EESTI LENNUAKADEEMIA

Õppematerjalide ajakohasuse protokoll
2025/2026 õppeaasta

Õppematerjal on vastavuses Eesti Lennuakadeemia õppeprogrammile (MTOE 4.2.0, 4.2.1, 4.2.2, 4.2.3), Euroopa Komisjoni regulatsiooni Osa-66 liitega I.

Mooduli nr: Moodul 11

Õppematerjali nimetus: INTERNATIONAL CENTRE FOR AEROSPACE TRAINING (ICAT) MODULE 11 - TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

Lisainfo:
- International Centre for Aerospace Training (ICAT) paberkandjal ja e-raamatuna (A, B1 kategooria)
- TÄIENDAV ÕPPEMATERJAL MOODLE KESKKONNAS

Õppematerjali pealkiri: INTERNATIONAL CENTRE FOR AEROSPACE TRAINING (ICAT) MODULE 11 - TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

Revisjoni number: 2 (EU 2025/111 kohane uuendus)

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Heaks kiidetud veebikeskkond distantsõppe läbiviimiseks	Zoom (https://zoom.us/)
	Google Classroom (classroom.google.com)

Protokolli koostamise kuupäev: 12.02.2026

MTO koolitusjuht: Madis Parv
                      (allkirjastatud digitaalselt)

ÕPPEMATERJALI VASTAVUSHINDAMISE KONTROLL-LEHT

Mooduli nr. ja nimetus: Module 11 Aeroplane Aerodynamics, Structures And Systems	Tase		Õppematerjali vastavus Osa-66 Lisa III mooduli programmile
	A	B1	
11.1 Theory of Flight **(a) Aeroplane aerodynamics and flight controls** *Operation and effect of:* — *roll control: ailerons and spoilers;* — *pitch control: elevators, stabilators, variable incidence stabilisers and canards;* — *yaw control, rudder limiters;* — *elevons, ruddervators;* — *high-lift devices, slots, slats, flaps, flaperons;* — *drag-inducing devices, spoilers, lift dumpers, speed brakes;* — *trim tabs, servo tabs, control surface bias.*	1 -	2 -	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
(b) Aeroplane: other aerodynamic devices *Operation and effect of:* — *balance and antibalance (leading) tabs;* — *spring tabs, mass balance, aerodynamic balance panels;* — *mass balance, aerodynamic balance panels;* — *effects of wing fences, saw tooth leading edges;* — *boundary layer control using vortex generators, stall wedges or leading-edge devices.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.2 Airframe Structures (ATA 51) **(a) General Concepts:** — *Zonal and station identification systems;* — *Electrical bonding;* — *Lightning strike protection provisions.* **(b) Airworthiness requirements for structural strength:** *Structural classification: primary, secondary, and tertiary;* *Fail-safe, safe-life, damage-tolerance concepts;* *Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;* *Drains and ventilation provisions;* *System installation provisions.* *(c) Construction methods* — *Stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, skinning, anticorrosive protection, wing, empennage and engine attachments;* — *Structure assembly techniques: riveting, bolting, bonding;* — *Methods of surface protection, such as chromating, anodising, painting;* — *Surface cleaning;* — *Airframe symmetry: methods of alignment and symmetry checks.*	2 2 1	2 2 2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.3 Airframe Structures — Aeroplanes **11.3.1 Fuselage, doors, windows (ATA 52/53/56)** **(a) Construction principles** *Construction and pressurisation sealing;*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta MÄRKUS: alateema Airborne towing devices (glider, banner,

Wing, stabiliser, pylon and undercarriage attachments; *Seat installation and cargo loading system;* *Doors and emergency exits: construction, mechanisms, operation and safety devices;* *Windows and windscreen construction and mechanisms.*			target õppematerjal Moodle keskkonnas
(b) Airborne towing devices (glider, banner, target).	1	2	
(c) Doors — Doors and emergency exits: safety devices; — Cargo loading system.	1	1	
11.3.2 Wings (ATA 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.3.3 Stabilisers (ATA 55) *Construction;* *Control surface attachment.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.3.4 Flight Control Surfaces (ATA 55/57) *Construction and attachment;* *Balancing — mass and aerodynamic.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.3.5 Nacelles/Pylons (ATA 54) *Nacelles/Pylons:* *— Construction,* *— Firewalls,* *— Engine mounts.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.4 Air Conditioning and Cabin Pressurisation (ATA 21)	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
(a) Pressurisation *Pressurisation systems;* *Cabin pressure controllers, control and safety valves;* *Control and indication*	1	3	
(b) Air supply *Sources of air supply including engine bleed, APU and ground cart.* *Distribution systems.*	1	3	
(c) Air Conditioning *Air conditioning systems;* *Air cycle and vapour cycle machines;* *Flow, temperature and humidity control system.* *Control and indication control valves.*	1	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
(d) Safety and warning devices *Protection and warning devices.*	1	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
(e) Heating and ventilation systems. (A2;B1.2)			☑Kontrollitud, vastab ☐Kontrollitud, ei vasta ÕPPEMATERJAL ICAT ÕPIKUS M11B

11.5 Instruments/Avionic Systems **11.5.1 Instrument Systems (ATA 31)** *Pitot-static:* *Airspeed indicators,* *Vertical speed indicators,* *Altimeters;* *Gyroscopic:* *Gyroscopic principles,* *Artificial horizons,* *Attitude directors,* *Direction indicators,* *Horizontal situation indicators (HSI),* *Slip indicators,* *Turn indicators,* *Turn coordinators;* *Compass systems: systems, direct reading, remote reading,* *Stall-warning systems and angle-of-attack indicating systems,* *Glass cockpit,* *Indications of other aircraft systems.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.5.2 Avionic Systems *Fundamentals of system lay-outs and operation of:* *— Auto Flight (ATA 22),* *— Communications (ATA 23),* *— Very High Frequency (VHF) communications,* *— High Frequency (HF) communications,* *— Satellite Communications (SATCOM),* *— Controller–pilot data link communications (CPDLC),* *— Audio systems,* *— Emergency Locator Transmitters (ELTs),* *— Cockpit Voice Recorder (CVR);* *— Navigation Systems (ATA 34).* — Very high frequency omnidirectional range (VOR), — Automatic direction finder (ADF), — Instrument landing system (ILS), — Microwave landing system (MLS), — Flight director systems (FDSs), distance-measuring equipment (DME), — Area navigation (RNAV) systems, — Flight management systems (FMSs), — Satellite navigation systems, — Air traffic control transponder, secondary surveillance radar, — Traffic alert and collision avoidance system (TCAS), — Weather avoidance radar, — Radio altimeter, — Inertial navigation system (INS), — ARINC (Aeronautical Radio Incorporated) communication and reporting. Types and uses of avionics general test equipment.	1	1	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta MÄRKUS:Alateema Types and uses of avionics general test equipment õppematerjalis ICAT M7.4
11.6 Electrical Power (ATA 24) *— Installation and operation of batteries;* *— DC power generation;* *— AC power generation;* *— Emergency power generation;* *— Voltage regulation;* *— Power distribution;* *— Inverters, transformers, rectifiers;* *— Circuit protection;*	1	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta

— External/ground power			
11.7 Equipment and Furnishings (ATA 25) (a) Emergency equipment; Emergency equipment requirements (b) Cabin and cargo lay-out: Seats, harnesses and belts; Cabin lay-out; Equipment lay-out; Cabin Furnishing installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs.	2 1	2 1	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.8 Fire Protection (ATA 26) (a) Fire and smoke detection and and fire-extinguishing systems; — Fire and smoke detection and warning systems Fire extinguishing systems; System tests; (b) Portable fire extinguisher.	1 1	3 1	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta MÄRKUS: alateema 11.8 (a) on tasemel 3 vastavalt EU2025/111
11.9 Flight Controls (ATA 27) (a) Primary and secondary flight controls: Primary controls: aileron, elevator, rudder, spoiler; Trim control, trim tabs; High lift devices; System operation: manual; Gust locks and gust lock systems; Artificial feel , Yaw damper, Mach trim, rudder limiter Stall warning system.	1	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
(b) Actuation and protection: Active load control; Lift dump, speed brakes; Hydraulic, pneumatic systems Stall-protection systems.	1	3	
(b) System operation: Electrical systems, fly-by-wire systems.	1	3	
(c) Balancing and rigging;	1	3	
11.10 Fuel Systems (ATA 28) **(a) Systems:** System lay-out; Fuel tanks; Supply systems;	1	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta MÄRKUS: alateema Inert gas systems õppematerjal Moodle keskkonnas
(b) Fuel handling Cross-feed and transfer; Refuelling and defuelling;	1	3	
(c) Indication and warnings.	1	3	

(d) Special systems: *Dumping, venting and draining;* *— Inert gas systems.*	1	3	
(e) Balancing: *Longitudinal balance fuel systems.*	1	3	
11.11 Hydraulic Power (ATA 29) **(a) System description:** *System lay-out;* *Hydraulic fluids;* *Hydraulic reservoirs and accumulators;* *Filters;* *Power distribution;*	1	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta MÄRKUS: alateema Servicing õppematerjal Moodle keskkonnas
(b) System operation (1): *Pressure generation: electric, mechanical;* *Pressure Control;* Indication and warning systems; *Servicing.* *System operation (2):* *Pressure generation: pneumatic* *Emergency pressure generation;* Interface with other systems.	1	3	
11.12 Ice and Rain Protection (ATA 30) *(a) Principles:* *Ice formation, classification and detection;*	1	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
(b) De-icing: *De-icing systems: electrical, hot air, pneumatic and chemical;* *Probe and drain heating;*	1	3	
(c) Anti-icing: *Anti-icing systems: electrical, hot air and chemical;*	1	3	
(d) Wipers *Wiper systems.*	1	3	
(e) Rain repellent;	1	3	
11.13 Landing Gear (ATA 32) **(a) Description:** *Construction, shock absorbing;* *Tyres;*	2	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta MÄRKUS: alateema Tail Protection õppematerjal Moodle keskkonnas
(b) Systems *Extension and retraction systems: normal and emergency;* *Indications and warning;* *Wheels, brakes, antiskid and autobraking;* *Steering;*	2	3	

(c) *Air-ground sensing.*	2	3	
(d) *Tail protection:* *Skids.*	2	3	
11.14 Lights (ATA 33) *External: navigation, anti collision, landing, taxiing, ice;* *Internal: cabin, cockpit, cargo;* *Emergency.*	2	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.15 Oxygen (ATA 35) *System lay-out: cockpit, cabin;* *Sources, storage, charging and distribution;* *Supply regulation;* *Indications and warnings.*	1	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.16 Pneumatic/Vacuum (ATA 36) *(a) Systems:* *System lay-out;* *Sources: engine/APU (Auxiliary Power Unit), compressors,* *reservoirs, ground supply;* *Pressure control;* *Distribution;* *Indications and warnings;* *Interfaces with other systems.*	1	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
(b) Pumps: *Pressure and vacuum pumps;*	1	3	
11.17 Water/Waste (ATA 38) *(a) Systems:* *Water system lay-out, supply, distribution, servicing and draining;* *Toilet system lay-out, flushing and servicing;*	2	3	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
(b) Corrosion: *Corrosion aspects.*	2	3	
11.18 On Board Maintenance Systems (ATA 45) *Central maintenance computers;* *Data loading system;* *Electronic library system;* *Printing systems;* *Structure monitoring (damage tolerance monitoring).*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
11.19 Integrated Modular Avionics (ATA42) *(a) Overall system description and theory:* *Core System; Network Components.* *Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others:* *Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta MÄRKUS: alateema Inert gas systems õppematerjal Moodle keskkonnas

(b) Typical system layout	1	2	
11.20 Cabin Systems (ATA44) *System architecture, operation, and control of systems for:* *— passenger in-flight entertainment;* *— communication within the aircraft (Cabin intercommunication data system (CIDS);* *— communication between the aircraft cabin and ground stations;* *— including voice, data, music, and video transmission.* *CIDS interface between cockpit/cabin crew and cabin systems.* *Data exchange between the different related Line Replaceable Units (LRUs)* *Flight Attendant Panels (FAPs).* *Cabin network server (CNS) and interfaces with the following systems:* *— Data/Radio Communication;* *— Cabin Core System (CCS);* *— In-flight Entertainment System (IFES);* *— External Communication System (ECS);* *— Cabin Mass Memory System (CMMS);* *— Cabin Monitoring System (CMS);* *— Miscellaneous Cabin Systems (MCSs).* *- Other Systems.* *Cabin network server (CNS) hosting functions:* *— access to pre-departure/departure reports;* * — e-mail/intranet/internet access; passenger database.* *In-flight Entertainment System;* *External Communication System;* *Cabin Mass Memory System;* *Cabin Monitoring System;* *Miscellaneous Cabin System.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta MÄRKUS: alateema Other systems õppematerjal Moodle keskkonnas
11.21 Information Systems (ATA46) **System architecture, operation, and control of:** *— Storage and electronic library;* *— Updating;* *— Retrieving of digital information* *Air Traffic and Information Management Systems (ATIMS) and Network Server Systems* *Aircraft General Information System;* *Flight Deck Information System;* *Maintenance Information System;* *Passenger Cabin Information System;* *Miscellaneous Information System.* — Other linked systems.	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta MÄRKUS: alateema Other linked systems õppematerjal Moodle keskkonnas

OTSUS:
Õppematerjal **<u>vastab</u>** kehtiva määruse Osa-66 Lisa III I liite mooduli programmile.

Õppematerjali vastavuse kontrollis ja kinnitas:

MTO koolitusjuht: Madis Parv
                             /allkirjastatud digitaalselt/

Kuupäev: 12.02.2026