COURSE DESCRIPTION CARD - SYLLABUS

Course name
Reliability of Manufacturing Processes [S2IBiJ1-JiEwBP>NPW]

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
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

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Lecturers

Prerequisites

A student who begins this course should have basic knowledge of the basics of technological design, occupational health and safety, ergonomics and psychology. The student should know the general principles of exploitation of technical objects and modern concepts of management. The student should be able to recognize cause and effect relationships in the area of broadly understood security. The student should be able to assess the degree of compliance of the organization of the workplace with the applicable requirements in the field of ergonomics, occupational health and safety regulations and environmental protection

Course objective

Getting to know and understanding the basic theoretical and practical aspects of rational shaping of optimal working conditions. Acquiring knowledge and skills in improving work organization, preventing work-related occupational diseases and accidents at work.

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 in terms of reliability of manufacturing processes [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 security management in organizations [K2_K01].
2. The student is ready to initiate activities related to improving safety, taking into account pro-ecological solutions in terms of reliability of manufacturing processes [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 over 51% of the possible points.

Programme content

The program includes: an overview of the basic operational problems of technical systems, reliability and durability of operational facilities, a discussion of the concept of reliability, reliability management of manufacturing processes, active reliability enhancement, and issues of diagnostic susceptibility of facilities.

Course topics

The lecture program covers the following topics:
Functions of diagnostic systems for industrial processes;
Diagnostics of technical condition of machines;
Basic assumptions of diagnostics, types of diagnostic tests;
Use of machines, performance characteristics of machines;
Technical and operating documentation of machines;
Reliability and durability of machines;
Multi-criteria approach to control the level of safety of complex technical objects;
Anthropocentric approach in evaluating the efficiency and reliability of control processes in complex technical-social systems;
Anti-destructive systems.

The student designs solutions to support operator activities in the area of increasing reserve time, which is important for the operational reliability of the anthropotechnical system.

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., Wróbel K., (2021). Indicative Method of Human Failure in Sustainable Chain of Custody Management, European Research Studies Journal Volume XXIV Special Issue 5, p. 709-725.
2. Kubasiński S., Piechocki J., Sławińska M., (2019), Identification of key relations for work safety - a case study, [w:] Human Factors in Contemporary Organizations (XXXI International Seminar of Ergonomics), (red.) Leszek Pacholski, Krzysztof Hankiewicz, Beata Mrugalska, Marcin Butlewski, Adam Górny, USA : DEStech Publications, Inc., s. 86-94.
3. Sławińska M., (2019), Ergonomic engineering of technological devices, Wydawnictwo Politechniki Poznańskiej, 129 s.
4. Szopa T., (2016), Niezawodność i bezpieczeństwo, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa.
5. Butlewski M. Jasiulewicz-Kaczmarek M., Misztal A. & Sławińska M., (2014), Design methods of reducing human error in practice, p. 1101-1106, [in]: Safety and Reliability: Methodology and Applications, Edited by Nowakowski T. et al. (Eds), Taylor & Francis Group, London, ISBN 978-1-138-02681-0.
6. Sławińska M., Jurga A., (2011), Choosen aspects of designing information systems supporting logistic processes, K. Grzybowska, P. Pawlewski (eds.), Solutions for supporting the processes of administration, logistics and manufacturing - Selected aspects, pp. 21-34, Monograph, Poznan 2011 ISBN: 978-83-7775-067-4.

Additional:
1. Sławińska M., Reengineering ergonomiczny procesów eksploatacji zautomatyzowanych urządzeń technologicznych (ZUT), (2011), Rozprawy Nr 462, Wyd. Politechniki Poznańskiej, Poznań 2011, ISSN 0551-6528, ISBN 978-83-7775-100-8.
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3. Sławińska M., (2012), Niezawodność człowieka w interakcji z procesem przemysłowym, Wyd. Politechniki Poznańskiej, Poznań, ISBN 978-83-7775-178-7.
4. Słowiński B., (2011), Inżynieria eksploatacji maszyn, Wydawnictwo Uczelniane Politechniki Koszalińskiej, Koszalin.
5. Legutko S., (2007), Podstawy eksploatacji maszyn, Wydawnictwo Politechniki Poznańskiej, Poznań.
6. Będkowski L., Dąbrowski T., (2006), Podstawy eksploatacji, część II, Podstawy niezawodności eksploatacyjnej, Wydawnictwo Wojskowej Akademii Technicznej, Warszawa.
7. Niziński S., Michalski R., (2002), Diagnostyka obiektów technicznych, ITE Radom.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	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)	30	1,00