

AERONAUTICS THEMES

1 Air-vehicle engineering

1.1 Aeronautical and aerodynamic environment

1.1.1 Climatic, atmospheric and meteorological environment

1.1.2 subsonic and supersonic aerodynamics

1.1.3 aerodynamics of the aircraft and inlets

1.1.4 Electromagnetic environment, Lightning

1.2 Architecture and aeronautical technologies

1.2.1 Air vehicles piloting: flight mechanics and qualities of flight, flight area, control surface actuators and aid steering, influence of wind and of gusts

1.2.2 Mechanical architecture: materials and structures of aircraft, static load and structural fatigue, mechanical vibration, structural modes and flutter, aircraft manufacturing, manufacturing control and quality

1.2.3 Propulsion of the engine planes and motorisation of helicopters: thermodynamics and science of heat, specific materials, role of propeller and operating principles, turbojet engines, turbo-props and propellers, turbine and rotors, engines for general and leisure aviation, installation and integration on aircraft

1.2.4 Thermal architecture of air vehicle aircraft

1.2.5 Energy Management and on board ancillary equipments: power transmission and tribology, electrical engineering, power generation and distribution, fuel circuit, hydraulic and pneumatic easements, engine start, air conditioning and oxygen supply, habitability, icing, de-icing, fire detection, auxiliary power units.

1.2.6 On board avionics: hardware, functional, and software architectures- on board computer systems (computers and networks) - servos, sensors, actuators, dialogue facilities, processing facilities management and information links - monitoring of systems, recording of flights-man machine interface (MMI)

1.2.7 Telecommunications, localization and navigation, radar and optical sensors.

1.3 Dependability for design and manufacture, flight safety, crash

1.4 Cockpit ergonomics (Man Machine Interface MMI), cabin layout and comfort for passengers

1.5 Noise (airport noise) and pollution

1.6 Managing the production and manufacture of aircraft

1.7 Implementation and maintenance of aircraft, maintenance in operational condition, integrated logistics support

1.8 Rules of aeronautics civil and military programs and associated quality assurance

1.9 Normalisation, standardization, regulation, law, insurance

2. Aeronautics and civil aviation

2.1 Specificity of civil aircrafts and various types of civil aircrafts: passengers aircraft and cargo, business aviation, light and leisure aviation, helicopters

2.2 Certification of civil aircraft and flight safety, airworthiness

2.3 Medicine, formation and training of crews, flight simulators

2.4 Airport operation systems

2.5 Air traffic control, telecommunications, navigation

3 Military Aircraft

3.1 Operation context and threats, aerial and aeromarine mission specificities , air traffic control

3.2 Fighter aircraft: operational performance, profiles of missions (air-ground attacks, air-to-air mission, conveying), carrying and arms, in-flight refuelling, avionics specific avionics for fighter aircraft, conduct of fire (radar, optronics, lasers), electronic counters measures, flying at very low altitude

3.3 Airliners

3.4 Fighter, transport and rescue helicopters

3.5 Unmanned aircraft, drones and missiles

3.6 Vulnerability and hardening, discretion, stealth

3.7 Medicine, formation and training of crews, simulators

3.8 Individual equipments for crew fighter aircraft crews, protection against accelerations, evacuation