

Module Title:	Aviation Construction Materials and Hardware
Language of Instruction:	English
Credits:	5
NFQ Level:	6
Module Delivered In	2 programme(s)
Teaching & Learning Strategies:	This module will be taught by lectures, tutorials and practical tasks, with reference to standard aircraft materials, hardware and test equipment.
Module Aim:	The student will be able to identify standard aircraft hardware, perform aircraft assembly tasks and apply materials testing 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	Identify the properties and characteristics of ferrous, non-ferrous and composite materials.
LO2	Describe the fundamentals of corrosion formation.
LO3	Assemble aircraft components and sub-assemblies of a light aircraft as described in the aircraft assembly manuals.
LO4	Classify aircraft hardware components such as screws, bolts, locking devices, pipes and unions, bearings, transmissions, control cables and their application to aviation.
LO5	Evaluate commonly-used materials testing procedures on aircraft materials.
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

Aircraft Materials – Ferrous and Non-Ferrous

Characteristics, properties and identification of common alloy steels used in aircraft. Heat treatment and application of alloy steels. Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.

Aircraft Materials - Composite and Non-Metallic

Composite and non-metallic materials. Characteristics, properties and identification of common composite and non-metallic materials used in aircraft. Sealant and bonding agents. The detection of defects/deterioration in composite and non-metallic material. Repair of composite and non-metallic material.

Wooden Structures

Construction methods of wooden airframe structures. Characteristics, properties and types of wood and glue used in aeroplanes. Preservation and maintenance of wooden structures. Detection of defects and repair methods for wood material and wooden structures. Characteristics, properties and types of fabrics used in aeroplanes. Inspection and repair methods for fabric coverings.

Corrosion

Chemical fundamentals. Formation by galvanic action processes, microbiological growth and stress. Types of corrosion and their identification. Material types and susceptibility to corrosion.

Fasteners

Screw threads and nomenclature, thread forms, dimensions and tolerances for standard threads used in aircraft. Measuring screw threads. Bolts, studs and screws. Bolt type, specification, identification and marking of aircraft bolts, international standards. Nuts, self locking, anchor, standard types. Machine screws aircraft specifications. Studs, types and uses, insertion and removal. Self tapping screws and dowels. Locking devices, tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins. Aircraft rivets, types of solid and blind rivets, specifications and identification, heat treatment.

Pipes and Unions

Rigid and flexible pipes and their connectors used in aircraft. Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.

Springs

Types of springs, materials, characteristics and applications.

Bearings

Purpose of bearings, loads, material, construction. Types of bearings and their application.

Transmissions

Gear types and their application. Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns. Belts and pulleys, chains and sprockets.

Control Cables

Types of cables. End fittings, turnbuckles and compensation devices. Pulleys and cable system components, bowden cables. Aircraft flexible control systems.

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	30.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Each student will take a class test administered during term time.	1,2	10.00	n/a

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Each student will complete assembly of aircraft components and sub-assemblies as outlined in the aircraft manufacturer assembly manual. Aircraft materials testing will be demonstrated during lab sessions. Completed task cards, a brief report and team presentation will be assigned 20% of the total module mark.	3,4,5	30.00	Sem 1 End

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.	1,2,3,4,5	60.00	End-of-Semester

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	12 Weeks per Stage	2.00
Practicals	12 Weeks per Stage	3.00
Independent Learning	15 Weeks per Stage	4.33
Total Hours		125.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EEAER_B	Bachelor of Engineering (Honours) in Aerospace Engineering	4	Mandatory
CW_EEACS_D	Bachelor of Engineering in Aircraft Systems	4	Mandatory