



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Systems reliability

Course

Field of study

Aviation

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

Number of credit points

2

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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Wydział Inżynierii Lądowej i Transportu

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Prerequisites

The student starting this course understands the concept of the system. Has basic knowledge

from the theory of probability and mathematical statistics. The student has basic knowledge of the field

reliability of technical facilities. The student is able to use basic models in the field of probability and mathematical statistics. The student is able to use elementary reliability models of technical objects.

The student understands and accepts the necessity of introducing to social and industrial systems and transport restrictions, which most often lead to an improvement in the functioning of these systems.



Course objective

Learning elementary and advanced methods, processes, procedures and models in the field

issues of reliability and safety of systems and the acquisition of the ability to use them.

Course-related learning outcomes

Knowledge

1. has extended knowledge in the field of material strength, including the theory of elasticity and plasticity, stress hypotheses, methods of calculating beams, membranes, shafts, joints and other structural elements, as well as methods of testing the strength of materials and the state of deformation and stress in structures, and has basic knowledge of the main departments of technical mechanics: statics, kinematics and dynamics of a material point and a rigid body

2. has detailed knowledge related to selected issues in the field of construction of aircraft propulsion systems and the design of their components

Skills

1. is able to obtain information from various sources, including literature and databases, both in Polish and in English, integrate them properly, interpret and critically evaluate them, draw conclusions and exhaustively justify their opinions

2. is able to properly use information and communication techniques, applicable at various stages of the implementation of aviation projects

3. when formulating and solving tasks related to civil aviation, is able to apply appropriately selected methods, including analytical, simulation or experimental methods

Social competences

1. is aware of the importance of knowledge in solving engineering problems and knows examples and understands the causes of faulty engineering projects that have led to serious financial and social losses, or to a serious loss of health and even life

2. is aware of the social role of a technical university graduate, in particular understands the need to formulate and provide the society, in an appropriate form, with information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the engineer profession

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: on the basis of a written test.

Classes: based on the evaluation of the developed exercise reports.

Programme content

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 objects



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 states of the exponential type. Markov multi-state models of technical facilities operation. Repertoire of reliability characteristics of non-renewed and renewed technical facilities. Exercises in applying methods, processes, procedures and models related to the reliability of technical objects. Sora as an element of the reliability system. Functional safety.

Teaching methods

Informative (conventional) lecture (providing information in a structured way) - may be of a course (introductory) or monographic (specialist) character

The exercise and projekt method (subject exercises, practice exercises) - in the form of auditorium exercises

(application of acquired knowledge in practice - may take various forms: solving cognitive tasks or training psychomotor skills; transforming a conscious activity into a habit through repetition

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, 2019, niepublikowany.
3. Kadziński A., Niezawodność i bezpieczeństwo systemów. E-skrypt Politechniki Poznańskiej, Poznań, 2019, niepublikowane.
4. Kadziński A., Studium wybranych aspektów niezawodności systemów oraz obiektów pojazdów szynowych. Seria rozprawy, nr 511, Wyd. Politechniki Poznańskiej. Poznań, 2013.
5. Karpiński J., Korczak E., Metody oceny niezawodności dwustanowych systemów technicznych. Wyd. Omnitech Press, Instytut Badań Systemowych, Warszawa, 1990.
6. NPOIK – tekst jednolity, Rządowe Centrum Bezpieczeństwa, 2015.
7. Nuclear Security Series, Risk Informed Approach for Nuclear Security Measures for Nuclear and other Radioactive Material out of Regulatory Control, IAEA, 2015



Additional

11. Gill A., Warstwowe modele systemów bezpieczeństwa do zastosowań w transporcie szynowym.

Wyd. Politechniki Poznańskiej, Poznań 2018.

2. Gucma L., Wytyczne do zarządzania ryzykiem morskim. Wyd. Naukowe Akademii Morskiej, Szczecin, 2009.

3. Jamroz K., Metoda zarządzania ryzykiem w inżynierii drogowej. Wyd. Politechniki Gdańskiej, Gdańsk, 2011.

4. Kaczmarek T.T., Ryzyko i zarządzanie ryzykiem. Ujęcie interdyscyplinarne. Wyd. Difin, Warszawa, 2006.

5. Klich E., Bezpieczeństwo lotów. Wydawnictwo Naukowe Instytutu Technologii Eksploatacji – PIB, Radom, 2011.

6. Markowski A.S. (red.), Zapobieganie stratom w przemyśle, część 3, Zarządzanie bezpieczeństwem procesowym, Wyd. Politechniki Łódzkiej, Łódź, 2000.

7. Migdalski J., Podstawy strukturalnej teorii niezawodności. Skrypt Politechniki Świętokrzyskiej, Kielce, 1978.

8. Poradnik niezawodności. Podstawy matematyczne. Wyd. Przemysłu Maszynowego „WEMA”, Warszawa, 1982.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	35	1,5
Student's own work (literature studies, preparation for classes, preparation for tests,) ¹	15	0,5

¹ delete or add other activities as appropriate