



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Reliability and safety of technical objects [S1Lot1-BTL>NiBOT]

Course

Field of study

Aviation

Year/Semester

2/4

Area of study (specialization)

Air Transport Safety

Profile of study

general academic

Level of study

first-cycle

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

30

Projects/seminars

0

Number of credit points

4,00

Coordinators

dr hab. inż. Adrian Gill
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Lecturers

Prerequisites

KNOWLEDGE: knows the construction of basic types of technical objects and knows the general principles of their operation. The student has basic knowledge of probability and mathematical statistics **SKILLS:** The student is able to apply basic models in the field of probability and mathematical statistics. **SOCIAL COMPETENCES:** The student understands that the further from the construction phase of technical objects their high unreliability is noticed, the more expensive it is. The student realizes that the costs of repairing technical objects are usually a small part of the losses caused by their damage. The student is able to manage the time available to perform the tasks indicated.

Course objective

Getting to know the elementary methods, procedures, models and characteristics in the field of reliability issues of technical objects and acquiring the skills of their application.

Course-related learning outcomes

none

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written test from the lecture and practical part of the course.

Programme content

Formal and meritorical introduction to the subject (program, hourly structure, literature, the way to pass the classes, introduction to the reliability of technical facilities). Technical objects as subjects of reliability assessments. Non-renewable and renovated objects. Object failure. Reliability tests of technical objects. Life models of non-renewable and renewed objects. Reliability of non-renewable objects: probabilistic and statistical reliability characteristics. Selected elements of structural reliability. Classification of reliability structures; simple and complex structures. Fault tree analysis. Reliability control of systems with simple structures. Reliability model of operation of technical objects with non-zero renewal time. Multi-state models of exploitation of technical objects. Availability function and coefficient Estimating the time an object stays in exponential states. The concept of ensuring the safety of technical facilities. Methods of hazard risk analysis at the stage of designing technical objects. Exercises in the application of methods, processes, procedures and models related to the reliability and safety of technical objects.

Teaching methods

1. Lecture with multimedia presentation.
2. Exercises - solving tasks.

Bibliography

Basic:

1. Inżynieria niezawodności, Por. pod red. J. Migdalskiego, Wyd. ATR Bydgoszcz i Ośr. Badań Jakości Wyr. "ZETOM", Warszawa, 1992.
2. Kadziński A., Niezawodność obiektów technicznych. E-skrypt Politechniki Poznańskiej, Poznań, 2012.
3. Karpiński J., Korczak E., Metody oceny niezawodności dwustanowych systemów technicznych. Wyd. Omnitech Press, Instytut Badań Systemowych, Warszawa, 1990.
4. Augustyn, E., Kadziński, A., Gill, A. Safety systems components in air task domain of Tactical Aircraft Operating System. Transportation Research Procedia, Elsevier B.V. 2019. Vol. 40. P. 1238–43. <https://doi.org/10.1016/j.trpro.2019.07.172>.
6. Żółtowski J., Wybrane zagadnienia z podstaw konstrukcji i niezawodności maszyn. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2004.
7. Lewitowicz, J. Podstawy eksploatacji statków powietrznych. Wydawnictwo Instytutu Technicznego Wojsk Lotniczych, Warszawa. 2007.
8. Szymanek A., Bezpieczeństwo i ryzyko w technice. Wyd. Politechniki Radomskiej, Radom 2006.

Additional:

1. Bobrowski D., Modele i metody matematyczne teorii niezawodności w przykładach i zadaniach, WNT, Warszawa, 1985.
5. Niezawodność i eksploatacja systemów. Pod redakcją Wojciecha Zamojskiego. Wyd. Politechniki Wrocławskiej, Wrocław 1981.
6. Radkowski S., Podstawy bezpiecznej techniki. Oficyna Wyd. Politechniki Warszawskiej, Warszawa 2003.
7. Słowiński B., Podstawy badań i oceny niezawodności obiektów technicznych. Wyd. Uczelniane Wyższej Szkoły Inżynierskiej w Koszalinie, Koszalin 1992.
8. Kadziński, A. Studium wybranych aspektów niezawodności systemów oraz obiektów pojazdów szynowych [Study on selected dependability aspects of systems and rail vehicles objects]. Wydawnictwo Politechniki Poznańskiej, Poznań. 2013.
9. Gill, A. Warstwowe modele systemów bezpieczeństwa do zastosowań w transporcie szynowym [Layered models of safety systems for rail transport applications]. Wydawnictwo Politechniki Poznańskiej, Poznań. 2018.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,50