

Curriculum for AIM Training - Module 1: Basic Training

2. AVIATION LEGISLATION

The general objectives are to enable students to:
 Appreciate the development and application of Aviation Legislation;
 Recognise the Rules of the Air and regulations governing airspace.

2.1 Overview of aviation legislation				
2.1.1	State the necessity for Air Law.	1	Standardisation; harmonisation.	
2.1.2	Name the key National & International aviation organisations.	1	ICAO, EUROCONTROL, National Supervisory Authority (CCAA).	
2.1.3	Describe the impact these organisations have on Air Navigation Services and air traffic operations and their interaction with each other.	2	Regulatory process.	
2.2 International organisations				
2.2.1	Explain the purpose, organization and function of ICAO.	2	ICAO Convention, ICAO Council, Air Navigation Commission (ANC), ICAO Regional Offices.	
2.2.2	Describe the methods by which ICAO notifies and implements legislation.	2	Annexes, SARPS, PANS, SUPPS, Documents.	
2.2.3	Describe the purpose and function of other international agencies and their relevance to Air Navigation Services and Air Traffic Operations.	2	EASA, EUROCONTROL.	
2.2.4	Be aware of the various international controller, pilot, airline operator and airspace user associations.	0	IFATCA, IFALPA, IATA, IAOPA, IACA, ACI, CANSO, COSESNA.	
2.3 National organisations				
2.3.1	State the National Organisations responsible for the regulation of aviation	1	National Supervisory Authorities, Government Authorities, Military	

	and their relevance to Air Navigation Services and Air Traffic Operations.		Authorities.	
2.3.2	State the relationship between service providers and regulators.	1	DCANSP, CCAA.	
2.3.3	State the methods by which legislation is implemented and notified.	1	National legislation, Air Law.	
2.3.4	Specify the organisation of the National Supervisory Authority.	1	National Supervisory Authority.	
2.3.5	Describe how the body carries out its regulation responsibilities.	2	National legislation, audits and inspections.	
2.3.6	Be aware of the various national controller, pilot, airline operator and airspace user associations.	0		
	2.4 Financing Air Navigation Services			
2.4.1	Be aware of the cost of air navigation services	0		
2.4.2	Describe the principle of route charges.	2	Aviation Regulation	
2.4.3	Describe the principle of local charges.	2	e.g. ATC charges, Navigation charges, APP charges, DEP charges.	National AIP and/or AIC
2.4.4	Be aware of charges for AIS publications.	0	e.g. AIP, charts, etc.	National AIP and/or AIC
2.4.5	Be aware of charges for webbased products.	0	e.g. Home briefing.	National AIP and/or AIC
	2.5 Airspace			
2.5.1	List the different types of airspace.	1	Control zones, control areas, airways, upper and lower airspace, FIR, TMA, ATZ.	ICAO Annex11
2.5.2	Explain the function of each type of airspace.	2	FIR, CTR, TMA, etc.	ICAO Annex11
2.5.3	Explain how airspace is applied nationally.	2	FIR, CTR, TMA, etc.	National AIP
2.5.4	List the ICAO airspace classes.	1	Classes A-G.	ICAO Annex 11
2.5.5	Explain the differences between the airspace classes.	2	Classes A-G.	ICAO Annex 11

2.5.6	Explain the national application.	2	Classes A-G.	National AIP
	2.6 Rules of the Air			
2.6.1	State the categories of International Rules of the Air.	1	General, visual, instrument.	ICAO Annex 2
2.6.2	Be aware of the influence of relevant general flight rules on ATM.	0	e.g. Applying separation.	ICAO Annex 2
2.6.3	Explain those rules of the air that have most relevance to AIS.	2	Applicability, protection of persons and property, flight plans, time, VFR, IFR.	ICAO Annex 2
2.6.4	Differentiate between flying in accordance with visual and instrument flight rules (VFR and IFR).	2		ICAO Annex 2
2.6.5	Be aware of any notified national differences with ICAO.	0		National AIP; GEN 1.7; ICAO Annexes

3. PRINCIPLES OF AIR TRAFFIC MANAGEMENT

The general objectives are to enable students to:

Understand the basic operational procedures used by the air traffic control service in providing separation to aircraft;

Be aware of the necessity for ATC to apply these procedures to ensure a safe and expeditious service to airspace users.

3.1 Organisation of Air Traffic Management				
3.1.1	List the types of Air Navigation Services.	1	Definitions: ATM (ATS, TFM/ATFCM, ASM), AIS, MET, CNS, SAR.	ICAO Doc 9713; ICAO Annex 11; ICAO Annex 15; ICAO Annex 3 ; ICAO Annex 12
3.1.2	State the objectives of the Air Traffic Services.	1	ATC, Advisory Service, FIS, ALRS.	ICAO Annex 11
3.1.3	List the types of Air Traffic Services.	1	ATC, Advisory Service, FIS, ALRS.	ICAO Annex 11
3.1.4	Define ATC Service.	1		ICAO Annex
3.1.5	Explain specific areas of responsibility of ATC Services.	2	Area Control, Approach Control, Aerodrome Control.	ICAO Annex 11
3.1.6	Be aware of different types of control services.	0	Radar, non-radar.	
3.1.7	Define Flight Information Service.	1		ICAO Annex 11
3.1.8	State the information that shall be passed to aircraft by a controller.	1		ICAO Annex 11
3.1.9	Define Alerting Service.	1		ICAO Annex 11
3.1.10	Describe the phases of emergency.	2	Uncertainty, alert, distress phase.	ICAO Annex 11
3.1.11	Describe the organisation, responsibilities and structure of Rescue Co-ordination Centres.	2	National AIP, National RCC.	
3.1.12	State the purpose of ATFM/ATFCM.	1	Flow management.	ICAO Annex 11; ICAO Doc 4444
3.1.13	State the purpose of ASM.	1	Flexible use of airspace (FUA).	ICAO Doc 4444
3.2 Air-ground communications				
3.2.1	State the different methods of airground communications.	1	Radiotelephony, ADS-B, Mode S, ACARS, CPDLC, SELCAL, etc.	ICAO Doc 4444 ICAO Annex 11
3.2.2	Be aware of the need for standard ICAO phraseology.	0		ICAO Annex 10; ICAO Doc 4444

3.2.3	Be aware of the ICAO phonetic alphabet and expressions for numerals and time.	0		ICAO Annex 10
	3.3 Flight data processing			
3.3.1	State the need for Flight Data Processing.	1		ICAO Doc 4444
3.3.2	List the stages of the flight plan process.	1	FPL+estimate+clearance.	ICAO Doc 4444
3.3.3	Specify the methods of exchange of estimates.	1	Telephone.	ICAO Doc 4444
	3.4 ATC clearances and instructions			
3.4.1	Define ATC Clearance.	1		ICAO Annex 11
3.4.2	State the contents of an ATC clearance.	1		ICAO Annex 11
3.4.3	Define ATC Instructions.	1		ICAO Doc 4444
3.4.4	State the contents of an ATC Instruction.	1		ICAO Doc 4444
	3.5 Co-ordination between controllers			
3.5.1	Be aware of the necessity of coordination.	0	Safe conduct of flight.	ICAO Annex 11
3.5.2	Describe the principles of coordination.	2	Negotiation, notification, agreement.	
3.5.3	State methods of co-ordination.	1	Data link, Telephone, Intercom, Voice, etc.	ICAO Annex 11
	3.6 Altimetry and level allocation			
3.6.1	Explain the relationship between flight level, height and altitude.	2	QNH, QFE, Standard Pressure Setting.	ICAO Doc 4444
3.6.2	Define transition level, transition altitude and transition layer.	1		ICAO Doc 8168
3.6.3	Be aware of the consequences of the variability of the transition. Level.	0	Broadcast of Transition Level.	ICAO Doc 4444
3.6.4	State the cruising level allocation system.	1	Table of cruising levels.	ICAO Annex 2
3.6.5	Describe the factors that determine lowest useable flight level.	2		ICAO Doc 4444 ICAO Doc 8168
3.6.6	Describe the concept of RVSM.	2	Table of cruising levels.	ICAO Annex 2;

	3.7 Principles of separation			
3.7.1	State the vertical separation minima.	1	Vertical separation minima (500, 1000 and 2000 ft).	ICAO Doc 4444
3.7.2	Describe the use of vertical separation.	2	Vertical separation minima as per Flight Level Allocation, Use of Mode C and Mode S derived information.	ICAO Doc 4444
3.7.3	Be aware of longitudinal separation based on time and distance.	0	Longitudinal separations.	ICAO Doc 4444; RNAV
3.7.4	Be aware of the use of lateral separation.	0	Lateral separations.	ICAO Doc 4444
3.7.5	State the general radar separation minima.	1	Radar separation (3NM, 5NM, 10NM).	ICAO Doc 4444
3.7.6	Be aware of the influence of wake turbulence on separation.	0	Aircraft spacing – time/distance/altitude.	ICAO Doc 4444
	3.8 Collision avoidance			
3.8.1	State the working principle of the available airborne collision avoidance systems.	1	ACAS, TCAS.	ICAO Doc 8168
3.8.2	State the working principle of the available ground based collision avoidance systems.	1	MTCA, STCA.	
	3.9 Data displays			
3.9.1	Explain the purpose of the controller's flight progress display.	2	Flight Progress Strips, Electronic Data Display.	ICAO Doc 4444
3.9.2	List the pertinent data to be extracted from a flight plan to produce a flight progress display.	1		ICAO Doc 4444
3.9.3	State the pertinent data from other sources to produce a flight progress display.	1	Pilot Reports, Controller Coordination, Data Exchange.	ICAO Doc 4444
3.9.4	Describe how a controller updates the data display to accurately reflect the traffic situation.	2	Strip display update procedures.	

	3.10 Air Traffic Flow and Capacity Management (ATFM)			
3.10.1	Define air traffic flow management/air traffic flow and capacity management.	1		ICAO Doc 4444
3.10.2	Be aware of the need for ATS system capacity management.	0		ICAO Doc 4444
3.10.3	List the main factors influencing ATS capacity.	1		ICAO Doc 4444
	3.11 Airspace Management (ASM)			
3.11.1	State the need for airspace management.	1		ICAO Annex 2; ICAO Annex 11;
3.11.2	Explain the need for Flexible Use of Airspace (FUA).	2		ICAO Doc 4444;
3.11.3	State the responsibilities for airspace management.	1		

4. AERODROMES

The general objectives are to enable students to: Be familiar with the layout of an aerodrome; Describe aerodrome marking and lighting systems.

4.1 Aerodrome layout				
4.1.1	Define "aerodrome".	1		ICAO Annex 14
4.1.2	Differentiate aerodrome areas.	2	Movement and manoeuvring areas.	ICAO Annex 14
4.1.3	Identify the parts of the manoeuvring area.	1	Runways and taxiways.	
4.1.4	Be aware of the terms airside/landside.	0	The movement area of an airport, adjacent terrain and buildings or portions thereof, access to which is controlled.	ICAO Annex 17
4.2 Runways				
4.2.1	Define "runway".	1		ICAO Annex 14
4.2.2	List the elements of a runway.	1	Threshold, end, TDZ, etc.	ICAO Annex 14
4.2.3	Describe the physical characteristics of a runway.	2		ICAO Annex 15; ICAO Annex 14
4.2.4	Define "runway shoulder".	1		ICAO Annex 14
4.2.5	State the characteristics of runway shoulders.	1		ICAO Annex 14
4.2.6	Define "runway strip".	1		ICAO Annex 14
4.2.7	State the dimensions of a runway strip.	1		ICAO Annex 14
4.2.8	Define "RESA" (Runway End Safety Area).	1		ICAO Annex 14
4.2.9	State the dimensions of a RESA.			ICAO Annex 14
4.2.10	Explain the purpose of aerodrome marking and lighting systems.	2	Visual guidance to pilots.	ICAO Annex 14
4.2.11	Describe runway markings.	2	RWY designation, centre line, threshold, fixed distance, TDZ.	ICAO Annex 14
4.2.12	Describe runway lighting systems.	2	Runway, threshold identification, edge, end, centre line, touchdown zone and SWY.	
4.2.13	Define "clearway".	1		ICAO Annex 14
4.2.14	State the dimensions of a clearway.	1		ICAO Annex 14
4.2.15	Define "stopway".	1		ICAO Annex 14
4.2.16	State the dimensions of a stopway.	1		ICAO Annex 14

	4.3 Taxiways			ICAO Annex 14
4.3.1	Define "taxiway".	1		ICAO Annex 14
4.3.2	Describe the main characteristics of taxiways.	2	Rapid exit, taxiway shoulders, etc.	ICAO Annex 14
4.3.3	State the dimensions of a taxiway.	1		ICAO Annex 14
4.3.4	Describe taxiway markings.	2	Centre line, taxi holding point and taxiway intersection.	ICAO Annex 14
4.3.5	Describe taxiway lighting.	2	Centre line, edge lights and stop bars.	ICAO Annex 14
	4.4 Aprons			
4.4.1	Define "apron".	1		ICAO Annex 14
4.4.2	List the elements of an apron.	1	Apron taxiway, aircraft stand, aircraft stand taxi lane.	ICAO Annex 14
4.4.3	Describe the main characteristics of an apron.	2		ICAO Annex 14
4.4.4	Be aware of visual docking/parking guidance systems.	0		ICAO Annex 14
	4.5 Landing aids			
4.5.1	List visual landing aids.	1	VASIS, PAPI and APAPI.	ICAO Annex 14
4.5.2	Describe visual landing aids.	2	VASIS, PAPI and APAPI.	ICAO Annex 14
4.5.3	List approach lighting systems.	1	Simple, precision and Category I, II and III systems, CALVERT.	ICAO Annex 14
4.5.4	Describe approach lighting systems.	2	Simple, precision and Category I, II and III systems, CALVERT.	ICAO Annex 14
4.5.5	Be aware of the effect of partial/total unserviceability of landing aids on aircraft operations.	0	Airport operations minima.	ICAO Annex 14; ICAO Annex; ICAO Doc 8168
4.5.6	State the function of the signal area.	1		ICAO Annex 14
4.5.7	Describe a wind direction indicator.	2	e.g. Wind sock (description, position, relative wind speed indication).	ICAO Annex 14

	4.6 Services / Facilities			
4.6.1	List the different services found at an airport.	1	Fuel, de-icing, customs, fire fighting service, security, maintenance, etc.	ICAO Annex 9
4.6.2	Be aware of the impact of the degradation of services on airport operations.	0	Fuel, de-icing, customs, fire fighting service, security, etc.	ICAO Annex 9
4.6.3	Identify the information that has to be passed between aeronautical information services (AIS) and the airport authorities.	1	Aerodrome conditions, fire/rescue category, condition of ground equipment and NAVAIDs.	ICAO Annex 14
	4.7 Obstacles			
4.7.1	Define "obstacle".	1		ICAO Annex 14
4.7.2	Describe how obstacles are identified.	2		ICAO Annex 14
4.7.3	List the obstacle limitation surfaces.	1		ICAO Annex 14
4.7.4	Explain the purpose of obstacle limitation surfaces.	2		ICAO Annex 14
4.7.5	State the obstacle limitation requirements.	1		ICAO Annex 14
4.7.6	Describe the marking of unusable or unserviceable areas on the movement area.	2	Closed runways/taxiways, apron.	ICAO Annex 14
	4.8 Aerodrome data			
4.8.1	List significant elements of aerodrome data.	1	Aerodrome reference point, Aerodrome reference temperature, Aerodrome dimensions, strength of pavements, declared distances, rescue and fire fighting, etc.	ICAO Annex 14
4.8.2	Define "Aerodrome Reference Point" (ARP).	1		ICAO Annex 14
4.8.3	Explain the significance of the ARP.	2		ICAO Annex 14
4.8.4	Define "aerodrome elevation".	1		ICAO Annex 14
4.8.5	Explain the significance of the aerodrome elevation.	2		ICAO Annex 14
4.8.6	Define "runway elevation".	1		ICAO Annex 14
4.8.7	Explain the significance of the runway elevation.	2		ICAO Annex 14
4.8.8	Define "threshold elevation".	1		ICAO Annex 14

4.8.9	Explain the significance of threshold elevation.	2		ICAO Annex 14
4.8.10	Define "strength of pavements".	1	PCN/ACN.	ICAO Annex 14
4.8.11	Explain the significance of the strength of pavements.	2		ICAO Annex 14
4.8.12	Define the terms TORA, TODA, ASDA and LDA.	1		ICAO Annex 14
4.8.13	Explain the significance of these distances.	2		ICAO Annex 14
	4.9 Heliports			
4.9.1	Define "heliport".	1		ICAO Annex 14
4.9.2	List the physical characteristics of a heliport.	1	Final approach and take-off areas (FATO), helicopter clearways, touchdown and lift-off areas, safety areas, helicopter ground taxiways, helicopter air taxiways, etc.	ICAO Annex 14
	Recognise the different visual aids at a heliport.	1	Wind direction indicators, markings and markers, lights, etc.	ICAO Annex 14

5 AIRCRAFT

The general objectives are to enable students to: Understand the basic principles of the theory of flight; Be familiar with factors affecting aircraft performance.

	5.1 Principles of flight			
5.1.1	Describe the forces acting on an aircraft in flight.	2	Lift, thrust, drag, weight.	
5.1.2	List the factors affecting these forces.	1	Streamline airflow, airfoil, angle of attack.	
5.1.3	List the main structural components of an aircraft.	1	Wings, tail plane, fuselage, flaps, elevator, rudder.	
5.1.4	Describe how the control surfaces influence the movements of an aircraft.	2	Flaps, elevator, rudder.	
5.1.5	Identify the critical factors that affect aircraft performance.	1	Maximum speed, stall speed, ceiling, streamline flow, turbulent flow.	
	5.2 Aircraft propulsion			
5.2.1	Explain the operating principles, of the piston engine and propeller.	2	Piston engines, fixed pitch, variable pitch, number of blades	
5.2.2	List the advantages and disadvantages of piston engines.	1	Quick reaction, cost effective, short runway operations – less power at high altitude, slow, high maintenance, unfavourable power/weight ratio.	
5.2.3	List the different types of gas turbines.	1	Straight jet, turbofan, afterburner.	
5.2.4	Explain the operating principles of turbine engines.	2	Inlet compression, combustion, exhaust.	
5.2.5	List the advantages and disadvantages of turbine engines.	1	Efficient at high level, very powerful, high speed, reliable – expensive.	
5.2.6	Explain the operating principles of turbo-prop propulsion.	2		
5.2.7	List the advantages and disadvantages of turbo prop propulsion.	1	Efficient at medium altitudes, short runway operations, fast and economical – older types are slow, less efficient, noise and vibrations.	

5.3 Factors affecting aircraft performance				
5.3.1	Be familiar with the factors affecting aircraft on take-off.	0	Runway characteristics and conditions, wind, temperature and aircraft weight.	
5.3.2	Be familiar with the factors affecting aircraft during climb.	0	Speed, weight, altitude, wind and temperature.	
5.2.3	Be familiar with the factors affecting aircraft at cruise.		Altitude, cruising speed, wind, effect of weight and air density on ceiling, cruising systems, i.e. LRC, cost index.	
5.3.4	Be familiar with the factors affecting aircraft during descent.	0	Wind, speed, rate of descent, aircraft configuration and pressurisation.	
5.3.5	Be familiar with the factors affecting aircraft during final approach and landing.	0	Wind, aircraft configuration, weight, meteorological and runway conditions.	
5.3.6	Be familiar with the factors affecting aircraft during missed approach and holding.	0	Flap setting, power setting, speeds.	
5.3.7	Be familiar with performance restrictions due to ecological constraints.	0	Fuel dumping, noise abatement procedures.	
5.4 Flight instruments				
5.4.1	List the basic flight instruments for VFR flights.	1	Magnetic compass, timepiece, pressure altimeter, airspeed indicator, etc.	ICAO Annex 6
5.4.2	List the additional flight instruments for IFR flights.	1	Turn and slip indicator, artificial horizon, directional gyroscope, rate of climb/descent, etc.	ICAO Annex 6
5.4.3	List the basic onboard navigation instruments.	1	To include: ADF, VOR (TACAN), DME, ILS, MLS, GNSS, INS, IRS.	
5.4.4	Be familiar with vital engine monitoring parameters.	0	Oil pressure and temperature, engine temperature, rpm, fuel state and flow, EGT, vibration, etc.	
5.4.5	Be familiar with the use of other cockpit instruments.	0	e.g. TCAS, Transponder mode CS, Head up display, (E)GPWS/TAWS,	ICAO Annex 10
			Wind Shear Indicator, Weather Radar, Autopilot, FMS, EFIS.	
5.5 Types and categories of aircraft				

4.5.1	List the different groups of aircraft.	1	Fixed wing, rotary wing, balloons, gliders, etc.	
4.5.2	State the wake-turbulence categories.	1	ICAO categories, national categories.	<i>Note: reference to FPL items</i>
4.5.3	Identify the most common types of aircraft in operational use.	1	Especially the most common local aircraft typical to the state/region.	<i>Note: reference to FPL items</i>
4.5.4	State the ICAO aircraft type designators and categories.	1	The most common local aircraft typical to the state/region.	ICAO Doc 8643

6 METEOROLOGY

The general objectives are to enable students to:

Understand the basics of meteorology;

Appreciate how meteorological phenomena affect airline operations and aircraft performance.

	6.1 Influence of meteorology on aviation			
6.1.1	Explain the relevance of meteorology to aviation.	2		ICAO Annex 3
	6.2 Atmosphere			
6.2.1	State the composition and structure of the atmosphere.	1	Gases, layers.	
6.2.2	Describe the main elements of the International Standard Atmosphere (ISA).	2	Temperature, pressure and density.	ICAO Doc 7488; ICAO Annex 8
6.2.3	State the reasons why the ISA has been defined.	1	Standardisation, reference data.	
6.2.4	Describe the characteristics of different types of air masses and their origin.	2	Polar, arctic, tropical, continental, maritime.	
6.2.5	Describe the major wind systems.	2	Polar east winds, west wind zone, trade winds, inner-tropical convergence zone.	
6.2.6	Describe high and low pressure systems.	2	Cyclones and anticyclones, ridges troughs.	
6.2.7	Describe the different types of fronts and the weather associated with them.	2	Fronts, warm, cold, occluded, squalls.	
6.2.8	Describe tropical meteorology	2	Storm, depression, hurricane,	
	6.3 Atmospheric processes			
6.3.1	Explain the processes by which heat is transferred and how the atmosphere is heated.	2	Radiation, convection, advection, conduction, turbulence.	
6.3.2	Describe temperature variation.	2	Lapse rates, land/sea variations, diurnal variation, inversion, freezing level.	

6.3.3	Differentiate between the different terms relating to air saturation levels.	2	Saturation, condensation, evaporation, relative humidity, dew point, sublimation, latent heat, spread super-cooled water.	ICAO Annex 3; ICAO Doc 8896
6.3.4	Explain the measurement of air pressure.	2	Barometer, hPa.	ICAO Annex 3; ICAO Doc 8896
6.3.5	Describe the relationship between pressure, temperature and height.	2	Boyle's Law, influence of changing density on engine performance.	
6.3.6	Define the various Pressure Data.	1	QFE, QNH, Standard Pressure Setting, altitude, height, flight level.	
	6.4 Meteorological phenomena			
6.4.1	Explain the different conditions necessary for the formation of clouds.	2	Saturation level, instability, adiabatic lifting processes.	
6.4.2	Explain how clouds are formed.	2	Advection, orographic lift, convection, rising along a warm front.	
6.4.3	Identify different cloud types and state their characteristics.	1	Stratus, Cumulus, etc.	
6.4.4	State how the amount of cloud is measured.	1	Okta, FEW, SCT, BKN, OVC, SKC.	ICAO Annex 3; ICAO Doc 8896
6.4.5	Explain the significance of precipitation in aviation.	2	Runway Conditions, icing.	
6.4.6	Describe all types of precipitation.	2	Rain, snow, sleet, hail, etc.	ICAO Doc 9328
6.4.7	Explain the causes of atmospheric obscurity.	2	Advection fog, radiation fog, mixing, evaporation, mist, drizzle, haze.	ICAO Doc 9328
6.4.8	State how visibility is measured.	1	Human eye, transmissometer.	ICAO Annex 3; ICAO Doc 8896; ICAO Doc 9328
6.4.9	Explain different types of visibility.	2	Meteorological visibility, RVR, slant visibility, prevailing visibility, flight visibility.	ICAO Doc 9328
6.4.10	Explain the different types of wind phenomena and their significance to aviation.	2	Veering, backing, gusting, jet streams, land/sea breezes, mountain/valley breezes, Föhn, surface wind, upper winds, Coriolis force.	
6.4.11	State how wind is measured.	1	Anemometer.	ICAO Annex 3; ICAO Doc 8896
6.4.12	List the significant meteorological phenomena hazardous to flight.	1	Turbulence, thunderstorms, icing, wind shear, micro bursts, wake turbulence, hail, CAT, freezing precipitation	

6.4.13	Describe their origins and impact on flight operations.	2		
6.5 Organisation of meteorological services				
6.5.1	Name the basic duties, organisation and working methods of MET offices.	1	Collating MET reports and making forecasts, drawing weather charts.	ICAO Annex 3; ICAO Doc 8896; AIP GEN 1.1.2, 3.5 AD 2.11 and 3.11
6.5.2	Be aware of the international and national standards for the exchange of meteorological data.	0		ICAO Annex 3; ICAO Doc 8896
6.5.3	Specify methods of collection and recovery of meteorological data.	1	Barometer, thermometer, ceilometers, anemometer, weather balloons, transmissometer, radar, satellites.	ICAO Annex 3
6.6 Meteorological information				
6.6.1	List the most common types of weather reports and forecasts.	1	METAR, SPECI, TAF, SIGMET, AIRMET, GAMET.	ICAO Annex 3; ICAO Doc 8896
6.6.2	Explain the contents of weather reports and forecasts.	2	Wind, visibility, clouds, temperature/dew point, pressure.	
6.6.3	List the most common types of weather charts.	1	Low level charts, High level charts significant weather charts.	ICAO Annex 3; ICAO Doc 8896
6.6.4	List the information depicted on the most commonly used weather charts.	1	Isobars, icing, turbulence, clouds, fronts, jet streams, temperature, wind signatures, etc.	

7. NAVIGATION

The general objective is to enable students to:

Understand the basic principles of navigation and air navigation systems.

	7.1 Introduction			
7.1.1	Explain the need for navigation in aviation.	2	Most economic route, safety, accuracy.	
7.1.2	Be aware of navigation methods used in aviation.	0	e.g. Historical overview, celestial, on-board, radio, satellites, navigation systems.	
	7.2 The Earth			
7.2.1	Describe the physical characteristics of the Earth.	2	Shape, size, rotation, revolution in space	
7.2.2	State the different temporal reference systems used in aviation.	1	Gregorian calendar, UTC, 24-hour local mean time, daylight saving time, time zones, dateline, atomic clocks, units of time measurement, beginning of the day – 0000, end of the day - 2359, SR and SS.	ICAO Annex 2; ICAO Annex 5; National AIP
7.2.3	Differentiate between UTC and local mean time.	2		National AIP GEN 2
7.2.4	List commonly used reference points/lines on the Earth's surface.	1	Meridians, parallels, equator, poles.	
7.2.5	Explain direction and distance on the earth.	2	(Units of measurement) Cardinal and inter-cardinal points, great circle, small circle, thumb lines, etc.	
7.2.6	Describe how a position on the Earth's surface is determined.	2	Latitude and longitude, units of measurement (degrees, minutes, seconds, NM, KM).	
7.2.7	Identify the general principles of horizontal reference system.	1	WGS-84 (World Geodetic System -1984).	ICAO Annex 4; ICAO Annex 11; ICAO Annex 15; ICAO Doc 9674
7.2.8	Identify the general principles of vertical reference system.	1	Mean sea level datum, Earth Gravitational Model 1996 (EGM – 96), local geoid models.	ICAO Annex 4; ICAO Annex 15; ICAO Doc 9674
7.2.9	Explain the general relationship between the Earth's magnetic field and the compass.	2	Magnetic variation, deviation, inclination, isogonals.	

7.2.10	Differentiate between the three north designations.	2	True north, magnetic north and compass north.	
	7.3 Projections			
7.3.1	Describe how the Earth is projected as a map.	2	Principle and types of projection	
7.3.2	Describe the properties of an ideal map.	2	Conformality, constant scale, true azimuth, distance, topography, accuracy.	
7.3.3	Explain the properties and uses of different projections.	2	Conformal Lambert, Mercator, Polar stereographic, middle latitude chart.	
	7.4 Applied navigation			
7.4.1	Explain how to measure the distance between two points.	2	Co-ordinates/points, ruler, protractor, computer, calculator (NM and minutes of a meridian).	
7.4.2	List types of aircraft speed.	1	True airspeed (Mach number), Indicated airspeed, Ground speed (knots, KM/h).	
7.4.3	Differentiate between air speeds.	2	True airspeed, Indicated airspeed.	
7.4.4	Explain the influence of wind on the flight path.	2	Heading, track, drift angle, wind correction angle, wind vector, flying time.	
	7.5 Navigation aids			
7.5.1	List the most common ground based aids to navigation.	1	NDB, VOR, DVOR, TACAN, DME, ILS & marker beacons, MLS, LORAN-C.	
7.5.2	Explain the working principles of ground based systems.	2	NDB, VOR, DVOR, TACAN, DME, ILS & marker beacons, MLS.	
7.5.3	Describe the use, precision and limitations of ground based systems.	2	NDB, VOR, DVOR, TACAN, DME, ILS and marker beacons, MLS, coverage and range.	
7.5.4	Identify the cockpit instrument/displays of	1	Analogue/multifunction displays	

	ground based systems.		(ADF, VOR, TACAN, DME, ILS and marker Beacons, MLS).	
7.5.5	Be aware of the working principles of VDF.	0	VDF used with or without RADAR (Controller's side) DRDF (Ref. 2.3.1 radio direction finding).	
7.5.6	Be aware of the use of on-board systems.	0	INS, IRS, FMS and navigational computers (area navigation) BRNAV, P-RNAV, EFIS (Electronic Flight Instrument System).	ICAO Doc 8168
7.5.7	Be aware of the use of satellite based navigational systems.	0	GNSS, ADS-B and C (Station holding).	ICAO Doc 8168

8. QUALITY MANAGEMENT SYSTEMS

The general objectives are to enable students to:

Understand the basic principles of quality management systems;

Being aware of the importance of quality management systems in air navigation services;

Describe the company's quality management system;

Apply pre-defined AIS processes within the quality management system.

	8.1 Introduction			
8.1.1	Define quality.	1		ICAO Annex 15; www.iso.org; ISO 8402
8.1.2	Describe a process.	2		www.iso.org
8.1.3	Explain the need for quality management	2		
8.1.4	Define a quality management system.	1		
8.1.5	List the benefits of a quality management system.	1		
	8.2 ISO (International Standards Organisation)			
8.2.1	State the objectives of ISO.	1		www.iso.org
8.2.2	Describe ISO 9000 series.	2		
8.2.3	Describe how ISO 9000 works.	2		www.iso.org
8.2.4	Explain the need for audits.	2	External, internal.	
8.2.5	Describe the certification process.	2		
8.2.6	State the importance of certification for ANSPs.	1		
	8.3 Key Performance Indicators (KPI)			
8.3.1	State company quality objectives.	1	e.g. Referring to core activities.	
8.3.2	Describe the role of a KPI.	2	Monitoring and continuous improvement.	
8.3.3	List AIS KPIs.	1	e.g. Customer satisfaction index, cost-effectiveness of AIS, staff capability, staff continuity, external co-ordination, re-work level, time spent on the product, security, traceability, user enquiries, availability, timeliness.	

8.3.4	Describe the most important KPIs for AIS customers.	2	Timeliness of data, user enquiries, traceability.	
8.3.5	Describe the most important KPIs for AIS organisations	2	Customer satisfaction index, rework level	
	8.4 ICAO and EUROCONTROL Requirements			
8.4.1	Explain the need to control the quality of data.	2	Accuracy, integrity and relevance of data, user requirements.	ICAO Annex 15
8.4.2	State the ICAO quality system requirements.	1		ICAO Annex 15
8.4.3	Describe the EUROCONTROL requirements for AIS data/ information quality management.	2	ESSIPs, European Commission	EUROCONTROL Strategic Guidance in Support of the Execution of the European Master Plan; EC Regulation 73/2010
	8.5 Company Quality Management System			
8.5.1	State the company policy on quality management.	1		Quality management policy
8.5.2	Describe the company's process model.	2		Process model
8.5.3	List the process levels.	1		Process model
8.5.4	Differentiate between process owner, process manager and process user.	2		Process model
	8.6 Company QMS Documentation			
8.6.1	Describe the structure of the QMS documentation.	2		Process description
8.6.2	State where to find the process document.	1		Process description
8.6.3	Describe the template.	2	Identify QMS document, its significance.	Process description
8.6.4	Describe the notification of changes in regulatory documents.	2		Process description

	Company AIS Processes			
8.7.1	Describe the AIS processes.	2		Process documentation
8.7.2	List AIS quality indicators.	1	KPIs, balanced score card.	Process documentation
8.7.3	Apply pre-defined AIS processes.	3	Relevant work instructions.	Process documentation

9. SAFETY MANAGEMENT SYSTEMS

The general objectives are to enable students to:

Understand the basic principles of safety management systems; Describe the impact of safety management systems to AIS/AIM.

	9.1 Principles of Safety Management			
9.1.1	Be aware of the underlying need for safety management policy and principles.	0	Lessons learnt from accidents, rising traffic levels, best practice.	
9.1.2	Be aware of the reactive and proactive nature of safety management policy and principles.	0	Nature of accidents, Reason Model, incident investigation, safety assessment.	
	9.2 ATS Safety Management			
9.2.1	State the responsibilities of the different authorities responsible for ATS safety management.	1	ICAO Annex 11; ICAO Doc 4444	
9.2.2	State the objectives of ATS safety management.	1		ICAO Doc 4444
9.2.3	List the main elements of an ATS safety management programme.	1		ICAO Doc 4444
9.2.4	Be aware of the need for incident reporting systems.	0		ICAO Doc 4444
9.2.5	State the need for safety reviews.	1		ICAO Doc 4444
9.2.6	Be aware of the scope of safety reviews.	0		ICAO Doc 4444
9.2.7	State the need for safety assessments.	1		ICAO Doc 4444
9.2.8	Be aware of safety enhancing measures.	0		ICAO Doc 4444
	9.3 EATM Safety Policy			
9.3.1	Be aware of the EATM Safety Policy Statement.		Safety management, safety responsibility, the priority of safety, the safety objective of an air navigation system.	European Safety Programme for ATM 2010-2014
9.3.2	Be aware of EATM safety management principles.		Safety management system framework, safety achievement, safety assurance; safety promotion, safety plan...	EATM Safety Management Handbook

9.4 Safety Regulations				
9.4.1	Be aware of the role of safety regulations.	0	Purpose of safety regulations, objectives of the national regulator, objectives of international safety institutions, European Aviation Safety Agency (EASA)	EC Regulations EUROCONTROL ESARR EASA publications
9.4.2	List the safety regulation documents.	1	EUROCONTROL Safety Regulatory Requirements (ESARRs), regulation advisory documentation, national regulations.	
9.4.3	Be aware of general safety regulatory requirements for ATM service personnel.	0		ESARR 5
9.4.4	Be aware of the impact of safety regulations on AIS.	0		
9.5 National and Company Safety Management Systems				
9.5.1	State the organisation of national safety management systems.	1		
9.5.2	Be aware of the working principles of the national safety management systems.	0		
9.5.3	State the organisation of the company's safety management system.	1		
9.5.4	Be aware of the company's safety management policy statement.	0		
9.5.5	Describe the working principles of the company's safety management system.	2		
9.5.6	List the publications or information provided by the company's safety management system.	1		
9.5.7	Describe the impact of safety management on AIM.	2		

10. HUMAN PERFORMANCE

The general objective is to enable students to: Appreciate the factors that affect personal performance; Appreciate the factors that affect team performance.

	10.1 Individual behaviour			
10.1.1	Recognise the differences and shared attributes that exist between people.	1	Attitudes, culture, language, etc.	
10.1.2	Recognise the danger of boredom.	1		
10.1.3	Recognise the danger of overconfidence and complacency.	1		
10.1.4	Recognise the danger of fatigue.	1	Sleep disturbance/deprivation, heavy workload.	
10.1.5	Identify factors involved in work satisfaction.	1		
10.1.6	Apply appropriate learning techniques.	3	Interactive methods, self-study, practical, etc.	
	10.2 Professional conduct			
10.2.1	Recognise the need for professional conduct in AIS.	1	Adherence to rules and regulations, quality and safety issues.	
	10.3 Teamwork			
10.3.1	Identify factors involved in human relations.	1	Team resource management.	
10.3.2	Describe the positive effect of learning and working together.	2	Sharing knowledge and experiences.	
10.3.3	Describe the principles of team work.	2	Team membership, group dynamics, conflict and conflict solutions.	
10.3.4	Identify leader style and group interaction.	1		
	10.4 Stress			
10.4.1	Define "stress".	1		

10.4.2	Recognise the symptoms and sources of stress.	1	Behavioural changes, lifestyle changes, physical symptoms, crisis events.	EUROCONTROL Human Factors Module: Critical Incident Stress Management.
10.4.3	Recognise the stages of stress.	1	Stress performance curve.	
10.4.4	Name techniques for stress management.	1	Relaxation techniques, diet and lifestyle, exercise.	
	10.5 Human error			
10.5.1	Define "human error".	1		
10.5.2	Describe the factors that help to cause error.	2	Fatigue, lack of skill, misunderstanding, distraction, etc.	
10.5.3	List types of error.	1	Mistakes, violations, lapse, etc.	
10.5.4	Explain the danger of violations becoming accepted as practice.	2		
	10.6 Interpersonal communication			
10.6.1	Define "communication".	1		
10.6.2	Define "the communication process".	1	Sender, encoder, transmitter, signal, interference, reception, decoder, receiver.	
10.6.3	Describe the factors that affect verbal communication.	2	Word choice, intonation, speed, tone, distortion, expectation, noise, interruption.	
10.6.4	Describe the factors that affect nonverbal communication.	2	Touch, sight, sound, choice, body language, expectation, distortion, interruption.	
10.6.5	List good communication practices.	1	Speaking, listening, visual communication.	
	10.7 The working environment			
10.7.1	Define "ergonomics".	1		
10.7.2	Recognise the need for good workplace design.	1	Light, insulation, décor, space, facilities, etc.	
10.7.3	Recognise the need for effective design at the workstation.	1	Good seating position, avoid strain, etc.	

10.7.4	Identify equipment at a workstation.	1	Communication means, information monitors, computer, printer, etc.	
	10.8 Health and well-being			
10.8.1	Recognise the effect of health on performance.	1	Fitness, diet, drugs, alcohol, etc.	
10.8.2	Be aware of company policy on healthcare.	0	Preventive programmes.	
10.8.3	State the company programmes on healthcare.	1		
10.8.4	Be aware of resources available for counselling.	0		

11. EQUIPMENT AND SYSTEMS

The general objectives are to enable students to:

Recognise the equipment and systems that are in general use in ANS;

Appreciate how this equipment and systems contribute to safe and efficient ANS; Use computer and other equipment required for AIS functions.

	11.1 ANS equipment			
11.1.1	Recognise the main items of ANS equipment.	1	Communications systems, surveillance systems, safety systems.	
11.1.2	Recognise the main items of AIS equipment.	1	Communications systems, data processing systems, plotting systems.	
	11.2 Communications systems			
10.2.1	State the principles of radio.	1		
10.2.2	Recognise the characteristics of radio waves.	1	Propagation limitations.	
10.2.3	State the use, characteristics and limitations of frequency bands.	1	Use in ATS, navigation and communications, usage and application in the Aeronautical Mobile Service, VHF, UHF, HF.	
10.2.4	State the use of radio in ANS.	1		
10.2.5	Describe the working principles of a transmitting and receiving system.	2		
10.2.6	Recognise, on a basic block diagram, the components of a transmitter/receiver system.	1		
10.2.7	State the principles of VDF/UDF.	1	VDF/UDF, QDM, QDR, QTF.	
10.2.8	State the precision of VDF/UDF used in the national system.	1		
10.2.9	State the use of other communications systems in ANS.	1	Telephone, interphone, intercom, email, internet, fax, etc.	
10.2.10	State the use of SELCAL and ACARS.	1	Airline operations.	
10.2.11	State the use of data link communications.	1	CPDLC.	

11.3 Aeronautical telecommunications systems				
11.3.1	List the main telecommunications networks used for the exchange of information.	1	AFTN, SITA, CIDIN, ATN, AMHS.	ICAO Annex 10; ICAO Annex 15; ICAO Doc 8126
11.3.2	Describe the main features of these networks.	2		ICAO Annex 10
11.3.3	Identify messages sent via these networks.	1	NOTAM, ATS and MET messages, etc.	
11.3.4	Recognise the benefits of the automatic exchange of AIS data.	1	Accuracy, speed, security, nonverbal communication.	
11.3.5	Recognise the limitations of the automatic exchange of AIS data.	1	Non-recognition of systems failure.	
11.3.6	State the working principles of broadcasting systems.	1	e.g. ATIS, VOLMET.	
11.3.7	Explain the use of these broadcasting systems in ATS.	2		
11.3.8	State the principles of closed circuit information systems.	1	CCIS.	
11.3.9	Explain the use of CCIS in AIS.	2	Data carried on CCIS.	
11.4 Surveillance systems				
11.4.1	State the principles of radar.	1		
11.4.2	Recognise the characteristics of radar waves.	1		
11.4.3	Recognise the use of different types of radar.	2	Long and short range radars, weather radar, high resolution radars.	
11.4.4	Recognise the characteristics, including limitations, of different types of radar.	1	Frequency bands, long and short range radars, weather radar, high resolution radars.	
11.4.5	Explain the working principles of primary radar.	2	PSR.	
11.4.6	Explain the working principles of secondary surveillance radar.	2	SSR, Mode A, Mode C.	
11.4.7	State the uses of PSR and SSR in ATC.	1	Surface movement, DFTI, PAR/GCA, aerodrome, approach and en-route.	
11.4.8	List the advantages and disadvantages of PSR and SSR.	1		
11.4.9	State the principles of Mode S.	1		

11.4.10	Recognise the use of Mode S in ATC systems.	1		
11.4.11	State the working principles of Automatic Dependent Surveillance systems.	1	ADS, satellite systems (GPS, GNSS), data links.	
11.4.12	Be aware of the use and limitations of ADS.	0	Situational awareness, Update times, no voice prompts, universal availability.	
	11.5 Computerisation			
11.5.1	State the difference between hardware and software.	1		
11.5.2	Recognise hardware components.	1	Terminal, printer, keyboard, monitor, modem, network, etc.	
11.5.3	Recognise software components.	1	Programmes and applications, operating systems, files, etc.	
11.5.4	Describe common operating systems.	2	DOS, UNIX, LINUX, WINDOWS, etc.	
11.5.5	Use input devices.	3	Mouse, keyboard, touch input display, etc.	
11.5.6	Use text processing applications.	3	e.g. MS Word, Excel.	
11.5.7	Use information storage devices.	3	File systems, CD-ROM, DVD, memory stick, etc.	