

Title (-)	Code 1010401151010411258
Field EDUCATION IN TECHNOLOGY AND INFORMATICS	Year / Semester 3 / 5
Specialty -	Course elective
Hours Lectures: 2 Classes: - Laboratory: - Projects / seminars: -	Number of credits 5
	Language Polish

Lecturer:

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Status of the course in the study program:

Semester 3, year 2, the first level

Assumptions and objectives of the course:

In terms of knowledge to provide students with the knowledge specified by the program,
In terms of mastering the basics skills of high-vacuum generation techniques and methods for obtaining low temperatures, and the ability to design, operation and maintenance of vacuum measurement systems.
In terms of social skills, teamwork skills.

Contents of the course (course description):

-Lecture:
Fundamentals of kinetic theory of gases and thermodynamics
Terms of viscous and molecular
Viscous effects, effusion, diffusion and thermal conductivity of gases under reduced pressure
Description and mechanisms of gas flow
The physical and chemical processes occurring on the surface of the solid under reduced pressure: sorption, desorption and adsorption
Fundamentals of vacuum technology
The materials used in the technology of low pressure, vacuum systems combine elements
Vacuum system components and design principles and health in vacuum technology
Methods of obtaining a vacuum and its control
Distribution and operation of vacuum pumps
Pump Selection Criteria
Fundamentals of vacuum metrology
Distribution and operation of vacuum gauges
Mass Spectrometry
Leaks in vacuum systems and detection
Basics of cryogenics, the basic definitions
Getting low-temperature gas liquefaction
Liquid and gas properties of materials at low temperatures
The use of vacuum technology and cryogenics

Project:

Performing calculations in terms of thermodynamics, the properties of gas under vacuum conditions

Methods for measuring pressure, temperature, and determining pumping speed

Identification of the various applications of vacuum.

Analysis of the parameters available parts and components based on vacuum components catalogs.

Schematic representation of vacuum

Design of the vacuum system (in groups of two) conceptual design drawn by the students. The project is to design a system implementing individual design assumptions, including:

- Design of the vacuum chamber
- Selection of the pumping system and the measuring
- Selection of additional components such as windows, culverts

Presentation and discussion of completed projects

Introductory courses and the required pre-knowledge:

Knowledge:

Basic knowledge on physics, thermodynamics and chemistry, such as the definition of the gas, the types of gas particles, particle effects, the concept of an ideal gas, real gas, gas conversion, pressure definition

Skills: Making drawings, including support software, analytical skills, using the Internet to acquire the necessary information

Social skills: Ability to work in a group, active attitude to problem solving

Courses form and teaching methods:

Lectures supported by a multimedia presentations

Project: The realization of individual vacuum system project

Form and terms of complete the course - requirements and assessment methods:

Forming Score:

a) In terms of the project: on the basis of (1) the current implementation of design tricks and (2) assess the preparation for classes

b) In the lecture: on the basis of (1) answers to questions concerning the material discussed in the previous lectures

Summary score :

a) In terms of the project: on the basis of (1) the accuracy and the form of their project, (2) made ??a public presentation of the project, (3) discussions held both in their presentation and that of others

b) In the lecture: on the basis of a written exam, answers to questions scored on a scale 0-1, driving test after obtaining at least 55% of the points from the written test and the correct answers in the oral test. The exam can be applied after completing the course design, (2) discuss the results of the examination.

Basic Bibliography:

1. Catalogs and instruction manuals manufacturers of vacuum components
2. Vacuum Technology Know How aviable on website:
<http://www.pfeiffer-vacuum.com/downloads/container>, pdf file
3. Technika wysokiej próżni, J. Groszkowski, PWN, Warszawa, 1978
4. Technologia wysokiej próżni, A. Hałas, PWN, Warszawa, 1980
5. Experimental techniques in Low-Temperature Physics, G. K. White, P. J. Meeson, Clarendon Press, Oxford, 2002

Additional Bibliography:

1. 1. Urządzenia próżniowe, J. Groszkowski, WSiP, Warszawa, 1982
2. Matter and Methods at Low Temperatures, F. Pobell, Springer, Berlin, 1996