



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Joining processes

### Course

Field of study

Product Lifecycle Engineering

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

English

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Ph.D. Eng. Artur WYPYCH

Responsible for the course/lecturer:

### Prerequisites

Basic knowledge of physics, chemistry and materials science.

### Course objective

Presentation of the essence of contemporary methods of joining homonimial and heteronimial materials in the form of metals and non-metals in aspect of manufacturing various product groups such as ships, vehicles, impact shields, elements of energy systems, everyday products, electrotechnic and electronic components, furniture, toys, etc.

### Course-related learning outcomes

Knowledge

The graduate knows and understands the essence of welding with individual methods, is able to choose the welding method for a specific case, has an idea what techniques in a given product group dominate, what are their advantages and disadvantages.

Skills

The graduate will not design processes, but is able to choose the best joining method, taking into account costs and accuracy, will be able to prepare joining preliminary documentation.



### Social competences

The graduate will be able to start a discussion and precisely present the problem, will be an organizationally prepared to lead the team.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture material - passing in the form of a written test.

Laboratory material - passing in the form of a project task, the topic of which is determined by the person responsible for the subject.

### Programme content

The essence of joining (welding, pressure welding, soldering, gluing) by various methods. Characteristics of welding methods due to the energy density of the heat source and the amount of heat input and the range of HAZ. Weldability of alloys in the variant of homonominal and heteronominal materials joining. Characteristics of changes in the heat affected zone on the example of selected alloys. Selection rules for additional materials and preparation of the base material. Criteria for determining the need to use initial and / or final treatments during joining.

### Teaching methods

Verbal method of transferring essential content along with multimedia imaging and using a traditional table and details in the form of samples made with currently discussed joining methods. Based on the lecture knowledge, individual work of the student in the laboratory under the supervision of the person responsible for the subject.

### Bibliography

#### Basic

1. Welding Engineering, D. H. Phillips, John Wiley & Sons Inc, 2015,
2. Modern Physics for Scientists and Engineers, S. Thornton, A. Rex, BROOKS COLE PUB CO, 2011

#### Additional

1. Welding Handbook vol. 10 - Welding and Cutting Science & Technology, American Welding Society,
2. Welding Fundamentals, W. A. Bowditch, K. E. Bowditch, M. A. Bowditch, Goodheart-Willcox, 2017.



### 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) <sup>1</sup>	20	1,0

<sup>1</sup> delete or add other activities as appropriate