



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Safety and standards [S2MiBM2>BiN]

### Course

Field of study

Mechanical Engineering

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

30

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

dr hab. inż. Łukasz Gierz prof. PP  
lukasz.gierz@put.poznan.pl

### Lecturers

### Prerequisites

Is able to obtain information from the Internet, library, reading room and other resources. In particular, he is able to properly indicate the sources of necessary information. Is able to determine the quality and usefulness of the retrieved information and data. He is also able to integrate information obtained from various resources, interpret it, draw conclusions and formulate and justify opinions. Social competences: Is able to cooperate and work in a group, taking on various roles in it.

### Course objective

Learning the basic safety requirements necessary during the machine design process. Learning publicly available databases in order to obtain technical and legal information for the machine design process. Based on the information obtained, the student will be able to draw appropriate practical conclusions for the needs of machine design and also business activity.

### Course-related learning outcomes

Knowledge:

1. The student has knowledge about the life cycle of devices.
2. Knows and understands the basic concepts and principles of economic, legal and other non-technical

conditions.

3. Knows the principles of industrial property and copyright protection.

Skills:

1. Is able to obtain information from literature, databases and other properly selected sources in the field of study; is able to integrate the information obtained, interpret and critically evaluate it, as well as draw conclusions and formulate and fully justify opinions.

2. Is able to work individually and in a team, use information and communication techniques appropriate to perform tasks, communicate using various techniques in a team and environment, also in English or another foreign language recognized as the language of international communication in the field of mechanics and machine construction.

3. Is also able to take into account non-technical conditions when solving engineering issues.

Social competences:

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

2. Is able to cooperate and work in a group, taking on various roles in it.

3. Is able to appropriately determine priorities for the implementation of a task specified by himself or others.

4. Correctly identifies and resolves dilemmas related to the profession.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: Exam/pass. Grades: very good - if the ratio of sums of achieved and total points is bigger than 90,1%, good plus - if the ratio of sums of achieved and total points is between 80,1-90%, good - if the ratio of sums of achieved and total points is between 70,1-80%, sufficient plus - if the ratio of sums of achieved and total points is between 60,1-70%, sufficient - if the ratio of sums of achieved and total points is between 50,1-60%.

Tutorials: Completion of exercises based on submitted projects.

### Programme content

Lectures:

Lecture 1 - Functions and goals of standardization, relationships between typification, unification and standardization; Main assumptions and organization of the standardization system in Poland after 1993; National, regional and international standardization documents, their nature, interconnections and relations to other legal provisions; Basic EU Directives.

Lecture 2 - Principles of standardization work - development of Polish Standards and implementation of European and international Standards. International and European standardization, organizational structure, documents and procedures for developing standards. Technical standards and their impact on product quality and standardization in design (ISO 9000). Classification systems - structure, application and method of use.

Lecture 3 - Product certification system in Poland, legal regulations, organizational structure and rules of conduct in the process of introducing a new product to the market. Technical standards and legal regulations constituting the basis for machine certification.

Lecture 4 - Electromagnetic Compatibility Directive 2014/30/EC (EMC) Basic information on assessing the compliance of equipment with the essential requirements regarding electromagnetic compatibility and how to mark it. Correct identification of products before they are placed on the market.

Lecture 5 - Legal conditions for the safety of machines and devices and basic terminology  
Reference to legal acts determining the provisions of occupational safety and health protection, with particular attention to the provisions referring to machines, i.e. the Machinery Directive 2006/42/EC and the Tools Directive 2009/104/EC, and the Act of April 13, 2016 on conformity assessment systems and market surveillance. Basic concepts will also be presented, including: essential and minimum requirements, machine, partly completed machine, set of machines (combined machine), modernization, modification, risk assessment, harmonized standard, placing on the market, certificate of conformity.

Lecture 6 - Scope of application of the Machinery Directive 2006/42/EC and the Tools Directive 2009/104/EC and the principle of comprehensive safety

The scope of application of the Machinery Directive 2006/42/EC and Directive 2009/104/EC will be

discussed, with a detailed indication of the dates of implementation of these provisions into Polish law. The following topics will be discussed: the principle of comprehensive safety, the three-stage method, basic principles of ergonomics, operator position in hazardous environments.

#### Lecture 7 - Analysis of threats posed (technical risk assessment)

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

#### Lecture 8 - Machine operation manual, EC declaration of conformity, form of marking and market surveillance

The scope of the operating manual will be discussed in detail, as well as the required content of the EC/EU declaration of conformity, the content of the declaration of incorporation of a partly completed machine, and requirements for storing the declaration. The CE marking template and examples of correct and incorrect CE marking will be discussed and presented. Methods of market surveillance will also be discussed, with an indication of the institutions that can perform inspections of production plants.

#### Tutorials:

##### Tutorial 1 - Analysis of a selected standard

How to use standards, what we find in them, where to look for them. exercises on the example of C-type standards, e.g.: PN-EN ISO 23125:2015-03 Machine tools - Safety - Lathes, PN-EN 415-5+A1:2010 Safety of packaging machines - Part 5: Wrapping machines.

##### Tutorial 2 - Safety requirements when designing machines

Drawing attention to the description of technical solutions enabling the construction of a safe machine based on the PN EN 12100:2012 and PN-EN 60204-1 standards.

##### Tutorial 3 - Safety requirements for machine design - continued

Guidelines when designing covers, analysis of safety space based on the PN-EN ISO 13854:2020-01 standard.

Tutorial 4 - Identification of the product in terms of meeting the requirements of the Electromagnetic Compatibility Directive (EMC). In order to properly assess the product before placing it on the market, it is necessary to identify: device, apparatus, stationary installation, mobile installation.

##### Tutorial 5 - assessment of compliance with minimum requirements

Assessment of the minimum requirements on a selected example of the so-called machine. old - sample checklist.

##### Tutorial 6 - Assessment of essential requirements

Assessment of essential requirements on a selected example of the so-called machine. new - sample checklist.

##### Tutorial 7 - Analysis of legal regulations for the selected machine

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

##### Tutorial 8 - Analysis and evaluation of technical and construction documentation for the selected machine

Assessment of technical and construction documentation for the purposes of the conformity assessment process.

##### Tutorial 9 - Analysis and evaluation of technical and construction documentation - continued

Assessment of technical and construction documentation - required test reports.

##### Tutorial 10 - Preparing an operating manual for a selected machine or device

Exercises in preparing an operating manual for a selected machine or device.

##### Tutorial 11 - Preparing an operating manual for a selected machine or device - continued.

Completing the user manual for the selected machine or device.

##### Tutorial 12 - Technical risk assessment for a selected machine

Selecting the appropriate method and conducting a technical risk assessment for the selected machine.

##### Tutorial 13 - Technical risk assessment for the selected machine - continued.

Completing the technical risk assessment and attempting to minimize it.

##### Tutorial 14 - Preparing the EC declaration of conformity for a selected machine

Preparation of the EC and EU declaration of conformity for the selected machine.

##### Tutorial 15 - Analysis of completed practice tasks and assessment

Compilation and review of documentation prepared for the purposes of inspection by supervisory departments, including: National Labor Inspectorate. Summary of issues and completion of exercises.

## Course topics

The classes will cover basic machine safety requirements and indicate appropriate conformity assessment

procedures for CE marking of machines. Publicly available databases will be presented, enabling obtaining technical and legal information for selected machine categories.

## Teaching methods

Lectures:

- lecture with multimedia presentation containing figures and pictures supported with examples presented on the blackboard
- the theory is presented in close relation with practice
- different aspects of presented problems are included e.g. economic, ecological, social, etc.
- during the lecture the discussion with students is initiated

Tutorials:

- solving exemplary problems on the blackboard
- tutorials are complemented with multimedia presentations containing figures and pictures
- the discussion is initiated on the obtained solutions of presented problems.

## Bibliography

Basic:

1. Gawlik J., Kielbus A.: Methods and tools in the analysis of product quality. Kraków University of Technology, Kraków, 2008, pp.79-92.
2. Machinery Directive 2006/42/EC
3. EMC Directive 2014/30/EU
4. Regulation of the Minister of Economy of October 21, 2008 on essential requirements for machines

Additional:

1. Samek A.: Cooperation of specialists in the design process. Przegląd Mechaniczny 3/2008, pp. 16-19
2. Guide to the application of Directive 2006/42/EC on machinery, 2nd edition, June 2010.
3. Missala T.: Essential requirements and principles of product conformity assessment resulting from the provisions implementing the EMC directive.
4. Gierz Ł. Technical opinion on the assessment of compliance with the essential requirements of a cotton pulper. District Court in Konin. 2017
5. Gierz Ł. Technical opinion on the assessment of the essential requirements of a wood saw. District Prosecutor's Office in Ostrzeszów. 2016
6. Gierz Ł. Technical opinion on the assessment of the minimum requirements of a lathe. District Court Poznań-Nowe Miasto and Wilda in Poznań. 2021

## Breakdown of average student's workload

|                                                                                                                                         | Hours | ECTS |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Total workload                                                                                                                          | 75    | 3,00 |
| Classes requiring direct contact with the teacher                                                                                       | 45    | 2,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 30    | 1,00 |