

Module Title:	Avionics 1
Language of Instruction:	English
Credits:	10
NFQ Level:	6
Module Delivered In	2 programme(s)
Teaching & Learning Strategies:	A combination of lectures, class discussion, tutorial, laboratory exercises and demonstrations will be used. Emphasis will be placed on active learning including problem and/or project based learning.
Module Aim:	To give students an understanding of digital electronics and avionics systems. Provide an appreciation of how the combination of digital sub-circuits form an overall functioning avionic system.
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Classify the different numbering systems and their applications in digital electronics.
LO2	Describe the process of conversion of analogue data for digital transmission using different types of transmission media.
LO3	Identify digital systems schematics and test the operation of these systems.
LO4	Describe the principle of operation of different microprocessors and demonstrate how these devices are interfaced to peripherals.
LO5	Illustrate the general arrangement of typical avionic and digital systems installed in civilian aircraft.
LO6	Describe common types of data-bus systems on modern aircraft.
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

Numbering Systems and digital electronics

Numbering Systems: Binary, Octal and Hexadecimal; Demonstration of conversions between Decimal and Binary, Octal and Hexadecimal systems and vice versa

Data Conversion

Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.

Logic Circuits

Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams. Interpretation of logic diagrams.

Basic Computer Structure

Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems). Computer related terminology; Operation, layout and interface of the major components in a micro-computer including their associated bus systems; Information contained in single and multi-address instruction words; Memory associated terms; Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems.

Microprocessors

Functions performed and overall operation of a microprocessor; Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit

Integrated Circuits

Operation and use of encoders and decoders; Function of encoder types

Multiplexing

Operation, application, and identification in logic diagrams of multiplexers and demultiplexers.

Software Management Control

Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes

Typical Electronic/Digital Aircraft Systems

Cockpit layout, general arrangement of typical electronic/digital Aircraft Systems and associated BITE (Built In Test Equipment) testing such as: ACARS-ARINC Communication and Addressing and Reporting System, ECAM-Electronic Centralised Aircraft Monitoring, ADS, EFIS-Electronic Flight Instrument System, EICAS-Engine Indication and Crew Alerting System, FBW-Fly by Wire, FMS-Flight Management System, GPS-Global Positioning System, IRS-Inertial Reference System, TCAS-Traffic Alert Collision Avoidance System. MEMS sensors

Data-buses

Operation of data bus in aircraft systems including knowledge of ARINC and other applications. Aircraft Network / Ethernet

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	Various assessments to reinforce learnings given throughout the semester.	1,2,4,5,6	10.00	Week 7

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	A set of regular practical exercises to complement the theory elements of the module.	2,3,4,5,6	30.00	n/a

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	n/a	1,2,4,5,6	60.00	End-of-Semester

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Other	Various assessments to reinforce learnings given throughout the semester.	1,2,4,5,6	10.00	n/a

No Project

Practical				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Practical/Skills Evaluation	A set of regular practical exercises to complement the theory elements of the module.	2,3,4,5,6	30.00	n/a

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	n/a	1,2,4,5,6	60.00	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	12 Weeks per Stage	5.00
Laboratory	12 Weeks per Stage	4.00
Independent Learning Time	15 Weeks per Stage	9.47
Total Hours		250.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EEAER_B	Bachelor of Engineering (Honours) in Aerospace Engineering	3	Mandatory
CW_EEACS_D	Bachelor of Engineering in Aircraft Systems	3	Mandatory