COURSE DESCRIPTION CARD - SYLLABUS

Course name
Certification of machines and vehicles

Course

Field of study
Mechatronics
Area of study (specialization)
Mechatronic design of machines and vehicles
Level of study
Second-cycle studies
Form of study
full-time

Year/Semester
2/3
Profile of study
general academic
Course offered in
Polish
Requirements
elective

Number of hours

Lecture
15
Tutorials
15
Laboratory classes
Projects/seminars
Other (e.g. online)

Number of credit points

2

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

Basics of engineering calculations in the field of technical mechanics and material strength, as well as

computer-aided engineering works. Ability to acquire knowledge on the basis of resources: library, internet (including e-resources).

Course objective

Pozyskanie przez Studentów wiedzy oraz umiejętności w zakresie prawidłowego wprowadzania do obrotu maszyn i pojazdów (certyfikacja i homologacja) na potrzeby prawidłowego funkcjonowania przedsiębiorstw produkcyjnych.

Course-related learning outcomes

Knowledge

1. Has knowledge of computer structure analysis including advanced operations in the CAD environment, regarding 3D visualization and analysis of the cooperation of mechanical elements - [K2_W15].

2. Has the knowledge necessary to understand the social, economic, legal and non-technical determinants of engineering activity and take them into account in engineering practice- [K2_W18].

3. Has basic knowledge of management, including quality management and running a business - [K2_W19].

Skills

1. Can define the directions of further learning and implement the process of self-education- [K2_U05].

2. Can work in an industrial environment and knows the basic principles of health and safety at work- [K2_ U08].

3. Can visualize a mechanical element in a 3D environment and analyze the cooperation of elements shown in the drawing- [K2_ U19].

Social competences

1. Understands the need for lifelong learning; can inspire and organize the learning process of other people- [K2_K01].

2. Is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for decisions made- [K2_K02].

3. Can think and act in a creative and entrepreneurial way- [K2_K06].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Exam / credit in case of correct answer to min. 2 questions from 4 questions: <2 ndst, 3 dst, 3.5 dst +, 4 db, 4.5 db +, 5 bdb), carried out at the end of the semester. The condition for obtaining a credit in the course is also obtaining a positive grade from the classes.

Classes: Passing in writing or in the form of a test

Programme content

Lectures:

Lecture 1 - Legal conditions for the safety of machinery and equipment and basic terminology

Reference to legal acts determining the provisions of occupational safety and health protection, with particular emphasis on the provisions referring to machines, i.e. the Machinery Directive 2006/42 / EC and the Tool Directive 2009/104 / EC, and the Act of April 13, 2016 on conformity assessment systems and market surveillance. Presentation of basic concepts, including essential and minimum requirements, machine, partly completed machine, set of machines (combined machine), modernization, modification, risk assessment, harmonized standard, placing on the market, death certificate.

Lecture 2 - Scope of application of the Machinery Directive 2006/42 / EC and the Tool Directive 2009/104 / EC and the principle of comprehensive safety

The scope of application of the Machinery Directive 2006/42 / EC and the Tool Directive 2009/104 / EC will be discussed, with a detailed indication of the dates of implementation of these provisions into Polish law. Will be discussed, among others. the principle of comprehensive safety, the three-stage method, the basic principles of ergonomics, operator's position in hazardous environments.

Lecture 3 - Analysis of the threats created (technical risk assessment)

The most frequently used methods of technical risk assessment (including the three-stage method, FMEA), also the method compliant with the PN EN ISO 12100: 2012 standard and the risk reduction strategy will be presented.

Lecture 4 - Machine manual, EC declaration of conformity and CE marking

The scope of the manual and the method of preparing technical and construction documentation will be discussed in detail. The content of the EC declaration of conformity, the content of the declaration of incorporation of a partly completed machine, the requirements for storing the declaration and the content of the certificate of operation will be discussed. The model of CE marking and examples of correct and incorrect CE marking will be discussed and presented.

Lecture 5 - Approval of motor vehicles

Basic concepts will be discussed: approval and its historical conditions and purpose of use, history of approval tests in Europe and in the world, basic national legal acts regarding approval regulations and methods of using publicly available sources of legal information (issap.sejm.gov.pl, eur- lex.europa.pl), vehicle type approval categories and body types used in the type approval regulations.

Lecture 6 - Content and use of Directive 2007/46 / EC

Will be discussed, among others. Directive 2007/46 / EC on approval and the regulation on the type approval of motor vehicles and trailers and their accessories or a part frame for approval.

Lecture 7 - Examples of approval tests

Approval procedures based on PORD Art.70 will be discussed, - examples of approval tests of vehicle equipment such as belts, headrests and seats, approval requirements for vehicle braking pursuant to UNECE Regulations No. 13, 78, 90 and technical conditions of vehicles (Journal of Laws No. of 2016, item 2022, as amended). Testing of external noise and gaseous pollutant emissions will be presented on the basis of the provisions of Polish legislation (technical conditions of vehicles and the method of conducting technical tests) and international legislation (Directives 70/157 and 70/220).

Lecture 8 - Unit approvals and design changes

The following will be discussed: legal regulations regarding unit approval contained in Polish legislation (PORD Act, approval regulation) and international legislation (framework directive), types of vehicles that are subject to unit approval, the scope of vehicle testing in a unit authorized under the unit approval procedure;

Basic guidelines for design changes contained in the PORD will be presented (Article 66 and Article 81), the classification of vehicle types, the classification of entities authorized to make design changes that change the type of vehicle (PKD classification), the scope of additional technical examination related to design changes + test fee

Exercises:

Exercise 1 - Analysis of legal regulations for a selected machine or device

Analysis of the applicable legal regulations in terms of their selection for the selected machine.

Exercise 2 - Preparation of a user manual for the selected machine

Preparation of a user manual for the selected machine.

Exercise 3 - Technical risk assessment for a selected machine

Choosing the appropriate method and carrying out a technical risk assessment for the selected machine.

Exercise 4 - Preparation of a declaration of conformity

Preparation of the EU / EC declaration of conformity for the selected machine

Exercise 5 - Preparation of product documentation from the manufacturer for the purpose of approval tests for a selected sub-system

Development of documentation for the purposes of approval tests based on the technical documentation of the product according to the normative requirements and entities carrying out approval tests based on the provided data.

Exercise 6 - Selecting the worst case for approval testing of the selected component

Analysis of the structure and parameters of the vehicle in terms of choosing the worst case for approval tests, taking into account the standard requirements and design data of the vehicle.

Exercise 7 - Preparation of a report on approval tests for a selected sub-system

Development on the basis of the obtained results of approval tests and guidelines for the preparation of a test report of its final form.

Exercise 8 - Summarizing and final classes

Discussion of the developed documentation during the classes. Pass a subject.

Teaching methods

Lecture: multimedia presentation illustrated with examples given on the board, solving problems

Exercises: solving practical problems, searching for sources, team work, discussion.

Bibliography

Basic

1.Gawlik J., Kiełbus A.: Metody i narzędzia w analizie jakości wyrobów. Politechnika Krakowska, Kraków 2008, s.79-92.

2.Kilar H.: Homologacja pojazdów samochodowych, Wydawnictwo uczelniane Politechniki Szczecińskiej, Szczecin 2005r

3. Dyrektywa Maszynowa 2006/42/WE

3. Rozporządzenie Ministra Gospodarki z dnia 21 października 2008 r. w sprawie zasadniczych wymagań dla maszyn

4. Dyrektywa 2007/46/WE Parlamentu Europejskiego i Rady z dnia 05 września 2007 r. ustanawiające ramy dla homologacji pojazdów silnikowych i ich przyczep oraz układów, części i oddzielnych zespołów technicznych przeznaczonych do tych pojazdów.

Additional

1. Samek A.: Współpraca specjalistów w procesie projektowania. Przegląd Mechaniczny 3/2008, s.16-19

2. Guide to the application of Directive 2006/42 / EC on machinery, 2nd edition, June 2010.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	20	1,0

[1] delete or add other activities as appropriate