



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Modern high strength alloys [S2IMat1-MMiTS>NSoWW]

Course

Field of study

Materials Engineering

Year/Semester

1/2

Area of study (specialization)

Metal and Plastics Materials

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

15

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of materials science, physics, phase transformations and strength of materials. Logical thinking, self-learning, use of library and internet. Student is aware of the importance and understanding of non-technical aspects and results of engineering activities including its influence on the environment

Course objective

To teach students how to fulfil demands for properties of materials applied for products of high durability and reliability in extreme work conditions

Course-related learning outcomes

Knowledge:

student should know the factors influencing strength of alloy. student should know untypical high strength alloys

Skills:

student can select material which fulfils the high strength requirements. student can propose method of increase of strength properties of alloy

Social competences:

student knows how to cooperate and work in teams assuming various roles within student is aware of the importance of application of high strength alloys for modern constructions

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Lecture: oral examination

Laboratory: On the basis of a written or oral tests and written reports on the content of the program during exercises. In order to pass the exercises, a written tests and all papers must be counted as positive

Programme content

Knowing with the possibilities of modifying the structure and properties of materials used for products with high durability and reliability under extreme operating conditions (elevated temperature, reduced temperature, high load).

Course topics

Lecture:

Mechanisms and methods of strengthening of alloys. Alloys applied for different products e.g. in vehicles, airplanes, ships and ect. Alloys applied for work at low and at high temperatures. Creation of products properties by controlled thermomechanical and thermal treatment, quenching and tempering, controlled bainitic quenching.

Laboratory exercises:

1. Titanium and its alloys. 2. Nickel and its alloys. 3. Cobalt and its alloys. 4. Special constuctional steels. 5. Alloys strengthened with dispersion particles.

Teaching methods

Lecture: multimedia presentation.

Laboratory exercises: performing exercises, discussion, team work.

Bibliography

Basic

1. Van Vlack L.H. Elements of Materials Science and Engineering, Massachusetts, Adison Wesley Publishing Company 1989

2. Flinn R.A., Trojan P.K. Engineering Materials and Their Application, Houghton Mifflin Company 1990 Boston

Additional

1. Dobrzański L.A. Metallurgy and Materials Science Principles (in Polish) WNT Warszawa 1998

2. Blicharski M. Introduction to Materials Science (in Polish) WNT Warszawa 1998.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	35	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	1,00