COURSE DESCRIPTION CARD - SYLLABUS

Course name
Introduction to automation

Course

Field of study
Aerospace Engineering

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
30

Laboratory classes
30

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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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

Has knowledge of selected branches of general physics including thermodynamics, electricity and magnetism, optics, photonics and acoustics, as well as solid state physics.

Has basic knowledge in metrology, knows and understands the methods of measuring electrical and non-electrical quantities.

Has structured and theoretically founded knowledge of the principles of operation of basic electronic, analog and digital components, selected electronic systems and systems.

Skills

Is able to obtain information from literature, databases and other sources; has self-study skills to improve and update professional competences.

Is able to develop documentation and present presentation of results regarding the implementation of an engineering task.

He speaks English at B2 level sufficient to communicate, as well as reading comprehension catalog cards, application notes, device manuals.

Social competences

Is aware of the need for a professional approach to technical issues, meticulous familiarization with the documentation and environmental conditions in which the devices and their elements can function, compliance with the principles of professional ethics and respect for the diversity of views and cultures

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	100	4
Classes requiring direct contact with the teacher	65	2,6
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) [1]	35	1,4

[1] delete or add other activities as appropriate