COURSE DESCRIPTION CARD - SYLLABUS

Course name
Ergonomics [S1IBez2>ERG]

Course

Field of study
Safety Engineering

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
30

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

4,00

Coordinators

dr hab. inż. Marcin Butlewski prof. PP
marcin.butlewski@put.poznan.pl

Lecturers

Prerequisites

Student has basic knowledge about the processes and conditions prevailing at workplaces, knows the basic production processes and rules of their organization, understands the basic concepts of organization and management sciences and the basics of work safety management.

Course objective

Provide students with theoretical and practical knowledge in the field of shaping safe and ergonomic working conditions, especially - in industrial and service enterprises, in manufacturing and service processes. Teaching measurement techniques for the assessment of the most important ergonomic factors. Developing the 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 devices and work organization, ensuring ergonomics and safety.

Course-related learning outcomes

Knowledge:
Student:
He knows in depth the issues of technical safety, safety systems, occupational health and safety as well

as threats and their effects. [K1_W02]
He has advances knowledge of threats and their effects, risk assessment in the work environment as well as occupational accidents and diseases. [K1_W03]
Has advances knowledge of ergonomics, human ecology and environmental protection. [K1_W05]
Has advances knowledge of quality engineering in relation to products and processes. [K1_W07]
He knows the fundamental dilemmas of modern civilization and development trends as well as the best practices in the field of security engineering. [K1_W10]

Skills:
Student:
He can prepare the necessary resources for work in an industrial environment and knows the safety rules related to this work and can enforce their application in practice. [K1_U05]
He can make a critical analysis of the way of functioning and assess, in connection with Safety Engineering, the existing technical solutions, in particular machines, devices, facilities, systems, processes and services. [K1_U06]
Can design, using appropriate methods and techniques, an object, system or process that meets the requirements of safety engineering and make its initial economic assessment [K1_U07]
He can plan, organize and implement individual and team work as well as conduct experiments, including measurements and computer simulations, interpret the obtained results and draw conclusions. [K1_U11]
Can identify changes in requirements, standards, regulations and technical progress and the reality of the labor market, and on their basis define the need for supplementing knowledge. [K1_U12]

Social competences:
Student:
He can see the cause-and-effect relationships in the implementation of set goals and use ranks in relation to the importance of alternative or competitive tasks. [K1_K01]
Is aware of the recognition of the importance of knowledge in solving problems in the field of safety engineering and continuous improvement. [K1_K02]
He can initiate activities related to the formulation and transfer of information and cooperation in the society in the field of security engineering. [K1_K05]
Is aware of responsibility for their own work and readiness to submit to the principles of teamwork and responsibility for jointly performed tasks. [K1_K07]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formative assessment:
a) in the field of exercises: current checking of knowledge and skills during exercises
b) in the field of lectures: on the basis of a discussion on the material assimilated at previous lectures;
c) in the field of laboratories. The skills acquired during laboratory classes are verified on the basis of a final test, consisting of 5-7 tasks with different scores and partial assessments of the progress in the implementation of individual classes.
Summative assessment:
a) in the field of exercises: on the basis of the results of the average of partial grades of the forming assessment
b) in the field of lectures: examination in the form of a written test.
c) for the laboratory: on the basis of the results of the average of the partial grades of the forming evaluation.

Programme content

The genesis of ergonomics in the context of the development of technology and science. The sciences of components and the nature of ergonomics. Ergonomics and occupational health and safety - economic aspects. The human system - a technical object and its surroundings. Interpretation of the system as a workplace. Purpose and scope of ergonomic activities. Contemporary trends in ergonomic research. Ergonomic diagnosis methods. Analysis of physical workload and the body's heat management. Analysis of work-related mental burdens. Principles of load optimization. Processes of perception and processing of information. Rules for the selection of signaling and control devices. Shaping the spatial parameters of the workplace, machines and hand tools with the use of anthropometric data. Assessment and

shaping of the work environment (mechanical vibrations, noise, micro-climate, lighting, harmful radiation, air pollution). Principles of ergonomic design. Examples of ergonomic design of workstations: processing, assembly, dispatching, computer.
Basic content of laboratory exercises:
•Physical capacity of the body and the BMI index.
•Human anthropometric features
•Visual work in changing lighting conditions.
•Absolute hearing threshold.
•Criteria for selecting the seat to the user.
•Acoustic conditions of the room
•Selected parameters of electric lighting.
•Feeling of mechanical vibrations.
•Simple and complex reactions.
•Sound and visual stimuli and making mistakes.
•Selected psychophysical possibilities.

Teaching methods

Lectures with a multimedia presentation and discussing examples of practical solutions
Laboratory exercises with the use of equipment for ergonomic measurements.

Bibliography

Basic:
1. Horst W. (ed.), Ergonomics with elements of safety and health protection at work, Wyd. Poznań University of Technology, Poznań, 2011
2. Olszewski J., Fundamentals of ergonomics and work physiology. Ed. University of Economics, Poznań, 1997
3. Tytyk E., Butlewski M. Ergonomics in technology. Ed. Poznań University of Technology, Poznań, 2011
4. Tytyk E., Ergonomic design, Wyd. PWN, Warsaw 2001
5. Wejman M., Diagnosing the work environment, Wyd. Poznań University of Technology, Poznań 2012
6. Norms and legal acts indicated during classes.

Additional:
1. Górska E., Ergonomics. I design, diagnosis, and experiments. Publishing House of the Warsaw University of Technology, 2002
2. Jabłoński J. (ed.), Product ergonomics. Ergonomic principles of product design, Publishing House of the Poznań University of Technology, Poznań, 2006
3. Koradecka D., (ed), Occupational safety and ergonomics, Ed. CIOP, Warsaw, 1999
4. Nowak E., Anthropometric Atlas of the Polish Population, Publishing House of the Institute of Industrial Design, Warsaw, 2000
5. Tytyk E., Mechanical vibrations and noise in terms of ergonomic engineering. Ed. Poznań University of Technology, Poznań 2021 (Open Access)
6. Butlewski M., Ergonomic design in the face of the dynamics of the human resource deficit, Poznań University of Technology 2018, ISBN: 978-83-7775-506-8; 255 pages

Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00