

Aircraft Engines II

Code: MK3REH2J03JL20-EN

ECTS Credit Points: 3

Evaluation: exam

Semester: 6th semester

Its prerequisite(s): Aircraft Engines I

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+0

Topics:

Control systems of gas turbine engines (turbojet and turbofan): hydraulic, hydro mechanical, hybrid and full authority digital electronic systems (FADEC). Details of FADEC system operation, components, functions, status monitoring.

Engine auxiliary equipment, their drives. Starting and ignition systems. Lubrication system. Construction of the fuel system and its relationship with regulation. Air systems of engines, compressor controls, turbine cooling. Secondary systems: fire protection and anti-ice systems.

Operation of internal combustion aircraft engines. Deviation of the real process from the ideal one. Efficiencies (thermal, indicated efficiencies and mechanical losses). Four- and two-stroke engines. Indicated and effective power. Main dimensions, geometric characteristics and structural design of internal combustion engines. Engine cooling and lubrication systems. Engine fuels and lubricants. Operation of carburettor and injection systems. Factors influencing engine emissions. Emission reduction possibilities. Charge exchange processes of internal combustion engines. Purpose and characteristics of charging systems. Cooperation of turbochargers and internal combustion engines.

Operation of turboprop engines, aerodynamic and flight mechanical characteristics of propellers, propulsion efficiency. Design and operation of propeller adjustment systems.

Literature:

Compulsory:

Cohen H, Rogers G, Saravanamuttoo H: Gas Turbine Theory. Longman. New York. 1998.

Gordon C. Oates: Aerothermodynamics of Gas Turbine and Rocket Propulsion. AIAA Education Series. 1988.

Ahmed F. El-Sayed: Aircraft Propulsion and Gas Turbine Engine. ISBN 978-0-8493-9196-5. Taylor & Francis. 2006.

Treager I. E.: Aircraft Gas Turbine Engine Technology. McGraw-Hill. 2000.

Schedule

1st week Registration week

2nd week:

Lecture: Control systems of gas turbine engines (turbojet and turbofan): hydraulic, hydro mechanical, hybrid and full authority digital electronic systems (FADEC).

4th week:

3rd week:

Lecture: Details of FADEC system operation, components, functions, status monitoring.

5th week:

Lecture: Engine auxiliary equipment, their drives. Starting and ignition systems. Lubrication system.

6th week:

Lecture: Air systems of engines, compressor controls, turbine cooling. Secondary systems: fire protection and anti-ice systems

8th week: 1st drawing week

9th week:

Lecture: Main dimensions, geometric characteristics and structural design of internal combustion engines.

11th week:

Lecture: Operation of carburettor and injection systems. Factors influencing engine emissions. Emission reduction possibilities.

13th week:

Lecture: Operation of turboprop engines, aerodynamic and flight mechanical characteristics of propellers, propulsion efficiency.

15th week: End-term test

Lecture: Construction of the fuel system and its relationship with regulation.

7th week:

Lecture: Operation of internal combustion aircraft engines. Deviation of the real process from the ideal one. Efficiencies (thermal, indicated efficiencies and mechanical losses). Four- and two-stroke engines. Indicated and effective power.

10th week:

Lecture: Engine cooling and lubrication systems. Engine fuels and lubricants.

12th week:

Lecture: Charge exchange processes of internal combustion engines. Purpose and characteristics of charging systems. Cooperation of turbochargers and internal combustion engines.

14th week:

Lecture: Design and operation of propeller adjustment systems.

Requirements

A, for a signature:

The criterion for the signature is the successful completion of the written examination during the semester. In case of insufficient written examination, it is possible to make up for it.

B, for a grade:

The exam is written, which lasts 90 minutes and has a maximum of 100 points. A minimum of 50 points must be achieved in the exam for a sufficient result.