

<b>Module Title:</b>	Maintenance Practices
<b>Language of Instruction:</b>	English
<b>Credits:</b>	10
<b>NFQ Level:</b>	6
<b>Module Delivered In</b>	<a href="#">2 programme(s)</a>
<b>Teaching &amp; Learning Strategies:</b>	The following tools will be used to teach this module: • Practical project assignments prepared using project based learning techniques • Workshop training sessions to enhance student practical skills • Practical demonstrations of all tooling and equipment • Practical skill development by completing various work pieces
<b>Module Aim:</b>	The student will be able to understand, identify and correctly handle standard materials, components, and hardware, as well as comply with safety procedures and basic standard practices that are commonly used throughout the aircraft industry.

Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Understand the requirement for health and safety in a workshop environment
LO2	Describe the standard maintenance practices that are employed in aircraft maintenance
LO3	Use standard aircraft maintenance tools and procedures and be cognisant of any ethical issues pertaining to their use
LO4	Describe and use the various manuals that are synonymous with Aircraft Maintenance e.g. Maintenance Manual, Wiring Diagram Manual
LO5	Perform standard calculations that may be used in aircraft maintenance
LO6	Use a computer application that will aid the engineer in a design and maintenance environment

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

<b>Indicative Content</b>
<p><b>Safety Precautions - Aircraft and Workshop</b> Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.</p>
<p><b>Workshop Practices</b> Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards</p>
<p><b>Tools</b> Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment;</p>
<p><b>Avionic General Test Equipment</b> Operation, function and use of avionic general test equipment</p>
<p><b>Engineering Drawings, Diagrams and Standards</b> Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams. Use of a 3D CAD package.</p>
<p><b>Fits and Clearances</b> Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.</p>
<p><b>Electrical Wiring Interconnection System (EWIS)</b> Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Identification of wire types, their inspection criteria and damage tolerance; Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding; EWIS installations, inspection, repair, maintenance and cleanliness standards.</p>
<p><b>Riveting</b> Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.</p>
<p><b>Pipes and Hoses</b> Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes</p>
<p><b>Springs</b> Inspection and testing of springs</p>
<p><b>Bearings</b> Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.</p>
<p><b>Transmissions</b> Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems</p>
<p><b>Control Cables</b> Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems</p>
<p><b>Material handling</b> Sheet Metal. Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work. Composite and non-metallic. Bonding practices; Environmental conditions Inspection methods</p>
<p><b>Welding, Brazing, Soldering and Bonding</b> Soldering methods; inspection of soldered joints. Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints</p>
<p><b>Aircraft Weight and Balance</b> Centre of Gravity/Balance limits calculation: use of relevant documents; Preparation of aircraft for weighing; Aircraft weighing;</p>
<p><b>Aircraft Handling and Storage</b> Aircraft taxiing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling/defuelling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.</p>
<p><b>Disassembly, Inspection, Repair and Assembly Techniques</b> Types of defects and visual inspection techniques. Corrosion removal, assessment and reprotection. General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes; Non destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods. Disassembly and re-assembly techniques. Trouble shooting techniques</p>
<p><b>Abnormal Events</b> Inspections following lightning strikes and HIRF penetration. Inspections following abnormal events such as heavy landings and flight through turbulence.</p>
<p><b>Maintenance Procedures</b> Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures. Control of life limited components, Ethical considerations for engineers</p>

<b>Assessment Breakdown</b>	<b>%</b>
Continuous Assessment	10.00%
Practical	20.00%
End of Module Formal Examination	70.00%

<b>Continuous Assessment</b>				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Short Answer Questions	Each student will take short answer question exams, administered during term time for which a maximum of 5% will be awarded.	1,2,3,4,5	10.00	Week 23

No Project
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<b>Practical</b>				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Practical/Skills Evaluation	Each student will complete a series of practical tasks during the module with a brief task report, administered during term time for which a maximum of 20% will be awarded.	3,4,6	20.00	n/a

<b>End of Module Formal Examination</b>				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Formal Exam	Each student will sit a formal written examination a the end of the module for which a maximum of 70% will be awarded.	1,2,4,5	70.00	End-of-Semester

**ITCarlow reserves the right to alter the nature and timings of assessment**

**Module Workload**

<b>Workload: Full Time</b>		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	3.00
Practicals	Every Week	2.50
Tutorial	Every Week	0.50
	Total Hours	6.00

**Module Delivered In**

Programme Code	Programme	Semester	Delivery
CW_EEAER_B	<a href="#">Bachelor of Engineering (Honours) in Aerospace Engineering</a>	3	Mandatory
CW_EEACS_D	<a href="#">Bachelor of Engineering in Aircraft Systems</a>	3	Mandatory