# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Defectoscopy and inspection of products in means of transport [S1MiTPM1>DiKWwŚT]

## Course

Field of study
Materials and technologies for automotive industry

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

## Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

## Number of credit points

2,00

## Coordinators

dr inż. Artur Wypych
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## Lecturers

## Prerequisites

The student has basic knowledge of physics, material science, chemistry. Has the ability to think logically, use information obtained from the library and the Internet. Understands the need to learn and acquire new knowledge.

## Course objective

To learn about non-destructive and destructive inspection and testing methods designed for the automotive industry.

## Course-related learning outcomes

Knowledge:
1. The student should characterize the different types of destructive and non-destructive testing methods.
2. The student should select the parameters of destructive and non-destructive testing processes.
3. The student should define the basic defects that occur in thermal sprayed coatings.
4. The student should define the basic defects that occur in welds.

Skills:
1. The student is able to operate equipment for quality testing and inspection of welded joints.
2. The student is able to select the initial conditions of the testing processes.
3. The student is able to interpret the obtained result.

Social competences:
1. The student is able to cooperate in a group.
2. The student is aware of the role of automotive welded joint testing and inspection processes in the modern economy and for society.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: credit on the basis of a colloquium consisting of 5 general questions (credit in case of correct answers to min. 3 questions: <3 = ndst, 3 = dst, 3.5 = dst+, 4 = db, 4.5 = db+, 5 = bdb) conducted at the end of the semester.
Laboratory: Credit on the basis of an oral or written answer on the content of each laboratory exercise performed, a report on each laboratory exercise as indicated by the instructor of laboratory exercises. In order to receive credit for the laboratories, all exercises must be passed (a passing grade on the answer and a passing grade on the report).

## Programme content

Issues related to the quality of bonded joints of elements used in the automotive industry, both in the area of the drive unit and in structural and body elements of vehicles, will be explained. The use of destructive and non-destructive testing methods will provide information on the quality of solid elements obtained by plastic processing, bonded and protective coated. Issues of defectoscopy and product control will be presented in the aspect of use for new elements - in order to determine production quality, and used elements - in order to determine operational durability and the possibility of further use. The subject matter will ultimately enable the recognition of production defects, welding and coating inconsistencies such as cracks, voids, shrinkage cavities, porosity, different materials inclusions, undercuts and lack of adhesion.

## Course topics

Lectures:
1.Destructive and non-destructive testing methods for automotive products.
2.Methods of defectoscopy and technical inspection of vehicle parts and propulsion engines.
3.Industrial radiography, ultrasonic defectoscopy, magnetic defectoscopy, penetration defectoscopy, eddy current methods: physical basis, methods and techniques of testing, detectability of defects and factors affecting it, advantages and limitations, apparatus, elements of the inspection process, application in the automotive industry.
4.Comparison and principles of selection of non-destructive inspection methods for automotive products.
Laboratories:
1.Ultrasonic defectoscope - construction and application.
2.Ultrasonic methods of defectoscopic testing and detectability of defects with their help.
3.Measurement of thickness of products by ultrasonic methods.
4.Visual examination of welded joints.
5.Interpretation of radiographs.
6.Inspection of products by methods of magnetic defectoscopy.
7.Testing the quality of welds by penetrant methods.

## Teaching methods

1. lecture: multimedia presentation, presentation illustrated by examples given on the blackboard.
2. laboratory exercises: practical exercises, performance of experiments, discussion and elaboration of results in the form of a report.

## Bibliography

Basic:
1. Badania nieniszczące. Podstawy defektoskopii, Lewińska-Romicka A., WNT, Warszawa, 2001

Additional:
1. World scientific literature resources like SCOPUS, Elsevier, etc. for the keywords or phrases - “automotive materials and connections testing methods”.
2. Wybrane metody badania materiałów, Senczyk D., Wyd. Politechniki Poznańskiej, Poznań, 1988

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 50 | 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) | 20 | 1,00 |