



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Exploitation and consumables

### Course

Field of study

Year/Semester

Construction and Exploitation of Means of Transport

3/5

Area of study (specialization)

Profile of study

Motor Vehicles

general academic

Level of study

Course offered in

First-cycle studies

Polish

Form of study

Requirements

full-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

15

15

Tutorials

Projects/seminars

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Lądowej i Transportu

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

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### Prerequisites

KNOWLEDGE: The student has a basic knowledge of the construction of motor vehicles 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 motor vehicles in the technical, economic and ecological aspect.

### Course objective

The aim of the course is to acquire basic skills of formulating and solving problems of car operation.



### Course-related learning outcomes

#### Knowledge

has knowledge of the basic processes taking place in the life cycle of devices, facilities and technical systems

#### Skills

is able to use the experience gained in the environment dealing with professional engineering activities related to the maintenance of devices, facilities and systems typical for the field of study

#### Social competences

Is ready to recognize the importance of knowledge in solving cognitive and practical problems and consult experts in the event of difficulties in solving the problem on its own

Is willing to think and act in an entrepreneurial manner

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written and oral test. Activity during classes and the implementation of a simple design task. Reports from laboratory classes.

### Programme content

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

Operational requirements for means of transport.

Problem groups in the theory of exploitation of means of transport.

Operational states. Airworthiness and unfitness condition, damage. Service life until failure and between failures. Limit state, durability. State assessment criteria. Typical courses of changes in technical condition. Statistical description of changes in technical condition. Analysis of operational data about mileage to failure and between failures. Analysis of the types, causes and effects of unfitness.

Operating factors influencing the condition of the vehicle. Road conditions. Driving conditions. Transport conditions. Climatic and natural conditions. Seasonal conditions. The role of man in vehicle operation

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

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

Strategies for servicing means of transport. 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.



Criteria for the efficiency of car operation. Determining the number of vehicles necessary to perform a specific transport work. 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 exercises on consumables. Shear resistance of lubricating oils - kinematic viscosity. Examination of lubricating properties of oils. Measurement of the penetration of plastic lubricants. Determination of water content and solid impurities in oils. Measurement of burning and solidification temperatures of lubricating oils. Determination of viscosity-temperature characteristics of oil with a rotational viscometer - dynamic viscosity

### Teaching methods

Informative and problematic lecture with multimedia presentation and didactic discussion. 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
8. Hebda M., Wachal A., Trybologia. WNT, Warszawa 1980.
9. Szczerek M., Wiśniewski M., Tribologia – Trybotechnika. 9 PTT, ITE, SiTMP, Radom 2000.
10. Zwierzycki W., Oleje i smary przemysłowe. ITE, Radom 1999.



Additional

1. Macha E.: Reliability of machines. Wydawnictwo Politechniki Opolskiej, Opole 2001
2. Oprzędkiewicz J., Stolarski B.: Komputerowe monitorowanie niezawodności samochodów. PWN, Warszawa 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	60	3,0
Classes requiring direct contact with the teacher	30	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	30	1,0

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