Ground Examination Syllabus

Commercial Pilot's Licence (Aeroplanes)

Commercial Pilot's Licence (Helicopters and Gyroplanes)

Airline Transport Pilot’s Licence (Aeroplanes)

Airline Transport Pilot's Licence (Helicopters and Gyroplanes)

HUMAN PERFORMANCE AND LIMITATIONS SYLLABUS

1. HUMAN PERFORMANCE AND LIMITATIONS

1.1 This syllabus is divided into four main topic areas:

1.1.1. Basic Aviation Physiology and Health Maintenance.
1.1.2. Basic Aviation Psychology.
1.1.3. Stress, Fatigue and Their Management.

1.2 Basic Aviation Physiology and Health Maintenance

1.2.1. Basic Physiology and the Effects of Flight
1.2.1.1. Anatomy and physiology of the eye, ear, vestibular, circulatory, and respiratory systems.
1.2.1.2. Composition of the atmosphere, gas laws, and the nature of the human requirement for oxygen.
1.2.1.3. Effects of reduced ambient pressure and of sudden decompression; times of useful consciousness.
1.2.1.4. Recognising and coping with hypoxia and hyperventilation.
1.2.1.5. Entrapped gases and baratrauma.
1.2.1.6. Diving and flying.
1.2.1.7. Effects of acceleration (+/-G) on circulatory system, vision and consciousness.
1.2.1.8. Mechanism, effects and management of motion sickness.
1.2.2. Flying and Health
1.2.2.1. Noise and age-induced hearing loss.
1.2.2.2. Visual defects and their correction.
1.2.2.3. Arterial disease and coronary risk factors, ECG, blood pressure, stroke.
1.2.2.4. Diet, exercise, obesity.
1.2.2.5. Fits, faints and the EEG.
1.2.2.6. Psychiatric diseases, drug dependence and alcoholism.
1.2.2.7. Tropical diseases and their prophylaxis, hepatitis and sexually transmitted diseases.
1.2.2.8. Common ailments and fitness to fly, gastro-enteritis, colds, use of common drugs and their side effects.
1.2.2.9. Toxic hazards.
1.2.2.10. Causes and management of in-flight incapacitation.
1.3 Basic Aviation Psychology
1.3.1 Basic plan of human information processing, including the concepts of
sensation, attention, memory, central decision-making and the creation of
mental models.
1.3.1.1 Limitations of central decision channel and mental workload.
1.3.1.2 Function of attention in selecting information sources, attention-getting
stimuli.
1.3.1.3 Types of memory; peripheral or sensory memory, long term (semantic and
episodic) memory, short term or working memory, motor memory (skills).
1.3.1.4 Memory limitations and failures.
1.3.1.5 Perception, the integration of sensory information to form a mental model.
1.3.1.6 Effects of experience and expectation on perception.
1.3.1.7 Erroneous mental models; visual, vestibular and other illusions.
1.3.1.8 Recognising and managing spatial disorientation.
1.3.1.9 Use of visual cues in landing.
1.3.1.10 Eye movements, visual search techniques, mid-air collisions.
1.3.1.11 Skill-, rule- and knowledge-based behaviour.
1.3.1.12 The nature of skill acquisition, the exercise of skill, conscious and automatic
behaviour, errors of skill.
1.3.1.13 Rule-based behaviour, procedures, simulator training, failure in rule-based
behaviour
1.3.1.14 Knowledge-based behaviour, problem solving and decision making, inference
formation, failures in knowledge-based behaviour.
1.3.1.15 Maintaining accurate mental models, situational awareness, conformation
bias.

1.4 Stress and Stress Management
1.4.1 Models and Effects of Stress
1.4.1.1 Definitions, concepts and models of stress.
1.4.1.2 Arousal, concepts of over- and under-arousal.
1.4.1.3 Environmental stresses and their effects: heat, noise, vibration, low humidity.
1.4.1.4 Domestic stress, home relationships, bereavement, financial and time
commitments
1.4.1.5 Work stress, relationships with colleagues and management
1.4.1.6 Effects of stress on attention, motivation and performance
1.4.1.7 Life stress and health, other clinical effects of stress
1.4.1.8 Defence mechanisms, identifying stress and stress management
1.4.1.9 Sleep and fatigue
1.4.1.10 Biological clocks and circadian rhythms, sleep/wakefulness and temperature
rhythms, 'zeitgebers'
1.4.1.11 Sleep stages, sleep at abnormal times of day, required quantity of sleep
1.4.1.12 Work-induced fatigue
1.4.1.13 Shift work
1.4.1.14 Time zone crossing, circadian disrhythmia, re-synchronisation
1.4.1.15 Rostering problems, sleep management and naps
1.4.1.16 Sleep hygiene
1.4.1.17 Management of sleep with drugs

1.5 Social Psychology and Ergonomics of the Flight Deck
1.5.1 Individual Differences, Social Psychology
1.5.1.1 Individual differences, definitions of intelligence and personality.
1.5.1.2 Assessing personality.
1.5.1.3 Main dimensions of personality: extroversion and anxiety. Other important traits: warmth and sociability, impulsivity, tough-mindedness, dominance, stability and boldness.
1.5.1.4 Goal-directed and person-directed types of behaviour
1.5.1.5 Autocratic and democratic leadership styles
1.5.1.6 Individual personality related problems of flying, especially risk-taking.
1.5.1.7 Personality interaction on the flight deck and the interaction of personality with status or seniority, role (e.g. handling/non-handling) and perceived ability of crew members
1.5.1.8 Concepts of conformity, compliance and risky shift. Implications of these concepts for the flight deck with regards to effects of crew size
1.5.1.9 Judgement, making decisions and assessing risk.
1.5.1.10 Communication: verbal and non-verbal communication, one and two way communication, different communication styles
1.5.1.11 Methods of maximising crew effectiveness and improving flight deck, or cockpit resource, management
1.5.1.12 Interacting with cabin crew, air traffic services, maintenance personnel and passengers
1.5.2 The Design of Flight Decks, Documentation and Procedures.
1.5.2.1 Basic principles of control, display and workspace design.
1.5.2.2 Eye datum, anthropometry and workspace constraints. External vision requirements, reach, comfort and posture.
1.5.2.3 Display size, legibility, scale design, colour and illumination. Common errors in display interpretation.
1.5.2.4 Control size, loading, location and compatibility of controls with displays.
1.5.2.5 The presentation of warning information and misinterpretation of warnings.
1.5.2.6 The design and appropriate use of checklists and manuals.
1.5.2.7 Effects of automation and the 'glass cockpit'. Integration of information from many data sources on one display and automatic selection of displayed information. Mode and status representation
1.5.2.8 Machine intelligence and relationship between aircraft decisions and pilot decisions
1.5.2.9 Avoidance of complacency and boredom, maintaining situational awareness, maintaining basic flying skills