COURSE DESCRIPTION CARD - SYLLABUS

Course name
Reliability of technical objects

Course

Field of study
Aerospace Engineering
Area of study (specialization)
–
Level of study
First-cycle studies
Form of study
full-time

Year/Semester
2/3
Profile of study
general academic
Course offered in
polish
Requirements
compulsory

Number of hours

Lecture
30
Laboratory classes
0
Other (e.g. online)
0
Tutorials
15
Projects/seminars
0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

Knowledge:
The student 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 use the basic models in the field of probability and mathematical statistics.
The student is fluent in a suite of computer office programs.

Social competences:
The student understands that the further from the phase of constructing technical objects their high unreliability is noticed, the more expensive it is.
The student is aware that the costs of repairing technical objects usually constitute a small part of the losses caused by their damage.
The student knows how to manage the time available to perform the tasks indicated for the implementation.

Course objective

Learning elementary methods, procedures, models and characteristics in the field of reliability issues of technical objects and acquiring the ability to apply them

Course-related learning outcomes

Knowledge

1. has a structured, theoretically founded general knowledge covering key issues in the field of flight safety and risk assessment

Skills

1. is able to obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions

Social competences

1. understands the need for lifelong learning; can inspire and organize the learning process of other people
2. is ready to critically evaluate his knowledge and received content, recognize the importance of knowledge in solving cognitive and practical problems and consult experts in the event of difficulties with solving the problem on his own

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Assessment of knowledge and skills on a written or oral exam based on the explanation of selected issues

Tutorials: assessing the solutions to tasks in the exercises, final test

Programme content

Introduction to the subject matter. Program, hour structure, literature, course of credit. Technical facilities as subjects of reliability assessment. Objects not renewed and renewed. Object damage. Reliability tests of technical facilities. Life models of non-renewed and renovated objects. Reliability of non-renewable facilities? probabilistic reliability characteristics. Reliability of non-renewable facilities? statistical reliability characteristics. Selected elements of structural reliability. Classification of reliability structures - simple and complex structures. Simple structures: serial, parallel, series-parallel, parallel-

serial. General formula for reliability. Complex structures: bridge, threshold. Tree of disability. Reliability control of systems with specific reliability structures. Reliable model of operation of technical facilities with non-zero renovation time. Two-state model of operation of technical objects. Markov processes. Standby and non-standby function. Readiness and non-availability ratio. Time spent in exponential states. Markov multi-state models of technical facilities operation. Repertoire of reliability characteristics of non-renovated and renewed technical facilities. Exercises in applying methods, processes, procedures and models related to the reliability of technical objects.

Teaching methods

Information lecture (conventional), information transfer in a structured way
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, 2018, niepublikowany, przekazywany na pierwszym wykładzie.
3. Karpiński J., Korczak E., Metody oceny niezawodności dwustanowych systemów technicznych. Wyd. Omnitech Press, Instytut Badań Systemowych, Warszawa, 1990.
4. Migdalski J., Podstawy strukturalnej teorii niezawodności. Skrypt Politechniki Świętokrzyskiej, Kielce, 1978.
5. Poradnik niezawodności. Podstawy matematyczne, Wydawnictwa Przemysłu Maszynowego ?WEMA?, Warszawa 1982.
6. Żółtowski J., Wybrane zagadnienia z podstaw konstrukcji i niezawodności maszyn. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2004.

Additional

1. Bobrowski D., Modele i metody matematyczne teorii niezawodności w przykładach i zadaniach, WNT, Warszawa, 1985.
2. Jaźwiński J., Ważyńska-Fiok K., Niezawodność systemów technicznych. Wyd. Naukowe PWN, Warszawa 1990.
3. Kadziński A., Niezawodność pojazdów szynowych. Ćwiczenia laboratoryjne, Wyd. Politechniki Poznańskiej, Poznań 1992.
4. Niezawodność i eksploatacja systemów. Pod redakcją Wojciecha Zamojskiego. Wyd. Politechniki Wrocławskiej, Wrocław 1981
5. Radkowski S., Podstawy bezpiecznej techniki. Oficyna Wyd. Politechniki Warszawskiej, Warszawa 2003.
6. Słowiński B., Podstawy badań i oceny niezawodności obiektów technicznych. Wyd. Uczelniane Wyższej Szkoły Inżynierskiej w Koszalinie, Koszalin 1992.
7. Żółtowski J., Podstawy niezawodności maszyn. Wyd. Politechniki Warszawskiej, Warszawa 1985.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for tutorials, preparation for tests) [1]	30	1,0

1 delete or add other activities as appropriate