Subject 1 : INTRODUCTION TO THE COURSE

The general objective is:

Learners shall:

i. know and understand the training programme that they will follow and how to obtain the appropriate information,
ii. recognise the potential for development of their careers in ATC and
iii. state the rules and regulations concerning employment and security.

1 COURSE MANAGEMENT

1.1 Course Introduction

1.1.1	Explain the aims and main objectives of the course.	2	

1.2 Course Administration

1.2.1	State course administration.	1	

1.3 Study Material and Training Documentation

1.3.1	Use appropriate documentation and their sources for the course.	3	*e.g. Training documentation, library, CBT library, Web , Learning Management Server*
1.3.2	Integrate appropriate information into course studies.	4	Training documentation *e.g. supplementary information*

2 INTRODUCTION TO THE ATC TRAINING COURSE

2.1 Course Content and Organisation

2.1.1	State the different training methods applied in the course.	1	Theoretical training, Practical training, Self-study
2.1.2	State the subjects of the course and their purpose.	1	
2.1.3	Describe the organisation of theoretical training.	2	
2.1.4	Describe the organisation of practical training.	2	*e.g. PTP, Simulation, Briefing, Debriefing*

2.2 Training Ethos

2.2.1	Recognise the feedback mechanisms available.	1	*e.g. Instructor discussions, Training progress, Assessment, Examinations, Results, Briefing, Debriefing*
2.2.2	Describe the positive effect of working and learning together with fellow course participants.	2	Team work in theoretical and practical training

2.3 The Assessment Process

2.3.1	Describe the assessment process.	2	

3 INTRODUCTION TO THE ATCO'S FUTURE

3.1 Job Prospects

3.1.1	Recognise an ATCO's working environment.	1	Area control unit, approach control unit, aerodrome control unit
3.1.2	Recognise career developments.	1	*e.g. OJT instructor, supervisor, operational managerial posts, non-operational posts*

4 CONDITIONS OF SERVICE

4.1 Current Conditions of Employment

4.1.1	Take account of administrative employment rules and regulations that apply to a student.	2	
4.1.2	Take account of administrative employment rules and regulations that apply to an ATCO as an employee.	2	
4.1.3	State the licensing/certification system.	1	

4.2 Negotiations and Policies

4.2.1	Recognise the management/staff negotiation and discussion procedures.	1	
4.2.2	Recognise the roles of trade unions, other ATC associations and professional organisations.	1	

5 SECURITY

5.1 Security

5.1.1	State the rules and regulations concerning the security at a facility and within ATC.	1

Subject 2 : AVIATION LAW

The general objective is:

Learners shall apply the regulations governing rules of the air, airspace and flight planning and explain their development and incorporation into national legislation.

1 INTRODUCTION

1.1 National and International Organisations

1.1.1	Name the key national and international aviation organisations.	1	*e.g. ICAO, ECAC, EASA, EUROCONTROL, National Authority*
1.1.2	Describe the impact these organisations have on ATC and their interaction with each other.	2	*e.g. consistency between ESARRs and ICAO SARPs*
1.1.3	State the necessity for air law, the sources and development of aviation law.	1	*e.g. ICAO Annex 2, National Aviation Law*

1.2 ATC Licensing/ Certification

1.2.1	Explain the ATC licensing/ certification process.	2	ESARR 5, Approved training courses, ATC ratings and endorsements *e.g. national documents, EC Directive on a Community air traffic controller licence*
1.2.2	Explain the privileges and limitations of controller licences.	2	*e.g. Qualification, validation, minimum experience, training and medical requirements, competence checks*

1.3 Safety Management and Regulation

1.3.1	Describe the need for safety regulation.	2	ESARR 1 *e.g. SRC policy document 3, National documentation*
1.3.2	Explain how a safety management system complies with regulatory requirements.	2	ESARR 3
1.3.3	Describe the general principles of the safety organisation.	2	Safety regulation *e.g. ESARR 3, national regulations*
1.3.4	Explain the impact of safety regulation on the controller.	2	*e.g. ESARR 5, ESARR 3, EC Directive on a Community air traffic controller licence, national regulation**s***
1.3.5	Describe the safety assessment methodology.	2	ESARR 4 *e.g. EATMP Air navigation system safety assessment methodology*

2 INTERNATIONAL ORGANISATIONS

2.1 ICAO

2.1.1	Explain the purpose and function of ICAO.	2	
2.1.2	Describe the methods by which ICAO notifies and implements legislation.	2	*e.g. SARPS, PANS, ICAO Annexes, ICAO Documents, regional offices*

2.2 Other Agencies

2.2.1	State the purpose and function of other international agencies and their relevance to air traffic operations.	1	*e.g. ECAC, EU, EASA, ITU, EUROCONTROL, SRC/SRU, CANSO*

2.3 Aviation Associations

2.3.1	State the purpose of controller, pilot, airline and airspace user associations and their interaction with ATC.	1	*e.g. IFATCA, IFALPA, IATA, AEA, IAOPA, IACA, military services, JATMWG, ATCEUC*

3 NATIONAL ORGANISATIONS

3.1 General

3.1.1	Describe the purpose and function of appropriate national agencies and their relevance to air traffic operations.	2	*e.g. Civil aviation administration agencies, government agencies*

3.2 National Legislative Procedures

3.2.1	Describe the methods by which legislation is implemented, notified and updated.	2	*e.g. ICAO Annex 15, AIS, AIPs, AICs, AIRAC SUP, NOTAMs, integrated aeronautical information package, national legislation, Letters of Agreement, operations manual*
3.2.2	Recognise the information contained in the different parts of the AIP.	1	

3.3 National Regulatory Body

3.3.1	Name the body responsible for licensing and enforcing legislation and operational procedures.	1	

3.3.2	Describe how the regulatory body carries out its safety regulation responsibilities.	2	
3.4	**National Aviation Associations**		
3.4.1	State the purpose of national controller, pilot, airline and airspace user associations and their interaction with ATC.	1	

4 RULES AND REGULATIONS

4.1	**General**		
4.1.1	Differentiate between the Air Navigation Services.	2	ICAO Doc 9161
4.1.2	Explain the considerations which determine the need for the ATS.	2	ICAO Annex 11
4.1.3	Differentiate between the ATS.	2	ATCS, ADVS, FIS, ALRS
4.1.4	Explain the objectives of ATS.	2	ICAO Annex 11
4.2	**Airspace and ATS routes**		
4.2.1	Explain airspace classification.	2	ICAO Classes A-G, ICAO Annex 11
4.2.2	Differentiate between the different types of airspace.	2	*e.g. Control zones, control areas, airways, upper and lower airspace, restricted areas, prohibited and danger areas, FIR, aerodrome traffic zone, etc.*
4.2.3	Differentiate between the different types of ATS routes.	2	airway, arrival route, departure route, advisory route, controlled route, uncontrolled route, etc.
4.2.4	Decode information from aeronautical charts.	3	*e.g. Control zones, control areas, ATS routes, upper and lower airspace, restricted areas, prohibited and danger areas, FIR, aerodrome traffic zone, etc.*
4.3	**Rules of the Air**		
4.3.1	Explain the Rules of the Air.	2	ICAO Annex 2

4.3.2	Appreciate any notified National differences with ICAO.	3	*e.g. ICAO Doc 7030, Supplements to ICAO Annex 2 and ICAO Annex 11*
4.3.3	Appreciate the influence of relevant flight rules on ATC.	3	General flight rules, instrument flight rules, visual flight rules
4.3.4	Appreciate the differences between flying in accordance with VFR and IFR, in VMC and IMC.	3	ICAO Annex 2
4.3.5	Explain the functions of a flight plan.	2	ICAO Doc 4444
4.3.6	Explain the different types of flight plans and associated update messages.	2	ICAO Doc 4444
4.3.7	Explain the pilot's responsibilities in relation to adherence to flight plan.	2	Inadvertent changes, Intended changes, Position reporting
4.4	**Aerodromes**		
4.4.1	Describe the general design and layout of an aerodrome.	2	Runway(s), taxiways, apron, movement area, manoeuvring area, designated positions on an aerodrome
4.4.2	Explain the numbering system and orientation of runways.	2	ICAO Annex 14
4.4.3	Differentiate between different types of aerodromes.	2	Controlled, uncontrolled. *e.g. military, international, regional*
4.4.4	Describe designated positions in the traffic circuit.	2	
4.5	**Holding Procedures for VFR Flights**		
4.5.1	Describe the purpose of VFR holding.	2	
4.5.2	Describe the principles of VFR holding.	2	
4.6	**Holding Procedures for IFR Flights**		
4.6.1	Describe types of holding patterns.	2	Published, Non-published, Extended
4.6.2	Describe the use of holding.	2	Effect of speed, effect of level used, effect of navigation aid in use, etc.

4.6.3	Describe the purpose of holding.	2	Traffic management, weather, ICAO Doc 4444, ICAO Doc 8168
4.6.4	Describe an ICAO holding pattern.	2	ICAO Doc 8168 - Parts of an IFR holding pattern, Entry/exit procedures, Dimensions of patterns, Protected airspace, Holding areas, Alignment, Rates of turns, Holding times, Expect further clearance, Expected Approach Times (EATs)
4.7	**Units of Measurement**		
4.7.1	Describe the units of measurement used in aviation.	2	ICAO Annex 5

Subject 3 : AIR TRAFFIC MANAGEMENT

The general objective is:

Learners shall describe the basic principles of air traffic management and apply basic operational procedures.

1	**AIR TRAFFIC MANAGEMENT**		
1.1	**Units of Measurement**		
1.1.1	Apply the units of measurement appropriate to ATM.	3	
1.2	**Air Traffic Control Service**		
1.2.1	Define ATC service.	1	ICAO Annex 11
1.2.2	Explain the division of the ATC service.	2	ICAO Annex 11
1.2.3	Explain the responsibility for the provision of the ATC service.	2	ICAO Annex 11
1.2.4	Differentiate between the different methods of ATC service.	2	Aerodrome, surveillance, procedural
1.2.5	List the factors affecting the selection of runway in use.	1	
1.3	**Flight Information Service**		
1.3.1	Define FIS.	1	ICAO Annex 11
1.3.2	Describe the scope of the FIS.	2	ICAO Annex 11
1.3.3	Explain the responsibility for the provision of the FIS.	2	ICAO Doc 4444
1.3.4	State the methods of transmitting information.	1	*e.g. RTF, data link, ATIS, VOLMET, etc.*
1.3.5	Issue information to aircraft.	3	*e.g. SIGMET, serviceability of navaids, weather, flight safety information, essential traffic, essential local traffic, information related to aerodrome conditions, etc.*

1.4	**Alerting Service**		
1.4.1	Define ALRS.	1	ICAO Doc 4444
1.4.2	Describe the scope of the ALRS.	2	ICAO Annex 11
1.4.3	Explain the responsibility for the provision of the ALRS.	2	ICAO Doc 4444
1.4.4	Differentiate between the phases of emergency.	2	Uncertainty, alert, distress
1.4.5	Describe the organisation of an ALRS.	2	Responsibilities, local organisation
1.4.6	Describe the cooperation between units providing the alerting services and the SAR units.	2	
1.4.7	Differentiate between distress and urgency signals.	2	*e.g. Mayday, Pan, visual signals, etc.*
1.5	**ATS System Capacity and Air Traffic Flow Management**		
1.5.1	Define ATFM.	1	
1.5.2	State the scope of capacity management.	1	ICAO Annex 11
1.5.3	Describe the scope of ATFCM.	2	ICAO Doc 4444 *e.g.:EUROCONTROL ATFCM Users Manual*
1.5.4	Explain the responsibility for the provision of ATFCM.	2	ICAO Doc 4444 *e.g.:EUROCONTROL ATFCM Users Manual*
1.5.5	State the methods of providing ATFCM.	1	ICAO Doc 4444 *e.g.:EUROCONTROL ATFCM Users Manual*
1.6	**Airspace Management**		
1.6.1	Define ASM.	1	*e.g. EUROCONTROL ASM HBK- Airspace Management Handbook for the application of FUA*
1.6.2	Describe the scope of ASM.	2	*e.g. EUROCONTROL ASM HBK- Airspace Management Handbook for the application of FUA*

1.6.3	Explain the responsibility for the provision of ASM.	2	*e.g. EUROCONTROL ASM HBK- Airspace Management Handbook for the application of FUA*
1.6.4	State the methods of managing airspace.	1	*e.g. Flexible use of airspace, airspace design, CDRs, TSAs*

1.7 Air Traffic Advisory Service

1.7.1	Define Air Traffic Advisory Service.	1	ICAO Annex 11
1.7.2	Describe the scope of the Air Traffic Advisory Service.	2	ICAO Doc 4444
1.7.3	Explain the responsibility for the provision of the Air Traffic Advisory Service.	2	ICAO Doc 4444
1.7.4	State to which flights Air Traffic Advisory Service shall be provided.	1	ICAO Doc 4444

2 RADIOTELEPHONY (RTF)

2.1 RTF General Operating Procedures

2.1.1	Explain the need for approved phraseology.	2	
2.1.2	Use approved phraseology.	3	Parts of the following documents relevant to the Basic course: ICAO Doc 4444, ICAO Doc 9432 RTF manual - standard words and phrases, ICAO Annex 10 Vol. 2
2.1.3	Perform communication effectively.	3	Communication techniques

3 ATC CLEARANCES AND ATC INSTRUCTIONS

3.1 Type and Content of ATC Clearances

3.1.1	Define ATC clearance.	1	ICAO Annex 2
3.1.2	Describe the contents of an ATC clearance.	2	ICAO Doc 4444, ICAO Annex 11
3.1.3	Issue appropriate ATC clearances.	3	including the verification of a read back

3.2	**ATC Instructions**		
3.2.1	Define ATC Instructions.	1	ICAO Doc 4444
3.2.2	Describe the contents of an ATC instructions.	2	ICAO Doc 4444, ICAO Annex 11
3.2.3	Issue appropriate ATC instructions.	3	including the verification of a read back

4 COORDINATION

4.1	**Principles, Types and Content**		
4.1.1	Explain the principles, types and content of coordination.	2	ICAO Doc 4444, ICAO Annex 11 *e.g. notification, negotiation, agreement, transfer of flight data and local agreements, etc.*
4.2	**Necessity**		
4.2.1	Appreciate the need for coordination.	3	*e.g. ICAO Doc 4444, Local agreements*
4.3	**Means**		
4.3.1	Describe the means of coordination	2	*e.g. Data link, telephone, intercom, voice, etc.*
4.3.2	Use the available means for coordination.	3	

5 ALTIMETRY AND LEVEL ALLOCATION

5.1	**Altimetry**		
5.1.1	Appreciate the relationship between height, altitude and flight level.	3	QFE, QNH, standard pressure
5.2	**Transition Level**		
5.2.1	Appreciate the relationship between transition level, transition altitude and transition layer.	3	ICAO Doc 4444, ICAO Doc 8168
5.2.2	Calculate transition levels.	3	
5.3	**Level Allocation**		

5.3.1	Describe the cruising level allocation system.	2	ICAO Annex 2, tables of cruising levels
5.3.2	Choose appropriate levels.	3	Flight levels, altitudes, heights

6 SEPARATIONS

6.1 Vertical Separation and Procedures

6.1.1	State the vertical separation standards and procedures.	1	ICAO Doc 4444

6.2 Horizontal Separation and Procedures

6.2.1	State the longitudinal separation standards and procedures based on time and distance.	1	ICAO Doc 4444
6.2.2	State the lateral separation standards and procedures.	1	ICAO Doc 4444

6.3 Visual Separation

6.3.1	State the occasions when clearance to fly maintaining own separation while in VMC can be used.	1	

6.4 Aerodrome Separation and Procedures

6.4.1	State the aerodrome separation standards and procedures.	1	Separation on the manoeuvring area, in the traffic circuit, for departing and arriving aircraft

6.5 Wake Turbulence Separation

6.5.1	Explain the wake turbulence categories and separations.	2	ICAO Doc 4444

6.6 Separation based on ATS surveillance systems

6.6.1	Explain the use of ATS surveillance systems in ATS.	2	Separation, identification, monitoring, vectoring, expedition and assistance to traffic *e.g. ICAO Doc 4444*
6.6.2	Explain the ATS surveillance systems separation standards and procedures.	2	

6.7 Applied separation

6.7.1	Apply separation.	3	*e.g. vertical, longitudinal, lateral, aerodrome, based on ATS surveillance systems, distances from airspace boundaries*

7 COLLISION AVOIDANCE AND SAFETY NETS

7.1 Airborne

7.1.1	State the main characteristics of airborne collision avoidance systems and their relevance to ATC operations.	1	*e.g. ACAS traffic alerts, ACAS ATC Procedures, ICAO Doc 4444, ICAO Doc 7030, Eurocontrol Guidelines for controller training in the handling of unusual/emergency situations.*

7.2 Ground

7.2.1	State the main characteristics of conflict alert systems and their relevance to ATC operations.	1	*e.g. MTCD, STCA, MSAW, DAIW*

8 DATA DISPLAY

8.1 Data Extraction

8.1.1	Encode and decode an appropriate selection of standard ICAO abbreviations.	3	*e.g. ICAO Doc 8585, ICAO Doc 8643, ICAO Doc 7910*
8.1.2	Extract pertinent data from relevant sources to produce a flight progress display.	3	Pilot reports, coordination, data exchange *e.g. flight plan*
8.1.3	Describe flight plan processing.	2	*e.g. AFTN, IFPS*
8.1.4	Encode and decode flight plans (including supplementary information).	3	ICAO format, AFTN format

8.2 Data Management

8.2.1	Update the data display to accurately reflect the traffic situation.	3	*e.g. Strip marking symbols, strip movement procedures, electronic data, radar label*

Subject 4 : METEOROLOGY

The general objective is:

Learners shall describe how meteorology affects ATS operations and aircraft performance and apply meteorological information in the basic operational procedures of ATS.

1	**INTRODUCTION**		
1.1	**Units of Measurement**		
1.1.1	Apply the units of measurement appropriate to meteorology.	3	
1.2	**Aviation and Meteorology**		
1.2.1	Explain the relevance of meteorology in aviation.	2	
1.2.2	Explain the requirements for the provision of meteorological information available to operators, flight crew members, and to air traffic services.	2	ICAO Annex 3, ICAO Annex 11
1.3	**Organisation of Meteorological Service**		
1.3.1	Name the basic duties, organisation and working methods of meteorological offices.	1	*e.g. WAFS, WAFC, MWO, VAAC, TCAC, SADIS*
1.3.2	State the International and National standards for coordination between ATS and MET services.	1	
2	**ATMOSPHERE**		
2.1	**Composition and Structure**		
2.1.1	State the composition and structure of the atmosphere.	1	Gases, layers
2.1.2	Describe the basic characteristics of the atmospheric parameters measured.	2	Temperature, pressure, wind, humidity, density
2.1.3	List the tools used for the collection of meteorological data.	1	*e.g. Barometer, thermometer, ceilometer, anemometer, weather balloons, transmissometer, radar, satellites, etc.*
2.2	**Standard Atmosphere**		

2.2.1	Describe the elements of the ISA.	2	Temperature, pressure, density
2.2.2	State the reasons why the ISA has been defined.	1	
2.3	**Heat and Temperature**		
2.3.1	Define the processes by which heat is transferred and how the atmosphere is heated.	1	Radiation, convection, advection, conduction, Water Cycle
2.3.2	Describe how temperature varies.	2	Adiabatic processes, lapse rates, stability
2.4	**Water in the Atmosphere**		
2.4.1	Differentiate between the different processes related to atmospheric moisture.	2	Condensation, evaporation, sublimation, saturation
2.4.2	Characterise relative humidity, dew point and latent heat.	2	
2.5	**Air Pressure**		
2.5.1	Describe the relationship between pressure, temperature, density and height.	2	
2.5.2	Explain the relationship between pressure settings.	2	QFE, QNH, standard pressure
2.5.3	Explain the effect of air pressure and temperature on altimeter readings and the true altitude of aircraft.	2	
3	**ATMOSPHERIC CIRCULATION**		
3.1	**General Air Circulation**		
3.1.1	State the major atmospheric circulation features on the Earth.	1	*e.g. Hadley cells, high and low belts, polar fronts, westerly winds, upper level jet streams*
3.2	**Air Masses and Frontal Systems**		
3.2.1	Describe the origin and movement of typical air masses and their general effect on European weather.	2	Polar, arctic, tropical, equatorial (maritime and continental)

3.2.2	Describe the main isobaric features.	2	Cyclones, anticyclones, ridge, trough
3.2.3	Describe the difference between various fronts and the associated weather.	2	Warm front, cold front, occluded front
3.3	**Mesoscale systems**		
3.3.1	Describe the main phenomena caused by mesoscale systems.	2	Mountain waves, Föhn, Slope and valley winds, thunderstorm, squall line *e.g. land/sea breezes, tornadoes, land spouts, waterspouts*
3.3.2	State the relevance of mesoscale systems to aviation.	1	
3.4	**Wind**		
3.4.1	Explain the significance of wind phenomena and types.	2	*e.g. veering, backing, gusting, jet streams, land/sea breezes, Föhn, surface, upper*
3.4.2	State how wind is measured.	1	
3.4.3	Explain effect of forces which influence wind.	2	
4	**METEOROLOGICAL PHENOMENA**		
4.1	**Clouds**		
4.1.1	Explain the different conditions for the formation of clouds.	2	
4.1.2	Recognise different cloud types.	1	
4.1.3	State the cloud types main characteristics.	1	
4.1.4	State how the cloud base and the amount of cloud are measured and/or observed.	1	
4.1.5	Define cloud base and ceiling.	1	

4.1.6	Differentiate between cloud base and ceiling.	2	
4.2	**Types of Precipitation**		
4.2.1	Explain the significance of precipitation in aviation.	2	
4.2.2	Describe types of precipitation and their corresponding cloud families.	2	*e.g. Rain, snow, snow grains, hail, ice pellets, ice crystals, drizzle*
4.3	**Visibility**		
4.3.1	Explain the causes of atmospheric obscurity.	2	
4.3.2	Differentiate between different types of visibility.	2	Horizontal visibility, slant visibility, prevailing visibility, RVR
4.3.3	State how visibility is measured.	1	
4.4	**Meteorological Hazards**		
4.4.1	State the meteorological hazards to aviation.	1	Turbulence, thunderstorms, icing, micro bursts, squall, macro burst, wind shear
4.4.2	Describe the effect of meteorological hazards on aviation.	2	
5	**METEOROLOGICAL INFORMATION FOR AVIATION**		
5.1	**Messages and Reports**		
5.1.1	Decode the content of weather reports and forecasts.	3	METAR, SPECI, TAF, SIGMET *e.g. local reports*

Subject 5 : NAVIGATION

The general objective is:

Learners shall explain the basic principles of navigation and use this knowledge in ATS operations.

1 INTRODUCTION

1.1 Units of Measurement

1.1.1	Apply the units of measurement appropriate to navigation.	3	

1.2 Purpose and Use of Navigation

1.2.1	Explain the need for navigation in aviation.	2	
1.2.2	Characterise navigation methods.	2	*e.g. Historical overview, celestial, on-board, radio, satellites*

2 THE EARTH

2.1 Purpose and Use of Navigation

2.1.1	Explain the Earth's properties and their effects.	2	*e.g. Form, size, rotation, revolution in space, seasons, day, night, twilight, units of time, time zones, UTC*

2.2 System of Coordinates, Direction and Distance

2.2.1	Characterise the general principles of a grid system.	2	*e.g. Degrees, minutes, seconds, WGS-84, latitude/ longitude*
2.2.2	Explain direction and distance on a globe.	2	*e.g. Great circle, small circle, rhumb line, cardinal points, inter-cardinal points*
2.2.3	Estimate position on the Earth's surface.	3	*e.g. Latitude/longitude*
2.2.4	Estimate distance and direction between two points.	3	

2.3 Magnetism

2.3.1	Explain the general principles of the Earth's magnetism.	2	True north, magnetic north, variation, deviation, inclination
2.3.2	Calculate conversions between the three north designations.	3	True north, magnetic north, compass north

3 MAPS AND AERONAUTICAL CHARTS

3.1 Map Making and Projections

3.1.1	State how the Earth is projected to create a map.	1	Types of projection
3.1.2	Describe the properties of an ideal map.	2	*e.g. Conformality, constant scale, true azimuth, rhumb lines and great circles*
3.1.3	Explain the properties and use of different projections.	2	*e.g. Lambert, Mercator, stereographic*

3.2 Maps and Charts Used in Aviation

3.2.1	Differentiate between the various maps and charts.	2	
3.2.2	State the specific use of various maps and charts.	1	
3.2.3	Decode symbols and information displayed on maps and charts.	3	

4 NAVIGATIONAL BASICS

4.1 Influence of Wind

4.1.1	Appreciate the influence of wind on the flight-path.	3	Heading, track, drift, wind vector

4.2 Speed

4.2.1	Explain the relationship between various speeds used in aviation.	2	True air speed, ground speed, indicated air speed (including Mach number)
4.2.2	Appreciate the use of various speeds in ATC.	3	

4.3 Visual Navigation

4.3.1	Explain the different methods of visual navigation.	2	map reading, visual reference *e.g. dead-reckoning*

4.4 Navigational Aspects of Flight Planning

4.4.1	Describe the navigational aspects affecting flight planning.	2	*e.g. fuel / time calculations, min altitudes, alternative routes*

5 INSTRUMENTAL NAVIGATION

5.1 Ground-based Systems

5.1.1	Explain the basic working principles of ground-based systems.	2	VDF, NDB, VOR, DME, ILS *e.g. TACAN, MLS*
5.1.2	State the use of ground-based systems.	1	VDF, NDB, VOR, DME, ILS *e.g. TACAN, MLS*
5.1.3	Characterise the main radio navigation techniques based on ground-based systems.	2	*e.g. homing, inbound/outbound tracking, instrument approach procedures, holding, drift assessment*
5.1.4	Explain the effects of precision and limitations of ground based systems on the flight.	2	VDF, NDB, VOR, DME, ILS *e.g. TACAN, MLS*

5.2 On-Board Systems

5.2.1	Explain the basic working principles of on-boards systems.	2	*e.g. INS/IRS*
5.2.2	State the use of on-board systems.	1	
5.2.3	Explain the effects of precision and limitations of on-board systems.	2	

5.3 Satellite Based Systems

5.3.1	Explain the basic working principles of positioning systems.	2	*e.g. GPS, GLONASS, Galileo*
5.3.2	State the basic principles of GNSS concept.	1	Basic, ABAS, SBAS, GBAS
5.3.3	State the effects of precision and limitations of satellite-based systems.	1	*e.g. RAIM, GPS Notams*

6 AREA NAVIGATION

6.1 Principles

6.1.1	Explain the basic principle of area navigation.	2	

6.1.2	State the benefits of area navigation.	1	
6.2	**Types and Techniques**		
6.2.1	List the types of RNAV.	1	*e.g. B-RNAV, P-RNAV, RNP-RNAV*
6.2.2	Characterise the main navigational techniques based on area navigation.	2	*e.g. waypoints and path terminators, fly over and fly by a waypoint*
6.2.3	Characterise the navigational functions of FMS.	2	*e.g. VNAV, LNAV*
6.2.4	List the types of RNP.	1	
6.3	**Future developments**		
6.3.1	Be aware of future developments.	0	PBN, etc.

Subject 6 : AIRCRAFT

The general objective is:

Learners shall describe the basic principles of the theory of flight and aircraft characteristics and how these influence ATS operations.

1 INTRODUCTION			
1.1 Units of Measurement			
1.1.1	Apply the units of measurement appropriate to aircraft and principles of flight.	3	
1.2 Aviation and Aircraft			
1.2.1	Explain the relevance of theory of flight and aircraft characteristics in ATS operations.	2	
2 PRINCIPLES OF FLIGHT			
2.1 Forces Acting on Aircraft			
2.1.1	Explain the forces acting on an aircraft in flight and their interaction.	2	Lift, thrust, drag, weight during level flight *e.g. during climb, descent, turn*
2.1.2	Explain causes and effects of wake turbulence.	2	induced drag
2.2 Structural Components and Control of an Aircraft			
2.2.1	List the main structural components of an aircraft.	1	Rotary and fixed wing, tail plane, fuselage, flap, aileron, elevator, rudder, landing gear
2.2.2	Explain how the pilot controls the movements of an aircraft.	2	*e.g. rudder, aileron, elevator, throttle, rotary wing controls*
2.3 Flight Envelope			
2.3.1	Characterise the critical factors which affect aircraft performance.	2	Maximum speeds, minimum and stall speeds, ceiling, critical angle of attack, maximum ROC
3 AIRCRAFT ENGINES			
3.1 Piston Engines			

3.1.1	Explain the operating principles, advantages and disadvantages of the piston engine and propeller.	2	Piston engines, fixed pitch, variable pitch, number of blades
3.2	**Jet Engines**		
3.2.1	Explain the operating principles, advantages and disadvantages of the jet engine.	2	
3.2.2	List the different types of jet engines.	1	
3.3	**Turboprop Engines**		
3.3.1	Explain the operating principles, advantages and disadvantages of the turboprop engine and propeller.	2	

4 AIRCRAFT SYSTEMS AND INSTRUMENTS

4.1	**Flight Instruments**		
4.1.1	Explain the basic operating principles and interpretation of the information displayed by flight instruments.	2	Altimeter, air speed indicator, vertical speed indicator, turn and bank indicator, artificial horizon, gyrosyn compass
4.1.2	Explain the impact of errors and abnormal indications of flight instruments on aircraft operations.	2	*e.g. Pitot-static failures, unreliable gyro source*
4.2	**Navigational Instruments**		
4.2.1	Describe the basic on-board operating principles and interpretation of the information displayed by navigational instruments/systems.	2	*e.g. ADF, VOR (TACAN), DME, ILS, MLS, inertial reference system, satellite based systems*
4.3	**Engine Instruments**		
4.3.1	List the vital engine monitoring parameters and their associated instruments.	1	*e.g. Oil pressure and temperature, engine temperature, rpm, fuel state and flow*
4.4	**Aircraft systems**		
4.4.1	Explain the use of the most common aircraft systems.	2	*e.g. SSR transponder, head up display, wind shear indicator, weather radar, GPWS,EFIS, Flight director, autopilot, FMS, hydraulic system, electrical system, environmental system*

4.4.2	Explain the impact of degradation/ failure of the most common aircraft systems on aircraft operations.	2	*e.g. hydraulic failure, electrical failure, environmental system failure*

5 AIRCRAFT CATEGORIES

5.1 Aircraft Categories

5.1.1	List the different categories of aircraft.	1	*e.g. Fixed wing, rotary wing, balloon, glider*

5.2 Wake Turbulence Categories

5.2.1	List the wake turbulence categories.	1	ICAO wake turbulence categories

5.3 ICAO Approach Categories

5.3.1	List the ICAO approach categories.	1	ICAO Doc 8168

6 FACTORS AFFECTING AIRCRAFT PERFORMANCE

6.1 Take Off

6.1.1	Explain the factors affecting aircraft during take off.	2	Runway conditions, runway slope, wind, temperature, aerodrome elevation, aircraft mass

6.2 Climb

6.2.1	Explain the factors affecting aircraft during climb.	2	Speed, mass, wind, temperature, cabin pressurisation, air density

6.3 Cruise

6.3.1	Explain the factors affecting an aircraft during cruise.	2	Level, cruising speed, wind, mass, cabin pressurisation

6.4 Descent and Initial Approach

6.4.1	Explain the factors affecting an aircraft during descent.	2	Wind, speed, rate of descent, aircraft configuration, cabin pressurisation

6.5 Final Approach and Landing

6.5.1	Explain the factors affecting an aircraft during final approach and landing.	2	Aircraft configuration, mass wind, wind shear, aerodrome elevation, runway conditions, runway slope,

6.6	**Economic Factors**		
6.6.1	Explain the economic consequences of ATC changes on the flight profile of an aircraft.	2	Routing, flight level, speed, rates of climb or descent
6.7	**Ecological Factors**		
6.7.1	Explain performance restrictions due to ecological constraints.	2	*e.g. Fuel dumping, noise abatement procedures, minimum flight levels*
6.8	**Miscellaneous Factors**		
6.8.1	Explain special operational requirements which affect aircraft performance.	2	*e.g. Military flying, calibration flights, aerial photography*

7 AIRCRAFT DATA

7.1	**Recognition**		
7.1.1	Recognise the most commonly used aircraft.	1	
7.2	**Performance Data**		
7.2.1	State the ICAO aircraft type designators and categories for the most commonly used aircraft.	1	Type designators, approach and wake turbulence categories
7.2.2	State the standard average performance data of the most commonly used aircraft.	1	Rate of climb/descent, cruising speed, ceiling

Subject 7 : HUMAN FACTORS

The general objective is:

Learners shall characterise factors which affect personal and team performance.

1 INTRODUCTION TO HUMAN FACTORS

1.1	**Introduction**		
1.1.1	List the topics that will be covered in the course.	1	Introduction to human factors, human performance,human error, communication, work environment
1.1.2	List the reference documents used.	1	*e.g. ICAO Human Factors Training Manual, EATCHIP/EATMP publications, Air Traffic Control-Human Performance Factors, (Anne Isaac 1999), Human Factors in Air Traffic Control, (V. David Hopkin 1995)*
1.1.3	Appreciate appropriate learning techniques.	3	How the influence of interactive techniques can lead to improved learning
1.2	**Why Human Factors**		
1.2.1	Explain why human factors is a subject in this course.	2	Historical background, safety impact on ATM, licensing requirements, incidents
1.2.2	Define human factors.	1	*e.g. ICAO Human Factors Training Manual*
1.2.3	Explain the concept of systems.	2	People, procedures, equipment
1.2.4	Explain ATM in systems terms.	2	
1.2.5	Recognise the consequences of a systems failure in ATS.	1	
1.2.6	Explain the need for matching human and equipment.	2	*e.g. ICAO Human Factors Training Manual*
1.2.7	Explain the use and benefits of the SHELL model.	2	*e.g. ICAO Human Factors Training Manual, visits to the simulator and OPS room*
1.2.8	Explain the information requirement of ATC.	2	Relevant, timely, accurate
1.2.9	Describe the role of the human in the evolution of ATC.	2	*e.g. History of ATC, airspace, communications, radar, the future of ATC*

1.2.10	Recognise the importance of situational awareness for decision making.	1	

2 HUMAN PERFORMANCE

2.1 Individual Behaviour

2.1.1	Explain the differences and commonalities that exist between people.	2	*e.g. Attitudes, cultural, language*
2.1.2	Explain the dangers of boredom.	2	
2.1.3	Explain the dangers of overconfidence and complacency.	2	
2.1.4	Explain the dangers of fatigue.	2	Sleep disturbance, heavy workload
2.1.5	Describe the positive effect of working and learning together with fellow course participants.	2	How the influence of interactive studies can lead to success

2.2 Professional Conduct

2.2.1	Describe the need for professional standards in ATC.	2	*e.g. adherence to rules and regulations etc.*
2.2.2	Describe the needed basic professional attitudes to respond to a high level of safety.	2	*e.g. punctuality, rigour, adherence to rules, teamwork attitude*
2.2.3	Recognise the impact of responsibility on controllers action (s).	1	Responsibility as a guidance for appropriate action
2.2.4	Recognise the different responsibilities of a controller.	1	Prospective and retrospective responsibility, guilt and obligation, types of responsibility (moral, welfare, legal, task, role responsibility etc.)

2.3 Health and Well Being

2.3.1	Consider the effect of health on performance.	2	*e.g. Fitness, diet, drugs, alcohol*

2.4 Teamwork

2.4.1	Describe the differences between social human relations and professional interactions.	2	
2.4.2	Describe the different types and characters in a team.	2	*e.g. leader, follower*
2.4.3	Describe the principles of teamwork.	2	*e.g. team membership, group dynamics, advantages/ disadvantages of teamwork, conflicts and their solutions*
2.4.4	Describe leader style and group interaction.	2	
2.5	**Basic Needs of People at Work**		
2.5.1	List basic needs of people at work.	1	*e.g. Balance between: individual ability and workload, working time and rest periods. Adequate physical working conditions, positive working environment*
2.5.2	Characterise the factors of work satisfaction.	2	*e.g. money, achievement, recognition, advancement, challenge*
2.6	**Stress**		
2.6.1	Define stress.	1	Stress definition *e.g. EATCHIP Human Factors Module - Stress*
2.6.2	Recognise stress symptoms and sources.	1	Behavioural changes, lifestyle changes, physical symptoms, crisis events, main causes of stress *e.g.EATCHIP Human Factors Module - Stress*
2.6.3	Describe the stages of stress.	2	Stress performance curve *e.g. EATCHIP Human Factors Module - Stress*
2.6.4	Describe techniques for stress management.	2	*e.g. Relaxation techniques, diet and lifestyle, exercise, EATCHIP Human Factors Module - Stress*
3	**HUMAN ERROR**		
3.1	**Introduction**		
3.1.1	Recognise the dangers of error in ATC.	1	*e.g. Air Traffic Control-Human Performance Factors, (Anne Isaac 1999), Human Factors in Air Traffic Control, (V. David Hopkin 1995)*
3.2	**Definition of Human Error**		

3.2.1	Define human error.	1	
3.2.2	Describe the factors which help to cause error.	2	*e.g. fatigue, lack of skill, misunderstanding, lack of information, distraction, lack of work satisfaction*
3.3	**Classification of Human Error**		
3.3.1	State the types of errors.	1	*e.g. slips, lapses, mistakes*
3.3.2	Define violations.	1	
3.3.3	Differentiate between errors and violations of rules.	2	
3.3.4	Describe the three levels of performance according to the Rasmussen model.	2	Skill based, knowledge based, rule based
3.4	**The Reason Model**		
3.4.1	Describe the Reason model.	2	Active failures and latent conditions
3.4.2	Apply the Reason principles on error during a case study.	3	*e.g. Herald of Free Enterprise accident*
4	**COMMUNICATION**		
4.1	**Introduction**		
4.1.1	Demonstrate the importance of good communications in ATC.	2	
4.2	**The Communication Process**		
4.2.1	Define communication.	1	
4.2.2	Define the communication process.	1	*e.g. Sender, encoder, transmitter, signal, interference, reception, decoder, receiver, feedback*
4.3	**Communication Modes**		

4.3.1	Describe the factors which affect verbal communication.	2	*e.g. word choice, intonation, speed, tone, distortion, load, expectation, noise, interruption, language knowledge (i.e. accent, dialect, vocabulary)*
4.3.2	Describe the factors which affect non-verbal communication.	2	*e.g. touch, choice, expectation, noise, interruption*
4.3.3	Apply good communication practices.	3	Speaking and listening

5 THE WORK ENVIRONMENT

5.1 Introduction

5.1.1	Define ergonomics.	1	
5.1.2	Be aware of the need for good building design.	0	*e.g. light, insulation, decor, space, facilities*
5.1.3	Explain the need for good work position design.	2	*e.g. anthropometry (seating, work station design, input device, etc.)*

5.2 Equipment and Tools

5.2.1	Characterise the equipment and tools that will be used in simulation in accordance with the SHELL model.	2	The physical environment, visual displays, suites, input devices, communications equipment, console profile and layout

5.3 Automation

5.3.1	Explain the reasons for automation.	2	
5.3.2	Describe the constraints of automation.	2	

Subject 8 : EQUIPMENT AND SYSTEMS

The general objective is:

Learners shall:

i. explain the basic working principles of equipment that is in general use in ATC;

ii. appreciate how this equipment aids the controller in providing a safe and efficient ATS;

iii. use computer equipment in order to successfully complete CBT and to handle electronic data displays.

1	**GENERAL**		
1.1	**ATC Equipment**		
1.1.1	Characterise the main items of ATC equipment.	2	*e.g. Communication equipment, VDF/UDF, radars*
2	**RADIO**		
2.1	**Radio Theory**		
2.1.1	State principles of radio.	1	
2.1.2	Recognise the characteristics of radio waves.	1	Propagation, limitations
2.1.3	State the use, characteristics and limitations of frequency bands.	1	Use in ATC, navigation and communications, use and application in the Aeronautical Mobile Service, HF, VHF, UHF
2.2	**Radio Communications**		
2.2.1	State the use of the radio in ATC.	1	
2.2.2	Describe the working principles of a transmitting and receiving system.	2	
2.2.3	Explain the effect of antenna shadowing on RTF communications.	2	
2.3	**Direction Finding**		
2.3.1	State the principles and use of VDF/UDF.	1	VDF/UDF, QDM, QDR, QTF
2.3.2	State the precision of VDF/UDF used in the State system.	1	

3 OTHER SYSTEMS AND COMMUNICATIONS

3.1 ATC Communications

3.1.1	Describe the use of other voice communications in ATC.	2	*e.g. telephone, interphone, intercom*

3.2 Airline Communications

3.2.1	State the use of SELCAL.	1	

3.3 Air Ground Communications

3.3.1	State the use of controller pilot datalink communications (CPDLC).	1	

4 RADAR

4.1 General

4.1.1	State the principles of radar.	1	
4.1.2	Recognise the characteristics of radar wavelengths.	1	
4.1.3	Recognise the use, characteristics and limitations of different radar types.	1	*e.g. frequency bands, long and short-range radar, weather radar, high-resolution radar*

4.2 Primary Radar

4.2.1	Explain the working principles of PSR.	2	

4.3 Secondary Radar

4.3.1	Explain the working principles of SSR.	2	Mode A, Mode C
4.3.2	Explain SSR code management	2	Discrete, non-discrete codes, special codes
4.3.3	Explain the effect of antenna shadowing on SSR operation.	2	

4.4 Use of Radars

4.4.1	Explain the use of PSR/SSR in ATC.	2	Area, approach, aerodrome, surface movement radar, DFTI
4.4.2	Explain the link between PSR/SSR with automated systems.	2	
4.4.3	Explain the advantages and disadvantages of PSR/SSR.	2	

4.5 Mode S

4.5.1	State the principles of Mode S.	1	
4.5.2	Explain the use of Mode S in ATC systems.	2	

5 AUTOMATIC DEPENDENT SURVEILLANCE

5.1 Automatic Dependent Surveillance

5.1.1	State the working principles of ADS.	1	Satellites, data links
5.1.2	Explain the use and limitations of ADS.	2	

6 FUTURE EQUIPMENT

6.1 Future Equipment

6.1.1	Be aware of developments in the equipment field.	0	Equipment to be introduced beyond training period

7 AUTOMATION IN ATS

7.1 General

7.1.1	Describe the principles of automation in communication and datalinks in ATS.	2	

7.2 Aeronautical Fixed Telecommunication Network

7.2.1	Describe the principles of AFTN.	2	

7.3 On-line Data Interchange

7.3.1	Recognise the benefits of automatic exchange of ATS data in coordination and transfer processes.	1	Accuracy, speed and safety, non-verbal communications
7.3.2	Recognise the limitations of automatic exchange of ATS data in coordination.	1	Non-recognition of a systems failure

7.4 Closed Circuit Information System

7.4.1	State the principles of CCIS.	1	
7.4.2	Explain the use of CCIS in ATS.	2	Data carried on CCIS

7.5 Systems Used for the Automatic Dissemination of Information

7.5.1	State the working principles of broadcasting systems.	1	*e.g. ATIS, VOLMET*
7.5.2	Explain the use of ATIS and VOLMET in ATS.	2	

8 WORKING POSITIONS

8.1 General

8.1.1	Recognise equipment in a working position.	1	*e.g. FPB, radio, telephone and other communication equipment, relevant maps and charts, strip printer, teleprinter, clock, information monitors, radars/displays*

8.2 Aerodrome Control

8.2.1	Recognise equipment to be found specifically in a TWR.	1	*e.g. Wind indicator, DFTI, SMR, crash alarm, signalling lamp, lighting control panel, runway-in-use indicator, binoculars, signalling/flare gun, IRVR and altimeter setting indicators, CCIS*

8.3 Approach Control

8.3.1	Recognise equipment to be found specifically in an APP.	1	*e.g. Sequencing system, PAR, RVR indicators*

8.4 Area Control

8.4.1	Recognise equipment to be found specifically in an ACC.	1	

Subject 9 : PROFESSIONAL ENVIRONMENT

The general objective is:

Learners shall recognise the need for close cooperation with other parties concerning ATM operations and aspects of environmental protection.

1	**FAMILIARISATION**		
1.1	**Familiarisation**		
1.1.1	Recognise civil and military ATS facilities.	1	*e.g. TWR, APP, ACC, AIS, RCC, Radar, Air Defence Unit*
1.1.2	Recognise airport facilities and local operators.	1	*e.g. fire and emergency services, airline operations office*
2	**AIRSPACE USERS**		
2.1	**Civil Aviation**		
2.1.1	Name airspace requirements for civil aircraft.	1	*e.g. Commercial flying, recreational flying, gliders, balloons*
2.2	**Military Aviation**		
2.2.1	Name airspace requirements for military aircraft.	1	*e.g. Low-level flying, in-flight refuelling, test flights, special military operations*
2.3	**Expectations and Requirements of Pilots**		
2.3.1	Be aware of the expectations and requirements of pilots.	0	
3	**CUSTOMER RELATIONS**		
3.1	**Customer Relations**		
3.1.1	State the role of ATC as a service provider.	1	
3.1.2	Recognise the means by which ATC is funded.	1	
4	**ENVIRONMENTAL PROTECTION**		
4.1	**Environmental Protection**		

4.1.1	Recognise the importance of environmental protection.	1	Air, water, noise