

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.
- 1.1.4. The Social Psychology and Ergonomics of the Flight Deck.

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 barotrauma.
 - 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