Trzcieleński, Beata Mrugalska - Cham, Switzerland: Springer, p. 330-346.
4. Walkowiak D Sławińska M., (2020), *Koncepcja doskonalenia ergonomiczności warunków funkcjonowania człowieka z wykorzystaniem Internetu Rzeczy (IoR) - studium przypadku*, [w:] *Społeczne aspekty marketingu i cyfryzacji - wybrane zagadnienia*, (red.) Joanna Jędrzejewska, Kamila Talarek - Lublin, Polska : Wydawnictwo Naukowe TYGIEL, s. 243-254.
5. Ewertowski T., Berlik M., Sławińska M., (2020), *Koncepcja oceny obciążenia zadaniowego operatora w aspekcie doskonalenia układu Człowiek-Technika-Otoczenie na przykładzie pilota*, *Zeszyty Naukowe Politechniki Poznańskiej. Organizacja i Zarządzanie* nr 81, s. 21-33.
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9. Butlewski M., Sławińska M., Niedźwiecki M., (2017), *3D Laser Models for the Ergonomic Assessment of the Working Environment*, R.H.M. Goossens (ed.), *Advances in Social & Occupational Ergonomics, Advances in Intelligent Systems and Computing* 487, pp. 15-24, DOI 10.1007/978-3-319-41688-5.
10. Jasiak A.,(2015), *Makroergonomia w projektowaniu systemów pracy i jakości życia*, Wydawnictwo Politechniki Poznańskiej, Poznań.
11. Sławińska M., *Reengineering ergonomiczny w zarządzaniu łańcuchem działania*, (2014), [w:] *Marketing i Rynek, Rocznik 2014*, nr 5 (CD), Polskie Wydawnictwo Ekonomiczne, s. 589-595, INDEKS 326224, ISSN 1231-7853.
12. Sławińska M., *Czynnik ludzki w ustawicznym doskonaleniu systemu pracy*, (2012), M. Złowodzki, H. Ogińska, T. Juliszewski, H. Pawlak (red.), *Ergonomia w warunkach gospodarki opartej na wiedzy*, Komitet Ergonomii PAN, Kraków-Lublin, s. 91-103, ISBN 978-83-936710-0- 7.
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Additional:

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2. Berlik M., Ewertowski T., Sławińska M., (2019), Overview of the workload assessment methods in the aspect of improvement of the operator-technical subsystem relations on the example of a pilot, Journal of Konbin, vol. 49, no. 3, s. 97-114.
3. Sławińska M., Reengineering ergonomiczny procesów eksploatacji zautomatyzowanych urządzeń technologicznych (ZUT), Rozprawy Nr 462, Wyd. Politechniki Poznańskiej, Poznań 2011, ISSN 0551-6528, ISBN 978-83-7775-100-8.
4. Pacholski L., Jasiak A., (2011), Makroergonomia, Wydawnictwo Politechniki Poznańskiej, Poznań.
5. Rabenda A., Kowal E. (2008), Oddziaływanie szkodliwości przemysłowych na organizm człowieka. Oficyna Wydawnicza Uniwersytetu Zielonogórskiego.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	20	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50