



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Work environment design [S1MiBM2>PSP]

Course

Field of study

Mechanical Engineering

Year/Semester

1/2

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

15

Number of credit points

2,00

Coordinators

Lecturers

Prerequisites

The student should have knowledge of the operation and organization of enterprises, production or service plants. He/she should be aware of the risks in the workplace and be able to identify them. The student should be able to use regulations and normative acts.

Course objective

The aim of the course is to familiarize students with issues relating to the work environment, the assessment of physical factors present at workstations and methods of minimizing or eliminating their harmful effects on the employee; occupational risk assessment; basic principles of designing workstations and the work environment.

Course-related learning outcomes

Knowledge:

Has advanced knowledge in the construction, operation, programming and testing of machines and robots K1_W07.

Has basic knowledge about the fundamental dilemmas of modern civilization K1_W13.

Skills:

Is able to take into account systemic and non-technical aspects, including ethical, ecological and

environmental protection K1_U06.

Is able to critically analyze and evaluate the functioning of existing technical solutions K1_U08.

Is able to plan and organize individual and team work K1_U15.

Social competences:

Understands the need for lifelong learning; is aware of the need to critically analyze and evaluate their proposals and actions K1_K01.

Is able to think and act in a creative and enterprising way K1_K05.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired as part of the lecture is verified on the basis of the final test during the last class in the semester. The test consists of 15 single-choice questions. In each question, 1 point is obtained for the correct answer. Passing threshold: 50%.

The knowledge and skills acquired in the project classes are verified by the presentation of the project developed by the students (in groups) and the discussion of the work.

Programme content

Lecture:

Work environment - definition, human workload. Basic principles of workstation design. Anthropometry in the design of workstations. Basic principles of work environment design: principles of minimizing exposure to mechanical vibration and noise, principles of workstation lighting design, principles of microclimatic conditions design and comfort assessment. Principles of designing workstations for the disabled, activation of the elderly. Assessment of occupational risk at workstations. Supervision and control of working conditions in Poland.

Project:

Topic: assessment of the material factors of the work environment at the selected position and design of changes to improve safety and comfort at work.

Tasks:

- Description of the studied workstation, taking into account the protective measures used
- Carrying out a chronometric of the working day (photographs of the working day)
- Identification of hazards at the analyzed workstation
- Determination and evaluation of energy expenditure using the Lehmann method
- Evaluation of microclimate at a selected workstation (evaluation of basic microclimate parameters, evaluation of thermal comfort of a temperate environment, PMV and PPD indices)
- Assessment of noise at a selected workstation (conducting questionnaire surveys including assessment of working conditions, sources of annoyance and discomfort, sources of noise, noise-related effects and perceived ailments, determination of occupational noise exposure, assessment of hearing protectors used, selection of hearing protectors using the HML and SNR methods)
- Assessment of lighting at a selected workstation (analysis of the type of lighting used, carrying out surveys taking into account the assessment of working conditions related to ensuring the safety of people in the interior, ensuring adequate conditions for performing visual tasks, assessment of illumination intensity and uniformity of room illumination based on the guidelines contained in the PN-EN 12665:2011 standard)
- Occupational risk assessment for measurable factors according to PN-N-18002:2011
- Design of changes to improve safety and comfort at the analyzed position

Course topics

none

Teaching methods

Lecture: multimedia presentation illustrated with examples.

Project: presentation of the project developed by the students (in groups), solving practical problems, finding sources, working in a team, discussion.

Bibliography

Basic:

Bugajska J., Gedliczka A., i inni, Bezpieczeństwo i ochrona człowieka w środowisku pracy, Ergonomia, CIOP-PIB, 2019 [in Polish]
Butlewski M., Tytyk E., Inżynieria ergonomiczna dla aktywizacji osób starszych, Praca i zabezpieczenie społeczne, 2015 [in Polish]
Kowalski P., Koton J., Bezpieczeństwo i ochrona człowieka w środowisku pracy, Drgania mechaniczne, CIOP-PIB, Warszawa, 2021 [in Polish]
Kozłowski E., Mikulski W., i inni, Bezpieczeństwo i ochrona człowieka w środowisku pracy, Hałas, CIOP-PIB, Warszawa, 2018 [in Polish]
Tytyk E., Projektowanie ergonomiczne, PWN, Warszawa - Poznań, 2001 r. [in Polish]
Wojcisz M., Ergonomia - ocena stanowisk pracy, Wydawnictwo Politechniki Poznańskiej, Poznań 2018 [in Polish]

Additional:

Głównyńska — Woelke K., Ocena ryzyka zawodowego, 2009 [in Polish]
Kozłowski E., Młyński R., Ochronniki słuchu - dobór i użytkowanie, CIOP-PIB, Warszawa, 2021 [in Polish]
Kucharski T., System pomiaru drgań mechanicznych, WNT, Warszawa 2002 [in Polish]
Rozporządzenie Ministra Pracy i Polityki Społecznej z dnia 6.06.2014 r. w sprawie najwyższych dopuszczalnych stężeń i natężeń czynników szkodliwych dla zdrowia w środowisku pracy (Dz. U. z 2014 r. poz. 817). [in Polish]
Rozporządzenie Ministra Pracy i Polityki Socjalnej z dnia 26 września 1997 r. w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy. (Dz. U. 1997 nr. 129 poz. 844) [in Polish]
PN EN 1005-(1-5) Bezpieczeństwo maszyn. Możliwości fizyczne człowieka. (Część 1: Terminy i definicje; Część 2: Ręczne przemieszczanie maszyn i ich części; Część 3: Zalecane wartości graniczne sił przy obsłudze maszyn; Część 4: Ewaluacja pozycji pracy i ruchów w relacji do maszyny; Część 5: Ocena ryzyka dotycząca czynności wykonywanych z dużą częstością powtórzeń). [in Polish]
PN-EN 352-(1-2):2005 Ochronniki słuchu. Wymagania ogólne. (Część 1: Nauszniki przeciwhałasowe; Część 2: Wkładki przeciwhałasowe). [in Polish]
PN-EN 458:2016-6 Ochronniki słuchu. Zalecenia dotyczące doboru, użytkowania, konserwacji codziennej i okresowej. Dokument przewodni. [in Polish]
PN-EN ISO 10819:2013-12. Drgania i wstrząsy mechaniczne. Drgania oddziałujące na organizm człowieka przez kończyny górne. Pomiar i ocena współczynnika przenoszenia drgań przez rękawice na dłoń operatora. [in Polish]
PN-EN ISO 9612:2011 Akustyka. Wyznaczanie zawodowej ekspozycji na hałas. Metoda techniczna [in Polish]
PN-EN ISO 7730:2006 Ergonomia środowiska termicznego. Analityczne wyznaczanie i interpretacja komfortu termicznego z zastosowaniem obliczania wskaźników PMV i PPD oraz kryteriów miejscowego komfortu termicznego. [in Polish]
Ratajczak Z., Psychologia inżynierska, Katowice 1974. [in Polish]
Tytyk E., Inżynieria ergonomiczna, Wyd. Politechniki Poznańskiej, 2011 [in Polish]

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00