AVIA: Basic Aerodynamics

Module Title:	Basic Aerodynamics
Language of Instruction:	English

Credits:	10

NFQ Level:	6

Module Delivered In	1 programme(s)

Teaching & Learning Strategies:	A combination of lectures, class discussion and demonstrations will be used. Particular emphasis will be placed on active learning including problem / project based learning.

Module Aim:	The student will understand basic and intermediate aerodynamic concepts and how they apply to an aircraft during all stages of flight so they develop simple aerodynamic analytical and troubleshooting skills.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Explain the theoretical fundamentals of the International Standard Atmosphere (ISA)
LO2	Describe basic aerodynamic fundamentals with the aid of simple sketches/drawings
LO3	Calculate flight forces in steady climbs, descents, glides and turns and give general descriptions of Theory of flight, Airplane Aerodynamics, Flight Controls and Stability
LO4	Describe common terms associated with high speed flight
LO5	Give a simple description of the operation and effect of rotary wing dynamics

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
No requirements listed

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Module Content & Assessment

Indicative Content
Physics of the Atmosphere International Standard Atmosphere (ISA), application to aerodynamics
Aerodynamics Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash and downwash, vortices, stagnation; The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.
Theory of Flight Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation
Flight Stability and Dynamics Longitudinal, lateral and directional stability (active and passive).
High Speed Flight Speed of sound, pressure waves from a moving source, compressibility, Mach number, flight speed classifications, subsonic and supersonic flow patterns, development of shock waves, shock stall.
Rotary wing aerodynamics Rotor systems, flight controls, hovering flight, coriolis and ground effect, gyroscopic precession, transverse flow, disymmetry of lift, autorotation.
Technical Graphics Technical drawing terminology and basics, orthographic projection, sectioning, tangents to circles. CAD engineering drawing basics, modifying, layering, dimensioning.

Assessment Breakdown	%
Continuous Assessment	30.00%
End of Module Formal Examination	70.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Essay	Continuous assessment tests during term time covering Learning Outcomes 1-5.	1,2,3,4,5	30.00	Sem 1 End

No Project

No Practical

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	Each student will sit a formal written examination at the end of the module	1,2,3,4,5	70.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Part Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	Per Semester	1.28
Independent Learning Time	Per Semester	8.72
	Total Hours	250.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_BSFOP_D	Bachelor of Science in Flight Operations	1	Mandatory