



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Exploitation of Means of Transport and storage

### Course

Field of study

Year/Semester

Transport

3/5

Area of study (specialization)

Profile of study

Logistics of Transport

general academic

Level of study

Course offered in

First-cycle studies

polski

Form of study

Requirements

part-time

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

18

9

Tutorials

Projects/seminars

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Michał Libera

e-mail: [michal.libera@put.poznan.pl](mailto:michal.libera@put.poznan.pl)

tel. +4861 665-2223

Faculty of Civil and Transport Engineering

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

dr inż. Marcin Kiciński

e-mail: [marcin.kicinski@put.poznan.pl](mailto:marcin.kicinski@put.poznan.pl)

tel. +4861 665-21-29

Faculty of Civil and Transport Engineering

ul. Piotrowo 3, 60-965 Poznań

### Prerequisites

KNOWLEDGE: The student has a basic knowledge of the construction of means of transport and the principles of operation of their components.

SKILLS: The student is able to analyze and synthesize information, draw conclusions, formulate and justify opinions

SOCIAL COMPETENCES: The student is aware of the importance of rational use of means of transport in the technical, economic and ecological aspect.



### Course objective

The aim of the course is to develop the ability to formulate and solve problems related to the operation (both use and maintenance) of means of transport and storage.

### Course-related learning outcomes

#### Knowledge

has ordered, theoretically founded general knowledge of technology, transport systems and various means of transport

has basic knowledge of the life cycle of means of transport, both hardware and software, and in particular about the key processes taking place in them

#### Skills

can, when formulating and solving tasks in the field of transport, apply appropriately selected methods, including analytical, simulation or experimental methods

is able to make a critical analysis of the functioning of transport systems and other technical solutions and to evaluate these solutions, including: is able to effectively participate in the technical inspection and assess the transport task from the point of view of non-functional requirements, has the ability to systematically conduct functional tests

#### Social competences

understands that in technology, knowledge and skills very quickly become obsolete

is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of malfunctioning transport systems that have led to serious financial and social losses or to a serious loss of health and even life

can think and act in an entrepreneurial way, incl. finding commercial applications for the created system, bearing in mind not only the business benefits, but also the social benefits of the conducted activity

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written and oral exam. Reports from laboratory classes.

### Programme content

Operation as a phase of product existence. Quality of operation. Classification of operational processes. The terminology of the exploitation theory.

Criteria for selecting a means of transport for operating conditions.

Goals and stages of research carried out as part of the operation of means of transport and storage.



Analysis of weak links in means of transport. Destructive processes occurring in elements of means of transport. The phenomenon of friction. Forms of wear of elements of means of transport; measures of wear and wear resistance. Lubrication (hydrostatic, hydrodynamic and elastohydrodynamic).

Models of operation of means of transport and storage. Classification of models of technical objects operation processes. The praxeological model of the exploitation system (chain of use and servicing). Symbols of operational state, operational graphs.

Technological models of the organization of the use of means of transport and storage. Structural model of the use base. Measurements of the use process (quantitative characteristics) of means of transport.

Strategies for handling means of transport and storage. Classification of types of servicing of means of transport. Methods of determining the service life. Structural model of the means of transport service base. Models of service processes. Measures of the process of servicing means of transport. Support for selected systems of means of transport. Safety of means of transport and road users. Safety of transported loads. International legal regulations in the field of transport of hazardous materials (ADR). Operating factors influencing the safety of transport

Modeling of operational systems of means of transport. Operating costs. Criteria of operational efficiency. Planning of operational needs. Transport work. Adjusting the operating system to the needs of the use system. Determining the number of vehicles to be repaired. Planning of supplying the vehicle service system with spare parts

Case study. Analysis of real transport systems. Identification of the use model and maintenance strategy. Quantitative characteristics of the operational efficiency of fleets of transport companies (based on real data from transport companies)

Laboratory classes. Health and safety instructor. Replacement of operating fluids in means of transport. Operation of running gear, tires. Operation of ventilation and air conditioning systems in means of transport. Washing and maintenance of means of transport. Operation of brake systems. Operation of drive systems - dynamometer. Operation of suspension systems, geometry.

### Teaching methods

Informative and problematic lecture with multimedia presentation and didactic discussion. Practical classes as part of laboratory classes.

### Bibliography

Basic

1. Gronowicz J.: Eksploatacja techniczna i utrzymanie samochodów. Wydawnictwo Uczelniane Politechniki Szczecińskiej, Szczecin 1997
2. Hebda M.: Eksploatacja samochodów. Wydawnictwo Instytutu Technologii Eksploatacji, Radom 2005
3. Smalko Z.: Podstawy eksploatacji technicznej pojazdów. Warszawa, Wydawnictwo Politechniki Warszawskiej, 1987



4. Orzełowski S.: Naprawa i obsługa pojazdów samochodowych. Wyd. Szkolne i Pedagogiczne, W-wa, 1998
5. Rydzkowski W., Wojewódzka-Król K.: Transport. PWN. W-wa, 2002
6. Uzdowski M., Abramek K., Garczyński K.: Pojazdy samochodowe. Eksploatacja techniczna i naprawa. WKŁ. W-wa, 2003
7. Niziński S.: Diagnostyka samochodów osobowych i ciężarowych, Dom wydawniczy Bellona, Warszawa 1999r

Additional

1. Macha E.: Reliability of machines. Wydawnictwo Politechniki Opolskiej, Opole 2001
2. Oprządkiewicz J., Stolarski B.: Komputerowe monitorowanie niezawodności samochodów. PWN, W-wa Kraków, 2000
3. Gołąbek A.: Eksploatacja i niezawodność maszyn. Wrocław, Wyd. Politechniki Wrocławskiej, 1988
4. Niziński S.: Eksploatacja obiektów technicznych. Wyd. ITeE, Radom, 2002
5. Moubray J.: Reliability centered maintenance, Industrial Press Inc, 2000
6. Kumar U.D., Crocer J., Knezewic J., El-Haram M.: Reliability, Maintenance and Logistic Support, Kluwert Academic Publishers, 2000
7. O'Connor P.D.T., Newton D., Bromley R.: Practical Reliability Engineering, John Willey and Sons, LTD, 2001

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	90	4,0
Classes requiring direct contact with the teacher	27	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	63	3,0

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