

**1. Aim of training course**

The aim of the course is to train a candidate to the level of proficiency required for the issue of a type rating for light sport aeroplanes, and to provide the training necessary to act as pilot-in-command of any light sport aeroplane for which he or she holds a valid type rating, engaged in non-revenue flights under visual flight rules.

**2. Theoretical knowledge course**

2.1 The theoretical knowledge course must cover the subjects as detailed in the syllabus:

- (1) Principles of Flight
- (2) Air Law
- (3) Aviation Meteorology
- (4) Aircraft Engines, Airframes and Instruments
- (5) General Navigation
- (6) Human Performance Limitations and Passenger care

2.2 Restricted Radio Telephony Operator's Certificate as prescribed in AIC 30.9

**3. Theoretical knowledge course syllabus**

**3.1 Principles of Flight –**

**3.1.1 General**

- (1) PHYSICS AND MECHANICS
  - (a) Speed, velocity, force
  - (b) Pressure – Bernoulli's Principle
  - (c) Motion of body along a curved path

Note: The student must have a good understanding of the speed squared law as applicable to Lift with specific reference to gusts and lulls, and their effect on your flight path.

- (2) AEROFOILS, LIFT AND DRAG
  - (a) Air resistance and air density
  - (b) Aerofoil shapes
  - (c) Lift and drag – Angle of attack and airspeed
  - (d) Distribution of lift, Centre of pressure
  - (e) Drag – Induced, parasite – Form, skin, interference
  - (d) Lift/drag ratio and aspect ratio
  - (e) Wake turbulence

---

(3) EQUILIBRIUM

- (a) The four forces: Lift, weight, thrust and drag
- (b) Centre of gravity (C of G) position
- (c) The balance of the four forces:   Straight and level  
  Climbing  
  Descending

(4) STABILITY

- (a) Positive, neutral, negative
- (b) Lateral and directional stability
- (c) Longitudinal stability
- (e) Wash-out

(5) LOOSE FORMATION/ GROUP FLYING

- (a) Law Governing
- (b) Procedures and hazards

(6) TURNING FLIGHT

- (a) The forces in the turn
- (b) Compensation for loss of lift

(7) THE STALL

- (a) Airflow separation
- (b) Stalling angle – Relationship to airspeed
- (c) Wing loading
- (d) Wing loading increase with bank angle increase
- (e) High-speed stall

(8) AIRCRAFT PERFORMANCE

- (a) Power curves  
    Effect of temperature, altitude, density, moisture etc.  
    Range and endurance
- (b) Climbing performance  
    Rate of climb  
    Angle of climb
- (c) Take-off and landing performance  
    Take-off run available  
    Take-off distance available  
    Landing distance available
- (d) Take-off and initial climb - performance  
    Effect of –  
        wind, wind gradient and wind shear  
        weight  
        pressure, altitude, temperature and density

---

ground surface and gradient

- (e) Approach and landing – performance
  - Effect of –
    - wind, wind gradient and wind shear
    - weight
    - turbulence and gusts
    - ground effect

### **3.1.2 Principles of flight - Conventional control specific**

#### **(1) FLYING CONTROLS**

- (a) The three axes: Vertical, Lateral, Longitudinal  
Yaw, Pitch, Roll
- (b) Operation and function of elevators, ailerons and rudder
- (c) Principles and purpose of mass and aerodynamic balance
- (d) Operation and purpose of trimming controls
- (e) Operation and function of flaps
- (f) Operation and function of spoilers, spoilerons and tip rudders

#### **(2) WEIGHT AND BALANCE**

- (a) Limitations on aircraft weight
- (b) Limitations in relation to aircraft balance
- (c) Weight and centre of gravity calculations

#### **(3) THE SPIN**

- (a) Causes of a spin
- (b) Autorotation
- (c) Effect of the C of G on spinning characteristics

#### **(4) PERFORMANCE**

- (a) Use of flaps
  - take off and initial climb performance
  - Approach and landing performance – effect of use of flaps
- (b) Cross control
  - Forward slipping
  - Side slipping

#### **(5) STABILITY**

- (a) Relationship of C of G to control in pitch

#### **(6) LOAD FACTOR AND MANOEUVRES**

- (a) Definition of load factor –  $V_n$  envelope
- (b) Effect on stalling speed
- (c) In-flight precautions

---

## 3.2 Air Law

- (1) Applicable acts, regulations and other documents
- (2) Structure and function of ANR's, CAR's, CAT's, AIP's, Notams, AIC's and AIP supplements.
- (3) Classification of aircraft
- (4) Aircraft documentation
- (5) Aircraft equipment
- (6) Aircraft radio equipment
- (7) Aircraft weight schedule
- (8) Documents to be carried on board
- (8) Documents and records to be maintained and produced on request
- (9) Offences in relating to documents and records
- (10) Airworthiness aspects
- (11) Flight crew licensing
- (12) Microlight aeroplane pilot - Privileges and limitations
- (13) Microlight aeroplane ratings
- (14) Personal flying logbook
- (15) Airspace classification
- (16) General flight rules
- (17) Visual flight rules
- (18) Special flight rules
- (19) Flight operations
- (20) General provisions
- (21) Air traffic services
- (22) Flight plans
- (23) Air-proximity reporting procedures
- (24) Incident/accident reporting
- (25) International operations
- (26) Operation of Non-type certified aircraft
- (27) Marine living resources act and Proclaimed nature reserves

## 3.3 Aviation Meteorology

- (1) THE ATMOSPHERE
  - (a) Composition and structure
  - (b) Vertical divisions
- (2) PRESSURE, DENSITY AND TEMPERATURE
  - (a) Barometric pressure, isobars
  - (b) Changes of pressure, density and temperature with altitude
  - (c) Solar and terrestrial energy radiation, temperature
  - (d) Lapse rate
  - (e) Stability and instability
  - (f) Effects of radiation, advection subsidence and convergence
- (3) HUMIDITY AND PRECIPITATION
  - (a) Water vapour in the atmosphere
  - (b) Dew point and relative humidity
- (4) PRESSURE AND WIND
  - (a) High and low pressure areas
  - (b) Gradient wind

- 
- (c) Vertical and horizontal motion
  - (d) Effect of wind gradient and windshear on take-off and landing
  - (e) Relationship between isobars and wind, Buys Ballot's law
  - (f) Turbulence and gustiness
  - (g) Local winds, land and sea breezes, berg winds, valley winds
- (5) CLOUD FORMATION
- (a) Cloud types
  - (b) Convection clouds
  - (c) Orographic clouds
  - (d) Stratiform and cumulus clouds
- (6) VISIBILITY
- (a) Fog, mist and haze
  - (b) Radiation, advection, frontal
  - (c) Formation and dispersal
  - (d) Reduction of visibility due to mist, snow, smoke, dust and sand
  - (e) Hazards of flight due to low visibility, horizontal and vertical
- (7) AIRMASSES
- (a) Weather associated with pressure systems
- (8) FRONTS
- (a) Formation of cold and warm fronts
  - (b) Associated clouds and weather, cold front
- (9) ICE ACCRETION
- (a) Conditions conducive to ice formation
  - (b) Effects of hoar frost, rime ice, clear ice
  - (c) Effects of icing on microlight performance
  - (d) Precautions and avoidance of icing conditions
  - (e) Powerplant icing
- (10) THUNDERSTORMS
- (a) Formation – airmasses, frontal, orographic
  - (b) Conditions required
  - (c) Development process
  - (d) Recognition of favourable conditions for formation
  - (e) Hazards
  - (f) Effects of lightning and severe turbulence
  - (g) Avoidance of flight in the vicinity of thunderstorms
- (11) FLIGHT OVER MOUNTAINOUS AREAS
- (a) Hazards
  - (b) Influence of terrain on atmospheric processes
  - (c) Mountain waves, windshear, turbulence, vertical movement, rotor effects
- (12) CLIMATOLOGY
- (a) General world circulation
  - (b) South African summer patterns
  - (c) South African winter patterns
  - (d) The South Westerly Buster
  - (e) The Cape Doctor
  - (f) The Black South Easter

- 
- (13) ALTIMETRY
    - (a) Operational aspects of pressure settings
    - (b) Pressure altitude, density altitude
    - (c) Height, altitude, flight level
  
  - (14) THE METEOROLOGICAL ORGANISATION
    - (a) Forecasting service
  
  - (15) WEATHER ANALYSIS AND FORECASTING
    - (a) Weather charts, symbols, signs
    - (b) Significant weather charts
    - (c) Prognostic charts for general aviation
  
  - (16) WEATHER INFORMATION FOR FLIGHT PLANNING
    - (a) Reports and forecasts for departure, *en route*, destination and alternate(s)
    - (b) Interpretation of coded information METAR, TAF
    - (c) availability of ground reports for surface wind, windshear, visibility
  
  - (17) METEOROLOGICAL BROADCASTS FOR AVIATION
    - ATIS, SIGMET
  
  - (18) MICRO-METEOROLOGY
    - (a) Rotors
    - (b) Venturies
    - (c) Katabatic and Anabatic winds
    - (d) Thermal activity
    - (e) Dust devils
    - (f) The immediate environment.
      - 1. Wind indicators
      - 2. Cloud forms
      - 3. Topography

### **3.4 Aircraft Engines, Airframes and Instruments**

- (1) AIRCRAFT AIRFRAME
  - (a) Structure
  - (b) Materials
  - (c) Wear and tear considerations
    - Repairs
    - Sail assessment
    - Wind
    - UV
    - Turbulence
    - Hard Landings
  
- (2) POWERPLANT AND SYSTEMS
  - (a) Engines – general
    - principles of 2 and 4 stroke engines
    - Maintenance
      - spark plug replacement
      - air-filter cleaning
      - cooling system
      - V-belt adjustment
      - gearbox oil change

- 
- renewing carb rubbers
  - adjusting idle
  - exhaust springs
  - manufacturer maintenance schedule
  - lubrication
  - (b) Ignition systems
  - (c) Carburetion and Fuel system
    - Principles of float type carburetor
    - Fuel-bypass (choke)
    - Recognition of faulty mixture
    - Methods to maintaining correct mixture ratio
      - carburetor jetting and needle and seat inspection
      - balancing carburetors
    - Carburetor icing
    - Emergency use of Fuel-bypass (choke)
  - (d) Fuel
    - Types
    - Suitability
    - Hazards of avgas
    - Contamination
    - Fuel strainers and drains
    - Fire hazards
      - containers
      - transportation
      - de-canting
  - (e) Electrical system
    - general
    - batteries
    - circuit breakers and fuses
    - recognizing malfunctions
- (3) PROPELLOR
- (a) nomenclature
  - (b) forces on blades
  - (c) designs
  - (d) effect of blade pitch changes
  - (e) maintenance and car
- (4) INSTRUMENTS
- (a) Airspeed indicator
  - (b) Altimeter
  - (c) VSI
  - (d) Magnetic compass
    - Precautions when carrying magnetic objects
    - Errors
  - (e) Engine instruments
  - (f) Temperature and pressure gauges
  - (g) Digital instruments
  - (h) RPM

---

## 3.5 General Navigation

### (1) FORM OF THE EARTH

- (a) Axis, poles
- (b) Meridians of longitude
- (c) Parallels of latitude

### (2) DIRECTION

- (a) True north
- (b) Earth's magnetic field, variation – annual change
- (c) Magnetic north
- (d) Magnetic influences within the microlight
- (e) Compass deviation
- (f) Turning, acceleration errors
- (g) Avoiding magnetic interference with the compass

### (3) DISTANCE

- (a) Nautical mile, statute mile, kilometre

### (4) AERONAUTICAL MAPS AND CHARTS (TOPOGRAPHICAL)

- (a) Projections and their properties
- (b) Scale
- (c) ICAO 1:250 000 and 1: 500 000 charts
- (d) main properties
- (e) Scale
- (f) depiction of height
- (g) Topography
- (h) Relief
- (i) Cultural features
- (j) Aeronautical symbols
- (k) Aeronautical information

### (5) CHARTS IN PRACTICAL NAVIGATION

- (a) Plotting positions
- (b) Latitude and longitude
- (c) Bearing and distance
- (d) Use of navigation protractor
- (e) Measurement of tracks and distances
- (f) Conversion of units

### (6) PRINCIPLES OF NAVIGATION

- (a) IAS, RAS (CAS) and TAS
- (b) Track, true and magnetic
- (c) Wind velocity, heading and ground speed
- (d) Triangle of velocities
- (e) Calculation of heading and ground speed
- (f) Drift, wind correction angle
- (g) EET and ETA
- (h) Dead reckoning, position, fix

### (7) FLIGHT PLANNING

- (a) Selection of charts
- (b) Route and aerodrome weather forecasts and reports
- (c) Assessing the weather situation



- 
- (d) Plotting the route
  - (e) Considerations of controlled airspace, airspace restrictions, danger areas, etc.
  - (f) Use of AIP and NOTAMS
  - (g) ATC liaison procedures in controlled airspace
  - (h) Fuel considerations
  - (i) *En-route* safety altitude(s)
  - (j) Alternate aerodromes
  - (k) Communications and radio/navaid frequencies
  - (l) Compilation of flight log
  - (m) Compilation of ATC flight plan
  - (n) Selection of check points, time and distance marks

( 8) PRACTICAL NAVIGATION

- (a) Compass headings, use of deviation card
- (b) Organisation of in-flight workload
- (c) Departure procedure
- (d) Maintenance of heading and altitude
- (e) Use of visual observations
- (f) Establishing position, checkpoints
- (g) Revisions to heading and ETA
- (h) Arrival procedures, ATC liaison
- (i) Use of minute marker graph.

(9) GLOBAL POSITIONING SYSTEM (GPS)

- (a) Limitations
- (b) Application
- (c) Principles
- (d) Presentation and interpretation
- (e) Coverage
- (f) Errors and accuracy
- (g) Factors affecting reliability and accuracy
- (h) Legalities

### **3.6 Human Performance Limitations and Passenger care**

#### **3.6.1 Human performance limitations**

- (1) Introduction
- (2) Oxygen
  - (a) Hypoxia
  - (b) Hyperventilation
- (4) Barotraumas
- (5) Common ailments
- (6) Decompression
- (7) Air sickness
- (8) Hearing
- (9) Sight
- (10) Toxic hazards
- (11) Blood pressure
- (12) Epilepsy
- (13) Alcohol and drugs
- (14) Knowledge and the senses
- (15) Disorientation
- (16) Avoiding the air proximity

- 
- (17) Stress
  - (18) Management of stress
  - (19) Emotional factors
  - (20) Social psychology
    - (a) The Ego Factor
    - (b) Intermediate syndrome

### **3.6.2 Passenger Care**

- (1) Embarking / Disembarking
- (2) Seatbelt and comfort
- (3) Briefing
  - (a) Open cockpit flying
  - (b) clothing, long hair and security
  - (c) cameras and loose articles
- (4) Human performance limitation as applicable to your passenger
- (5) Eye-contact and communication
- (6) Air law as applicable to passengers
- (7) Passenger seat and flying control access
- (8) Signing of indemnities