NPPL to PPL (A) Bridging Examinations
081 Principles of Flight Learning Objectives

Syllabus Reference	Syllabus details & Associated Learning Objective	NPPL to PPL
080.00.00.00	**PRINICIPLES OF FLIGHT**	
081.00.00.00	**PRINCIPLES OF FLIGHT: AEROPLANE**	
081.01.00.00	**Subsonic aerodynamics**	
081.01.01.00	**Basics concepts, laws and definitions**	
081.01.01.01	Laws and definitions:	x
	(a) conversion of units;	x
	(b) Newton´s laws;	x
	(c) Bernoulli's equation and venture;	x
	(d) static pressure, dynamic pressure and total pressure;	x
	(e) density;	x
	(f) IAS and TAS.	x
081.01.01.02	Basics about airflow:	x
	(a) streamline;	x
	(b) two-dimensional airflow;	x
	(c) three-dimensional airflow.	x
081.01.01.03	Aerodynamic forces on surfaces:	x
	(a) resulting airforce;	x
	(b) lift;	x
	(c) drag;	x
	(d) angle of attack.	x
081.01.01.04	Shape of an aerofoil section:	x
	(a) thickness to chord ratio;	x
	(b) chord line;	x
	(c) camber line;	x
	(d) camber;	x
	(e) angle of attack.	x
081.01.01.05	The wing shape:	x
	(a) aspect ratio;	x
	(b) root chord;	x
	(c) tip chord;	x
	(d) tapered wings;	x
	(e) wing planform.	x
081.02.01.00	**The two-dimensional airflow about an aerofoil**	
081.02.01.01	Streamline pattern	x
081.02.01.02	Stagnation point	x
081.02.01.03	Pressure distribution	x
081.02.01.04	Centre of pressure	x
081.02.01.05	Influence of angle of attack	x
081.02.01.06	Flow separation at high angles of attack	x
081.02.01.07	The lift – α graph	x

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081.03.01.00	**The coefficients**	
081.03.01.01	The lift coefficient Cl: the lift formula	x
081.03.01.02	The drag coefficient Cd: the drag formula	x
081.04.01.00	**The three-dimensional airflow round a wing and a fuselage**	
081.04.01.01	Streamline pattern:	x
	(a) span-wise flow and causes;	x
	(b) tip vortices and angle of attack;	x
	(c) upwash and downwash due to tip vortices;	x
	(d) wake turbulence behind an aeroplane (causes, distribution and	x
081.04.01.02	Induced drag:	x
	(a) influence of tip vortices on the angle of attack;	x
	(b) the induced local α;	x
	(c) influence of induced angle of attack on the direction of the lift vector;	x
	(d) induced drag and angle of attack.	x
081.05.01.00	**Drag**	
081.05.01.01	The parasite drag:	x
	(a) pressure drag;	x
	(b) interference drag;	x
	(c) friction drag.	x
081.05.01.02	The parasite drag and speed	x
081.05.01.03	The induced drag and speed	x
081.05.01.04	The total drag	x
081.06.01.00	**The ground effect**	
081.06.01.01	Effect on take off and landing characteristics of an aeroplane	x
081.07.01.00	**The stall**	
081.07.01.01	Flow separation at increasing angles of attack:	x
	(a) the boundary layer:	x
	(1) laminar layer;	x
	(2) turbulent layer;	x
	(3) transition.	x
	(b) separation point;	x
	(c) influence of angle of attack;	x
	(d) influence on:	x
	(1) pressure distribution;	x
	(2) location of centre of pressure;	x
	(3) CL;	x
	(4) CD;	x
	(5) pitch moments.	x
	(e) buffet;	x
	(f) use of controls.	x

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081.07.01.02	The stall speed:	x
	(a) in the lift formula;	x
	(b) 1g stall speed;	x
	(c) influence of:	x
	(1) the centre of gravity;	
	(2) power setting;	x
	(3) altitude (IAS);	
	(4) wing loading;	x
	(5) load factor n:	x
	(i) definition;	x
	(ii) turns;	x
	(iii) forces.	x
081.07.01.03	The initial stall in span-wise direction:	x
	(a) influence of planform;	x
	(b) geometric twist (wash out);	x
	(c) use of ailerons.	x
081.07.01.04	Stall warning:	x
	(a) importance of stall warning;	x
	(b) speed margin;	x
	(c) buffet;	x
	(d) stall strip;	x
	(e) flapper switch;	x
	(f) recovery from stall.	x
081.07.01.05	Special phenomena of stall:	x
	(a) the power-on stall;	x
	(b) climbing and descending turns;	x
	(c) t-tailed aeroplane;	x
	(d) avoidance of spins:	x
	(1) spin development;	x
	(2) spin recognition;	x
	(3) spin recovery.	x
	(e) ice (in stagnation point and on surface):	x
	(1) absence of stall warning;	x
	(2) abnormal behaviour of the aircraft during stall.	x
081.08.01.00	**CL augmentation**	
081.08.01.01	Trailing edge flaps and the reasons for use in take-off and landing:	x
	(a) influence on CL - α-graph;	x
	(b) different types of flaps;	x
	(c) flap asymmetry;	x
	(d) influence on pitch movement.	x
081.08.01.03	Leading edge devices and the reasons for use in take-off and landing	x
081.09.01.00	**The boundary layer**	
081.09.01.01	Different types:	x
	(a) laminar;	x
	(b) turbulent.	x

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081.10.00.00	**Special circumstances**	
081.10.00.01	Ice and other contamination:	x
	(a) ice in stagnation point;	x
	(b) ice on the surface (frost, snow and clear ice);	x
	(c) rain;	x
	(d) contamination of the leading edge;	x
	(e) effects on stall;	x
	(f) effects on loss of controllability;	x
	(g) effects on control surface moment;	x
	(h) influence on high lift devices during takeoff, landing and low speeds.	x
081.11.00.00	**Stability**	
081.11.01.00	**Condition of equilibrium in steady horizontal flight**	
081.11.01.01	Precondition for static stability	x
081.11.01.02	Equilibrium:	x
	(a) lift and weight;	x
	(b) drag and thrust.	x
081.12.00.00	**Methods of achieving balance**	x
081.12.01.01	Wing and empennage (tail and canard)	x
081.12.01.02	Control surfaces	x
081.12.01.03	Ballast or weight trim	x
081.13.00.00	**Static and dynamic longitudinal stability**	
081.13.01.01	Basics and definitions:	x
	(a) static stability, positive, neutral and negative;	x
	(b) precondition for dynamic stability;	x
	(c) dynamic stability, positive, neutral and negative.	x
081.13.01.02	Location of centre of gravity:	x
	(a) aft limit and minimum stability margin;	x
	(b) forward position;	x
	(c) effects on static and dynamic stability.	x
081.14.00.00	**Dynamic lateral or directional stability**	
081.14.01.01	Spiral dive and corrective actions	x
081.15.00.00	**Control**	
081.15.01.00	**General**	
081.15.01.01	Basics, the three planes and three axis	x
081.15.01.02	Angle of attack change	x
081.16.01.00	**Pitch control**	
081.16.01.01	Elevator	x
081.16.01.02	Downwash effects	x
081.16.01.03	Location of centre of gravity	x
081.17.01.00	**Yaw control**	
081.17.01.01	Pedal or rudder	x

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081.17.02.00	**Roll control**	
081.17.02.01	Ailerons: function in different phases of flight	x
081.17.02.02	Adverse yaw	x
081.17.02.03	Means to avoid adverse yaw:	x
	(a) frise ailerons;	x
	(b) differential ailerons deflection.	x
081.18.01.00	**Means to reduce control forces**	
081.18.00.01	Aerodynamic balance:	x
	(a) balance tab and anti-balance tab;	x
	(b) servo tab.	x
081.19.01.00	**Mass balance**	
081.19.00.00	Reasons to balance: means	x
081.20.01.00	**Trimming**	
081.20.01.01	Reasons to trim	x
081.20.01.02	Trim tabs	x
081.21.00.00	**Limitations**	
081.21.01.00	**Operating limitations**	
081.21.01.01	Flutter	x
081.21.01.02	Vfe	x
081.21.01.03	Vno, Vne	x
081.22.01.00	**Manoeuvring envelope**	
081.22.01.01	Manoeuvring load diagram:	x
	(a) load factor;	x
	(b) accelerated stall speed;	x
	(c) Va;	x
	(d) manoeuvring limit load factor or certification category.	x
081.22.01.02	Contribution of mass	x
081.23.01.00	**Gust envelope**	
081.23.01.01	Gust load diagram	x
081.23.01.02	Factors contributing to gust loads	x
081.24.00.00	**Propellers**	
081.24.01.00	**Conversion of engine torque to thrust**	
081.24.01.01	Meaning of pitch	x
081.24.01.02	Blade twist	x
081.24.01.03	Effects of ice on propeller	x
081.25.01.00	**Engine failure or engine stop**	
081.25.01.01	Windmilling drag	x
081.26.01.00	**Moments due to propeller operation**	
081.26.01.01	Torque reaction	x
081.26.01.02	Asymmetric slipstream effect	x
081.26.01.03	Asymmetric blade effect	x

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081.27.00.00	**Flight mechanics**	
081.27.01.00	**Forces acting on an aeroplane**	
081.27.01.01	Straight horizontal steady flight	x
081.27.01.02	Straight steady climb	x
081.27.01.03	Straight steady descent	x
081.27.01.04	Straight steady glide	x
081.27.01.05	Steady coordinated turn:	x
	(a) bank angle;	x
	(b) load factor;	x
	(c) turn radius;	x
	(d) rate one turn.	x