



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Heating and cooling devices [S2Trans1-TrD>UGiCh]

### Course

Field of study

Transport

Year/Semester

1/2

Area of study (specialization)

Road Transport

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

30

Laboratory classes

0

Other

0

Tutorials

15

Projects/seminars

0

### Number of credit points

4,00

### Coordinators

dr hab. inż. Krzysztof Bieńczak prof. PP  
krzysztof.bieniczak@put.poznan.pl

### Lecturers

### Prerequisites

**KNOWLEDGE:** Student has a general knowledge of the impact of technical facilities and technologies on the environment **SKILLS:** Student is able to define the threats to the environment that constitute a specific technological process implemented in the area of production and operation of food machines and refrigeration devices and to indicate ways of counteracting these threats. **SOCIAL COMPETENCES:** Work in the interdisciplinary team. Ability to lead a team and expand team knowledge.

### Course objective

Overview of the transport rules for products requiring controlled temperatures.

### Course-related learning outcomes

Knowledge:

Has ordered and theoretically founded general knowledge related to key issues in the field of transport engineering. Has advanced detailed knowledge of selected issues in the field of transport engineering.

Skills:

Is able to obtain information from literature, databases and other sources (in Polish and English),

integrate them, interpret and critically evaluate them, draw conclusions and formulate and exhaustively justify opinions. Is able to make a critical analysis of existing technical solutions and propose their improvements.

Social competences:

Student understands that in the field of transport engineering, knowledge and skills very quickly become obsolete.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lecture is verified on the basis of a written exam in the form of test. The skills acquired during the exercises are verified on the basis of a final test in the form of a written test.

### Programme content

Transport of food and dangerous products at controlled temperatures. Classification of vehicles for transport under controlled temperatures. Devices that ensure the cryptoclimate in the cargo space. Rules for the operation of devices responsible for the parameters of the cryptoclimate.

### Course topics

ATP agreement for the transport of perishable products. Temperature requirements in the transport of chilled and frozen food. Vehicle certification tests. Transport of hazardous materials of class 4.1 and 5.2. Design solutions of devices ensuring an appropriate crypto-climate in the body (refrigerating devices, compressor eutectic plates, cryogenic devices, heating and air-conditioning devices). Rules for operating heating and air-conditioning devices. Interaction of the vehicle-cargo system - cryptoclimate control devices. Temperature recording.

### Teaching methods

Information and problematic lecture with a multimedia presentation. Exercises - solving problems.

### Bibliography

Basic

1. Zwierzycki W., Bieńczak K., Pojazdy chłodnicze w transporcie żywności , Syntherm Poznań 2006
2. Kwaśniewski S., Pojazdy izotermiczne i chłodnicze, Navigator Wrocław 1997

Additional

1. B. Guziński, Chłodnictwo dla praktyków, Systherm Serwis, Poznań 2013

### Breakdown of average student's workload

	Hours	ECTS
Total workload	90	4,00
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)	45	2,00