PHYS H1604: Physics

Module Title:	Physics
Language of Instruction:	English

Credits:	10

NFQ Level:	6

Module Delivered In	No Programmes

Teaching & Learning Strategies:	Lectures: A series of lectures, using whiteboard, data projector and video, will initiate and broaden the students' knowledge of the scientific principles on which aircraft components are based. The initial stages of the module will involve 'everyday' science topics. Practicals: A series of demonstrations and practical exercises designed to motivate the interest of the students in learning the scientific principles.

Module Aim:	To give the students an understanding of the scientific principles underlying Aircraft Systems and components with emphasis on the underlying principles of Statics, Fluid Dynamics and Thermodynamics.

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Describe the nature, structure and properties of the various phases of matter
LO2	Solve simple problems in mechanics, dynamics, fluid dynamics, thermodynamics, light and sound involving simple physical laws
LO3	Perform algebraic manipulations and substitutions of physical formulae to solve problems using appropriate units
LO4	Measure and record experimental data and make appropriate analyses using graphs and/or calculations
LO5	Explain the application of physical laws in the design, construction and operation of aircraft, and the wider aircraft industry

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
Matter Nature of matter: the chemical elements, structure of atoms, molecules; Chemical compounds. States: solid, liquid and gaseous; Changes between states.
Statics Forces, moments and couples, representation as vectors; Centre of gravity. Elements of theory of stress, strain and elasticity: tension, compression, shear and torsion; Nature and properties of solid, fluid and gas; Pressure and buoyancy in liquids (barometers).
Kinetics Linear movement: uniform motion in a straight line, motion under constant acceleration (motion under gravity); Rotational movement: uniform circular motion (centrifugal/centripetal forces); Periodic motion: simple harmonic motion; Simple theory of vibration, harmonics and resonance; Velocity ratio, mechanical advantage and efficiency.
Dynamics Mass Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency; Momentum, conservation of momentum; Impulse; Gyroscopic principles; Friction: nature and effects, coefficient of friction (rolling resistance).
Fluid Dynamics Specific gravity and density; Viscosity, fluid resistance, effects of streamlining; effects of compressibility on fluids; Static, dynamic and total pressure: Bernoulli's Theorem, venturi.
Thermodynamics Temperature: thermometers and temperature scales: Celsius, Fahrenheit and Kelvin; Heat definition. Heat capacity, specific heat; Heat transfer: convection, radiation and conduction; Volumetric expansion; First and second law of thermodynamics; Gases: ideal gases laws; specific heat at constant volume and constant pressure, work done by expanding gas; Isothermal, adiabatic expansion and compression, engine cycles, constant volume and constant pressure, refrigerators and heat pumps; Latent heats of fusion and evaporation, thermal energy, heat of combustion.
Optics (Light) Nature of light; speed of light; Laws of reflection and refraction: reflection at plane surfaces, reflection by spherical mirrors, refraction, lenses; Fibre optics.
Wave Motion and Sound Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves; Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect.

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	20.00%
End of Module Formal Examination	70.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Other	Class test, online test	1,2,3,5	10.00	n/a

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Practical sessions will be held incorporating demonstrations and individual exercises for each student. The student will be expected to write a report for each demonstration / exercise. Some of these reports may be research–based only.	4	20.00	n/a

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 for which a maximum of 70% will be awarded.	1,2,3,5	70.00	End-of-Semester

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

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	Every Week	2.50
Practicals	Every Week	1.00
Independent Learning	Every Week	3.00
	Total Hours	6.50