



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Modeling of exploitation systems

Course

Field of study

Year/Semester

Transport

1/2

Area of study (specialization)

Profile of study

Road transport

general academic

Level of study

Course offered in

Second-cycle studies

polish

Form of study

Requirements

part-time

elective

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

9

9

0

Tutorials

Projects/seminars

9

0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

PhD (Eng) Jerzy Kupiec

Responsible for the course/lecturer:

PhD (Eng) Michał Libera

Piotrowo Street, 3

Piotrowo Street, 3

60 – 965 Poznan, Poland

60 – 965 Poznan, Poland

Ph: + 48 61 665 2709

Ph: + 48 61 665 2223

E-mail: jerzy.kupiec@put.poznan.pl

E-mail: michal.libera@put.poznan.pl

Prerequisites

Construction, maintenance and repair techniques, diagnostics of motor vehicles (technical facilities);

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

The student is aware of the importance of rational car operation in terms of technical, economic and ecological aspects.

Course objective

Introduction to the issues of reliability-oriented maintenance, i.e. a systematic approach to the selection of effective and technically feasible maintenance tasks and modeling of selected operating systems.



Course-related learning outcomes

Knowledge

1. Has advanced and in-depth knowledge of transport engineering, theoretical foundations, tools and means used to solve simple engineering problems.
2. Has advanced and detailed knowledge of the processes taking place in the life cycle of transport systems.

Skills

1. Can plan and carry out experiments, including measurements and simulations, interpret the obtained results and draw conclusions as well as formulate and verify hypotheses related to complex engineering problems and simple research problems.
2. Can use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems.

Social competences

1. Understands that knowledge and skills very quickly become obsolete in the field of transport engineering.
2. Understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Assessment on the basis of a written exam carried out during the examination session, completed laboratory classes (reports + tests) and a project carried out as part of the exercises.

Programme content

The scope of the lecture covers the following issues:

- Operation system - definition, construction
- Statistical basics of selecting the operating strategy (Weibul, Gumbel)
- Reliability Focused Operation (RCM)
- Methods of analysis of the causes of failure and selection of the operating strategy
- Analysis of threats and risks resulting from device damage and human errors - using the method of event trees (ETA).
- Analysis of the causes of each functional failure by FTA method,
- Application of RCM methods and procedures to operate selected vehicle systems.



As part of the exercises, students use the FTA method and statistical methods of selecting the operating strategy on the examples of basic vehicle systems.

As part of the laboratory classes, they confront the created models with a real object.

Teaching methods

1. Lecture with a multimedia presentation - a combination of an informative and problem lecture.
2. Classes - practical application of the FTA method - design method
3. Laboratory - confrontation of the created models with real objects - the method of the experiment

Bibliography

Basic

1. Kupiec J., Wróblewski P.: Diagnostowanie podzespołów i zespołów pojazdów samochodowych, WKiŁ, Warszawa 2015r
2. Szopa T.: Niezawodność i bezpieczeństwo, Oficyna wydawnicza Politechniki Warszawskiej, Warszawa 2009r.
3. PN-JEC 300-3-1, PN-EN 60300-2, PN-JEC 60300-3-9: - Zarządzanie niezawodnością.
4. PN-JEC 706-1 (do 5): - Przewodnik dotyczący obsługiwalności urządzeń.
5. PN-JEC 812: Procedura analizy rodzajów i skutków uszkodzeń (FMEA, FMECA).
6. PN-JEC 1025: - Analiza drzew niezdatności.
7. PN-JEC 1078: - Metoda schematów blokowych niezawodności.

Additional

Breakdown of average student's workload

	Hours	ECTS
Total workload	72	4,0
Classes requiring direct contact with the teacher	27	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	45	2,0

¹ delete or add other activities as appropriate