COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of Technical Diagnostics

Course

Field of study

Aviation

Year/Semester

3/5

Area of study (specialization)

Unmanned aircraft

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Grzegorz Szymański prof. PP

email: grzegorz.m.szymanski@put.poznan.pl

tel. (061) 665 22 67

ul. Piotrowo 3; 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Knowledge: Basic knowledge of mechanical quantity measurement and modeling techniques.

Skills: Is able to analyze the interdependencies between the effects and causes of phenomena and events resulting from the laws of physics.

Social competences: Prepared for teamwork.

Course objective

To know theoretical problems of technical diagnostics of means of transport and methods and ways of solving problems of their technical condition assessment and prognosis.

Course-related learning outcomes

Knowledge

has a well ordered and theoretically grounded general knowledge of technology and a variety of means of air transport, of the life cycle of means of transport, both hardware and software, and in particular of the key processes occurring in them

has a structured and theoretically well-founded general knowledge in the field of key issues of technology and a detailed knowledge of selected issues concerning air transport, knows the basic techniques, methods and tools used in the process of solving tasks associated with air transport, mainly of engineering nature

Skills

is able to properly plan and perform experiments, including measurements and computer simulations, interpret the results obtained, and draw appropriate conclusions

are able to formulate and solve tasks related to civil aviation, apply suitably selected methods, including analytical, simulation or experimental methods

is able to analyze technical objects and solutions, is able to search in catalogs and manufacturers' websites for ready components of machines and equipment, including means and devices, and assess their usability for own technical and organizational projects

Social competences

understands that in engineering, knowledge and skills become obsolete very quickly

is aware of the importance of knowledge in solving engineering problems and knows the examples and understands the reasons of malfunctioning engineering projects that led to serious financial, social or health or even life losses

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

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified by a 45-minute colloquium held during the 7th lecture. Colloquium consists of questions (test and open), variously scored. Pass mark: 50% of the points.

Laboratory skills are verified on the basis of the test colloquium, consisting of a variety of tasks depending on their difficulty level. Pass mark: 50% of the points.

Programme content

Concept of the term diagnostics, diagnostics as a measurement method, conditions for diagnosing technical objects. Essence of technical diagnostics, tasks and objectives of technical diagnostics. Concept of entropy in diagnostics, properties of entropy, relative entropy. Phases of object existence, diagnostics in particular phases of object existence. Diagnostics in vehicle operation system, diagnostics in use and

service subsystem. Diagnostic system. Diagnosis object analysis, diagnostic models (determined and undetermined), set of object condition characteristics, set of output parameters (working and accompanying). Object structure vs. diagnostic signal, notion of structure, structure parameters describing object condition. Conditions which must be met by output parameter to be considered as diagnostic parameter. Diagnostic parameters and their division. Symptoms of technical condition. Concept of limit and acceptable value of symptoms, methods of estimating limit values. Classification of technical states of an object, two, three and four state classification. Classification of state diagnostic parameters, general and specific parameters. Diagnostic methods, information synthesis method, information analysis method. Methods of diagnosing vehicles, instrumental and non-instrumental methods. Scope of activity of technical diagnostics, diagnosis of current state, supervision of object state, genesis of existing (past) states, prediction of future states. Diagnostic experiments, passive experiment, active experiment, active-passive experiment, passive-unreliable experiment. Diagnostic susceptibility of vehicles. Effectiveness of using diagnostics in vehicle operation. Methodology of diagnostic tests.

Teaching methods

1. Lecture: multimedia presentation, illustrated by examples given on the blackboard.

2. Laboratory exercises: multimedia presentation illustrated by examples given on the blackboard and performing the tasks given by the instructor - practical exercises

Bibliography

Basic

1. Bukowski J., Łucjanek W., Napęd śmigłowy. Teoria i konstrukcja, Wyd. MON, Warszawa 1986r

2. Mysłowski J., Doładowanie silników, Wyd. Komunikacji i Łączności, Warszawa 2006r

3. Niziński S. Michalski R.: Diagnostyka obiektów technicznych. Monograficzna seria wydawnicza Biblioteka Problemów Eksploatacji, Warszawa - Sulejówek - Olsztyn - Radom, 2002.

4. B. Żółtowski: Podstawy diagnostyki maszyn. Wydawnictwo. Uczelniane Akademii Techniczno-Rolniczej w Bydgoszczy, Bydgoszcz 1996.

5. C. Cempel, F. Tomaszewski: Diagnostyka Maszyn. Zasady ogólne, przykłady zastosowań. M.C.N.E.M.T, Radom 1992

Additional

1. R.B. Randall: Vibration based condition monitoring, Wiley, 2011

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for classes, preparation for tests,) [1]	55	2,0

[1] delete or add other activities as appropriate