COURSE DESCRIPTION CARD - SYLLABUS

Course name

SYSTEM RELIABILITY AND SAFETY

Course

Field of study

Transport

Year/Semester

1/2

Area of study (specialization)

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Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

18

Laboratory classes

Other (e.g. online)

Tutorials

9

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Lądowej i Transportu

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Responsible for the course/lecturer:

Prerequisites

Student understands the notion of a system. Student has basic knowledge in probability calculus and mathematical statistics. Student has basic knowledge relating to reliability of technical facilities.

Student can use basic models relating to probability calculus and mathematical statistics. Student can apply elementary reliability models of technical facilities. Student has fluent skills in computer office software.

Student understands and accepts that it is necessary to introduce appropriate social, industrial and transport system limitations that improve functioning of the systems. Student can manage his/her own time dedicated to performance of indicated tasks.

Course objective

Learning about elementary and advanced methods, processes, procedures and models relating to problems of reliability and safety of systems and learning the skills to apply them.

Course-related learning outcomes

Knowledge

Student has ordered and theoretically founded general knowledge related to key issues in the field of transport engineering

Student has advanced detailed knowledge of selected issues in the field of transport engineering

Student knows advanced methods, techniques and tools used in solving complex engineering tasks and conducting research in a selected area of transport

Skills

Student is able to use information and communication techniques used in the implementation of projects in the field of transport

Student is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems

Student is able to assess the usefulness and the possibility of using new achievements (methods and tools) and new products of transport technology

Student is able to make a critical analysis of existing technical solutions and propose their improvements (improvements)

Social competences

Student understands that in the field of transport engineering, knowledge and skills very quickly become obsolete

Student 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:

Lecture: a written examination.

Practical classes: credit based on written tests.

Programme content

Technical facilities and their systems as objects of reliability assessments. A repertory of elementary reliability models of facilities and systems. Prognostic models of damage and replacements of non-renewable transport facilities. Advanced elements of structural reliability. A general formula of reliability and its application for determination of reliability of systems with simple and complex reliability structures. Reliability models of renewed facilities with zero time of renewal. Estimating a demand for

spare parts for transport systems. A policy of renewal of resources of spare parts in transport systems. Reliability of transport means dedicated to realization of random quantities of transport tasks according to the cost and reliability-cost criteria. Optimization of the quantity of transport means in systems dedicated to realization of transport tasks. Simulation modeling in reliability assessments of transport means systems. Practice in the application of methods, processes, procedures and models connected with reliability of systems.

Safety management systems in transport systems. Risk management as a tool of safety policy in safety management systems in transport – the TRANS-RISK method. The integrated method of hazard risk management in transport. Identification of hazards in transport. Estimating and valuation of the risk of hazards. Conduct under a risk of hazards – safety systems. Implementations of elements of the TRANS-RISK method for risk management in the transport sector. Problems of risk management in corporations. The notion, legal conditions, risk assessments and responses to a workstation risk of hazards. The Machine Directive problems – purpose and basic principles. Summary of system safety problems. Practice in application of methods, processes, procedures and models connected with system safety.

Teaching methods

Lecture: with the use of multimedia presentations and computer applications.

Exercises: electronic presentations in the stages of formulating problems to be solved and presenting the final results, solving fragments of problems on the board by the teacher and / or students.

Bibliography

Basic

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2. Kadziński A., Niezawodność obiektów technicznych. E-skrypt Politechniki Poznańskiej, Poznań, 2019, niepublikowany.

3. KadzińskiA., 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.

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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

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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	70	3,0
Classes requiring direct contact with the teacher	27	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	43	1,5

[1] delete or add other activities as appropriate