COURSE DESCRIPTION CARD - SYLLABUS

Course name

Introduction to automation

Course

Field of study

Aviation

Year/Semester

2/4

Area of study (specialization)

Aircraft engines and airframes

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

30

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Andrzej Kwapisz

email: andrzej.kwapisz@put.poznan.pl

tel. 61 6652559

Zakład Sieci i Automatyki Elektroenergetycznej

Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Course objective

Getting to know the principles of operation, purpose and service of currently used industrial automatic control devices, with particular emphasis on the automation and control systems used in aircraft. Acquisition of skills in using computer control systems.

Course-related learning outcomes

Knowledge

1. has ordered and theoretically founded general knowledge in the field of key technical issues and

detailed knowledge of selected issues related to air transport, knows the basic techniques, methods and tools used in the process of solving tasks related to air transport, mainly of an engineering nature

2. has a basic knowledge of the mechanisms and laws governing human behavior and psyche

Skills

1. is able to obtain information from various sources, including literature and databases, both in Polish and in English, integrate them properly, interpret them and make a critical evaluation, draw conclusions and exhaustively justify the opinions they formulate

2. student can use theoretical probability distributions. Student is able to analyze and interpret statistical data. Student is able to use the methods and tools of mathematical statistics in engineering practice

3. can analyze objects and technical solutions, can search in catalogs and on manufacturers' websites, ready components of machines and devices, including means and devices, assess their suitability for use in their own technical and organizational projects

4. is able to organize, cooperate and work in a group, assuming various roles in it, and is able to properly define priorities for the implementation of a task set by himself or others

5. is able to plan and implement the process of own permanent learning and knows the possibilities of further education (2nd and 3rd degree studies, postgraduate studies, courses and exams conducted by universities, companies and professional organizations)

Social competences

1. understands that in technology, knowledge and skills very quickly become obsolete

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:

Exam in the form of a written exam.

Programme content

Introduction to automation. Basic concepts of automation. Types of control. Types of automation systems. Mathematical model of a dynamic system. Transmittance of a dynamic linear system. Characteristics of linear systems in time and frequency domain. The concept of dynamic system state. The method of state variables. Dynamic object equations: state equation and output equation. Matrix of transmittance. Steerability and observability. Model of the regulation system. Regulator signals. Properties of automatic control systems. Static and astatic regulation system. Adjustment indicators. Regulation stability. Rules for selecting regulators.

PART - 66 (THEORY - 22.5 hours, PRACTICE - 22.5 hours)

MODULE 5. ELECTRONIC INSTRUMENT SYSTEMS, DIGITAL TECHNIQUES

5.1 Electronic instrument systems

Typical system layout and cockpit layout of electronic instrument systems [2]

5.2 Numbering systems

Numbering systems: binary, octal and hexadecimal;

Demonstrate conversions between decimal and binary, octal and hexadecimal, and vice versa. [-]

5.3 Data Conversion

Analog data, digital data;

Operation and application of analog to decimal, decimal to analog converters, inputs and outputs, restrictions of various types. [-]

5.4 Data bus

Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.

Aircraft network / Eternet [-]

5.5 Logic circuits

a) Identifying commonly used symbols of gates, tables and peer circuits;

Applications used in aircraft systems, schematic diagrams. [-]

b) Interpretation of logical diagrams. [-]

5.6 Basic computer structure

a) Computer technology (including bits, bytes, software, hardware, central processing unit (CPU), integrated circuits (IC) and various memory tools such as RAM, ROM, PROM);

Computer technology (used in aircraft systems). [-]

b) Computer related terminology;

Operation, layout and interface of the main components of a microcomputer and their associated bus systems;

Information contained in the words of single and multi-address orders;

Terms relating to memory;

Operation of typical memory devices;

Operation, advantages and disadvantages of various data archiving systems. [-]

Teaching methods

Lecture in the form of a presentation

Laboratory classes in the form of solving thematic problems

Bibliography

Basic

1. Pawlak W.I., Wiklik K., Morawski J.M., Synteza i badanie układów sterowania lotniczych silników turbinowych metodami symulacji komputerowej, Wyd. Biblioteka Naukowa Instytutu Lotnictwa, Warszawa, 1996 r

2. Bodner W. A., Automatyka silników lotniczych. Wyd. MON, Warszawa, 1958 r

3. Balicki W., Szczeciński S., Diagnozowanie lotniczych silników turbinowych, Wyd. Biblioteka Naukowa Instytutu Lotnictwa, Warszawa, 2001 r

4. H. Orłowski - Komputerowe układy automatyki, WNT, Warszawa, 1987

Additional

1. Staniszewski R. Sterowanie zespołów napędowych, Wyd. Komunikacji i Łączności Warszawa, 1980 r

2. Niederliński - Systemy komputerowe automatyki przemysłowej, t. 1 i 2, WNT, Warszawa, 1984

3. Elementy, urządzenia i układy automatyki , Kostro Jerzy, WsiP, Warszawa, 2008

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 laboratory classes, preparation for tests) [1]	30	1,0

[1] delete or add other activities as appropriate