

Module Title:	Piston Engine
Language of Instruction:	English
Credits:	5
NFQ Level:	7
Module Delivered In	No Programmes
Teaching & Learning Strategies:	Teaching will be conducted through lectures and practicals. The Institute MLE will be used to evaluate the student's understanding of the basic concepts during each section, including using multiple choice questions. The practical sessions will be used to back up the theory.
Module Aim:	The aim of this module is to introduce the student to the principles of piston engine operation on aircraft.
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Describe the fundamental operating principles of aircraft piston engines.
LO2	Explain the design, construction and operation of aircraft piston engines.
LO3	Explain the design, construction and operation of ancillary systems.
LO4	Calculate parameters relating to aircraft piston engine performance.
LO5	Outline and perform maintenance tasks on aircraft piston engines.
Pre-requisite learning	
Module Recommendations	
<i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
Incompatible Modules	
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements	
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

Module Content & Assessment

Indicative Content

Fundamentals

Mechanical, thermal and volumetric efficiencies, 2 stroke and 4 stroke engine operating principles, Otto, Diesel and Dual thermodynamic cycles, piston displacement and compression ratio, engine configuration and firing order.

Engine Performance

Power calculation and measurement, efficiency and performance calculations, thermodynamic cycles, factors affecting engine power, mixtures and leaning, pre-ignition, detonation.

Engine Construction

Crankcase, crankshaft, camshafts, sumps, accessory gearbox, cylinder and piston assemblies, connecting rods, inlet and exhaust manifolds, valve mechanisms, propeller reduction gearboxes.

Engine Fuel Systems

Carburetors, types, construction and principles of operation, icing and heating, fuel injection systems, types, construction and principles of operation, electronic engine control, operation of engine control and fuel metering systems including electronic engine control (FADEC), systems layout and components.

Starting and Ignition Systems

Starting systems, pre-heat systems, magneto types, construction and principles of operation, ignition harnesses, spark plugs, low and high tension systems, auxiliary starting systems.

Induction, Exhaust and Cooling Systems

Construction and operation of induction systems including alternate air systems, exhaust systems, engine cooling systems (air and liquid).

Supercharging / Turbocharging

Principles and purpose of supercharging and its effects on engine parameters, construction and operation of supercharging / turbocharging systems, system terminology, control systems, system operation and system protection.

Lubricants and Fuels

Properties and specifications, fuel additives, safety precautions.

Lubrication Systems

System operation, layout and components.

Engine Indication Systems

Engine speed, cylinder head temperature, coolant temperature, oil pressure and temperature, exhaust gas temperature, fuel pressure and flow, manifold pressure, engine rpm, mechanical displacement.

Powerplant Installation

Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.

Engine Monitoring and Ground Operation

Procedures for starting and ground run-up, interpretation of engine power output and parameters, inspection of engine and components (criteria, tolerances and data specified by engine manufacturer).

Engine Storage and Preservation

Preservation and depreservation for the engine, accessories and systems.

Engine Diagnostics

Engine control unit (ECU), on board diagnostics (OBD), scan tools, diagnostic procedures.

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	Students will sit MCQ exams during the module and complete other coursework.	1,2,3,4	10.00	Week 8

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	As part of the programme students will be expected to complete practical assignments and tests and complete other coursework.	5	20.00	Every Week

End of Module Formal Examination				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Formal Exam	Final Written Exam	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: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	1.00
Practicals	Every Week	0.50
Independent Learning	Every Week	2.00
Total Hours		3.50

