COURSE DESCRIPTION CARD - SYLLABUS

Course name
Ergonomics [N1Log2>ERG]

Course

Field of study
Logistics

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
10

Laboratory classes
16

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Student has basic knowledge of processes and conditions existing in work enwironment, knows the basic logistic processes and rules of their organization, understands the basic concepts of organization and management sciences and the basics of work safety management.

Course objective

Providing students with theoretical and practical knowledge in the field of shaping safe and ergonomic working conditions, especially in enterprises¬industrial and service enterprises in manufacturing and logistics processes. To teach measuring techniques for assessing the most important ergonomic factors. Developing skills of critical observation of work processes in terms of safety and ergonomics, as well as the ability to design changes in the design of equipment and work organization, ensuring ergonomics and safety.

Course-related learning outcomes

Knowledge:
1. Student knows the basic relationships necessary to understand the non-technical conditions of engineering activities and the basic principles of occupational health and safety, in particular the

requirements regarding the ergonomics of positions in logistics [P6S_WK_08]

Skills:
1. Student can recognize in engineering tasks systemic, non-technical, socio-technical, organizational and economic aspects in the context of planning ergonomic activities in the field of logistics [P6S_UW_04]
2. Student can prepare measures necessary to work in an industrial environment and knows the principles of environmental safety associated with this work, including safety problems in logistics [P6S_UW_05]
3. Student can choose the right tools and methods to solve the problem that fits the framework of logistics and supply chain management, as well as effectively use them, observing the principles of employee well-being and environmental protection [P6S_UO_02]
4. Student can identify changes in requirements, standards, regulations, technical progress and reality of the labour market and on their basis determine the needs for improving knowledge, in particular in the field of ergonomics in logistics [P6S_UU_01]

Social competences:
1. Student is aware of the need for critical assessment and perception of cause-and-effect relationships in achieving the set goals and ranking the significance of tasks, in particular in the field of ergonomics in logistics activities [P6S_KK_01]
2. Student is aware of the need to initiate activities related to the formulation and transfer of information and cooperationin society for the needs of better planning of ergonomic activities in the field of logistics [P6S_KO_02]]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Formative assessments constitute 30% (15% a test from the lecture, 15% a written work on a given topic). The general knowledge acquired during the lectures is verified on the basis of an exam prepared in the form of a test (the answers consist in: selecting one correct one out of several, multiple choice questions, completing the sentence with the appropriate concept or term, or completing/matching the definition). Exam topics constituting the basis of questions are presented to students during the last lecture.
Laboratory: Skills acquired during laboratory classes are verified on the basis of partial tests. The grade may also be influenced by short oral or written statements made as part of the exercises, as well as reports made after a given laboratory task (forms obligatory to pass - however, in the case of a high level of student involvement, up to 10% of the score may be added as a grade for activity).
Passing threshold: the sum of more than 50% of possible points.

Programme content

Lecture: The origin of ergonomics against the backdrop of the development of technology and science. Components sciences and the nature of ergonomics. Ergonomics and health and safety - economic aspects. Human system - technical object and its surroundings. Interpretation of the system as a work¬place. The purpose and scope of ergonomic activity. Contemporary trends in ergonomic research. Ergonomic diagnosis methods. Analysis of physical workloads and body heat management. Analysis of work-related psychological burdens. Principles of load optimization. Perception and information processing processes. Selection rules for signaling and control devices. Shaping the spatial parameters of the workplace and manual machines and tools based on anthropometric data. Assessment and shaping of the working environment (mechanical vibrations, noise, microclimate, lighting, harmful radiation, air pollution). Principles of ergonomic design. Examples of ergonomic design of machining, assembly, dispatching and computer stations. Ergonomics of the elderly and the disabled.
Laboratory: Measurements in the analysis of visual perception; Reaction time measurements; Study of acoustic perception of employees; Measurements of acoustic insulation of materials using an acoustic microchamber; Light intensity measurements in the work environment; Analysis of the acoustic climate in the room; Research and assessment of ergonomics of work processes / Databases in ergonomic design; Measurements of forces when activating control devices (when unscrewing and tightening); Measurements of human anthropometric features and their application in design (Ergoeaser); Study of metabolic heat production and effective energy expenditure in assessing the severity of the work process; Designing visual information (selection of font sizes and evaluation of visual presentations);

Assessment of thermal loads on an employee in a moderate environment; Assessment of employee exposure to MSD's.

Course topics

The origins of ergonomics against the background of technical and scientific developments
Component sciences and the nature of ergonomics
Ergonomics and OSH - economic aspects
The human-technical-object system and its environment
Interpretation of the system as a workplace
Purpose and scope of ergonomic activities
Modern trends in ergonomic research
Ergonomic diagnosis methods
Analysis of physical workload and thermal management of the body
Analysis of mental workloads
Principles of load optimisation
Perception and information processing processes
Principles for the selection of signalling and control devices
Design of spatial parameters of the workstation and of machines and hand tools using anthropometric data
Assessment and design of the work environment (mechanical vibration, noise, microclimate, lighting, harmful radiation, air pollution)
Principles of ergonomic design
Examples of ergonomic design of workstations: machining, assembly, dispatching, computer workstations
Core content of laboratory exercises:
Physical fitness and the BMI index
Human anthropometric characteristics
Visual work under changing light conditions
Absolute hearing threshold
Criteria for the selection of a seat for the user
Acoustic conditions in the room
Selected parameters of electric lighting
Sensation of mechanical vibrations
Simple and complex reactions
Auditory and visual stimuli and the making of mistakes
Selected psycho-physical abilities

Teaching methods

Lecture: Lectures with multimedia presentation and discussion of practical solutions.
Laboratory: Laboratory exercises with the use of apparatus for ergonomic measurements.

Bibliography

Basic:
1. Horst W. (red), Ergonomia z elementami bezpieczeństwa i ochrony zdrowia w pracy, Wydawnictwo Politechniki Poznańskiej, Poznań, 2011.
2. Olszewski J., Podstawy ergonomii i fizjologii pracy, Wydawnictwo Akademii Ekonomicznej, Poznań, 1997.
3. Tytyk E., Butlewski M., Ergonomia w technice, Wydawnictwo Politechniki Poznańskiej, Poznań, 2011.
4. Tytyk E., Projektowanie ergonomiczne, Wydawnictwo Naukowe PWN, Warszawa 2001.
5. Wejman M., Diagnozowanie środowiska pracy, Wydawnictwo Politechniki Poznańskiej, Poznań 2012.

Additional:
1. Górska E., Ergonomia. Projektowamie, diagnoza, eksperymenty. Oficyna Wydawnicza Politechniki Warszawskiej, 2002.
2. Jabłoński J. (red.), Ergonomia produktu. Ergonomiczne zasady projektowania produktów, Wydawnictwo Politechniki Poznańskiej, Poznań, 2006.
3. Koradecka D. (red), Bezpieczeństwo pracy i ergonomia, CIOP, Warszawa, 1999.
4. Nowak E., Atlas antropometryczny populacji polskiej, Wydawnictwo Instytutu Wzornictwa Przemysłowego, Warszawa, 2000.
5. Tytyk E., Drgania mechaniczne i hałas w ujęciu inżynierii ergonomicznej. Wyd. Politechniki

Poznańskiej, Poznań 2021 (Open Access).
6. Dahlke G., Drzewiecka M., Stasiuk-Piekarska A.K., Pozasłuchowy wpływ elektrowni wiatrowych na człowieka, Logistyka 5/2014, s. 290-300.
7. Stasiuk-Piekarska A., Drzewiecka M., Dahlke G., Influence of macroergonomic factors on production systems organizing in automotive industry [w:] Vink P. (red.), Advances in Social and Organizational Factors, 2020, s. 194-205.
8. Standards and legal acts indicated during the classes.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	28	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	72	2,50