COURSE DESCRIPTION CARD - SYLLABUS

Course name
Macroergonomics [N2IBiJ1-JiEwBP>MAK]

Course

Field of study
Safety and Quality Engineering

Year/Semester
2/3

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

Number of hours

Lecture
10

Laboratory classes
0

Other
0

Tutorials
10

Projects/seminars
10

Number of credit points

3,00

Coordinators

dr inż. Aleksandra Dewicka-Olszewska
aleksandra.dewicka-olszewska@put.poznan.pl

Lecturers

Prerequisites

The student has basic knowledge in the field of ergonomics and management. He can properly analyze the causes and course of ergonomic phenomena and interpret the results of these observations.

Course objective

Acquisition of knowledge and skills in the field of practical application of the issues of third generation ergonomics.

Course-related learning outcomes

Knowledge:
1. Student knows in depth the methods and theories used in solving the problems of modern safety engineering, ergonomics and occupational safety [K2_W03].
2. Student knows in-depth the principles and rules of management, in particular project management, characteristic of safety engineering and ergonomics [K2_W06].
3. Student knows in depth the design methodology that takes into account the principles of safety and ergonomics [K2_W09].

Skills:
1. Student is able to develop and properly apply methods and tools for solving complex problems characteristic of the area of safety engineering, ergonomics and work safety, or select and apply existing and known analytical methods and tools in their area [K2_U03].
2.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].
3. Student is able to cooperate with other people as part of teamwork on solving a problem characteristic of the area of safety engineering, ergonomics and occupational safety, as well as take a managerial role in these teams [K2_U13].

Social competences:
1. Student correctly identifies and resolves dilemmas related to broadly understood security, understands the need to raise public awareness of the need to shape security [K2_K02].
2. Student is ready to initiate actions and solutions related to improving safety [K2_K03].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formative assessment: - lectures: discussion on current lecture problems, - classes: evaluation of reports on completed exercises and assessment of tasks to be completed independently, - project classes: assessment of progress in the implementation of the project task (compliance with the adopted schedule of project implementation) and activities during the classes. Summative assessment: - lectures: colloquium on definitions and concepts during the last lectures, closed test 10 questions, pass mark: 51%, - tutorial classes: average of the grades for prepared reports, pass mark 51%,- project classes: evaluation of the completed project , taking into account the assessment of progress in the implementation of the project task and activity in classes during the implementation of the project task, the pass mark of 51%.
Grading scale:
0 - 50 insufficient
51 - 59 sufficient
60 - 69 sufficient plus
70 - 79 good
80 - 89 good plus
90 - 100 very good.

Programme content

Lecture: Three stages of ergonomics evolution - macroergonomics. Macroergonomic paradigm of development in the field of human factor in technology. Macroergonomic information system (Evaluation and decomposition of criteria. Formal synthesis of assessments. Reliability of macroergonomic information. Criteria problem in macroergonomic design (Complexity of relations in macroergonomic systems). Basic methodological assumptions of non-traditional design information). Classes: Intelligent macroergonomic system. Shaping the macroergonomic zones of selected business cooperation. Projects: Macroergonomic diagnostics (Model. Concept. Issue of diagnostic conditions. Problem list) of a selected object/model.

Course topics

Lectures: Three stages of the evolution of ergonomics: classical ergonomics (micro), mesoergonomics, macroergonomics; the transition from the workstation level to the level of organizations and socio-technical systems; the significance of macroergonomics in the 21st century. The macroergonomic paradigm of the development of the human factors field in engineering; the systems paradigm; the role of humans in complex techno-organizational systems; ergonomics in the context of Industry 4.0 and digitalization. Macroergonomic information systems; evaluation and decomposition of criteria; methods of formal synthesis of assessments; reliability and limitations of macroergonomic information; examples of decision-support systems. The criterion problem in macroergonomic design, multi-criteria issues and decision conflicts. The complexity of relationships in macroergonomic systems (e.g., safety vs. efficiency vs. costs); decision models. Basic methodological assumptions for non-traditional design information: qualitative, heuristic, expert information; the use of foresight, Delphi, and scenario methods; integration of traditional

and non-traditional data sources.
Exercises: Intelligent macroergonomic system; simulation of information and decision systems; analysis of information flow within an organization. Designing macroergonomic zones in a selected business cooperation; identification of collaboration zones within the value chain; mapping decision-making and technological dependencies.
Project: Macroergonomic diagnostics of a selected object/organizational model.

Teaching methods

Lecture classes: information lecture, problem lecture, seminar with the use of a multimedia presentation.
The lecture is conducted using distance learning techniques in a synchronous mode.
Acceptable platforms: eMeeting, Zoom, Microsoft Teams.
Classes: the method of expert tables interchangeably with the method of cases. Project: multi-stage cognitive task.

Bibliography

Basic:
1. Pacholski L., Jasiak A., (2011), Makroergonomia, Wyd. Politechniki Poznańskiej, Poznań.
2. Jasiak A., Misztal A., (2004), Makroergonomia i projektowanie makroergonomiczne. Materiały pomocnicze., Wyd. Politechniki Poznańskiej, Poznań.
3. Jasiak, A. (2020). The fourth face of macroergonomics. Zeszyty Naukowe Politechniki Poznańskiej seria Organizacja i Zarządzanie, 71, 137-150.
4. Vargas, A. R., Maldonado-Macías, A. A., & García-Alcaraz, J. L. (2017). Macroergonomics for Manufacturing Systems: An Evaluation Approach. Springer.

Additional:
1. Sławińska M., (2019), Ergonomic engineering of technological devices, Wyd. Politechniki Poznańskiej, Poznań.
2. Jasiak A., Makroergonomia w projektowaniu systemów pracy i jakości życia., (2015), Wyd. Politechniki Poznańskiej, Poznań.
3. Dewicka-Olszewska A., Application and role of ergonomic innovations in small and medium-sized enterprises, Procedia Manufacturing - 2021, vol. 55, s. 521-526.

Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,00
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)	50	2,00