MODULE SPECIFICATION

Part 1: Information			
Module Title	Avionics and Control 3		
Module Code	UFMFL7-30-3	Level	Level 6
For implementation from	2018-19		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Contributes towards			
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: The course aims to provide an advanced study of aircraft avionics and flight control design with illustrated practical, computational exercises and group project work so that students can experience how complex aircraft avionics and flight control systems are designed.

In addition, the educational experience may explore, develop, and practise but not formally discretely assess the following:

IT skills in context
Communication skills and working effectively in teams
Application of project management and systems engineering skills
Problem formulation and decision making
Progression to independent learning

Outline Syllabus: The syllabus includes:

Signal Processing:
Conditioning and converting inputs and outputs of different types.
Analogue signal conditioning, A/D and D/A conversion

System Architectural Options:
Analogue, digital, microprocessor circuit design, databus configurations
Real Time Programming
The use of a compiled high level language (for example C) to effect processing and decision-making in a real-time system.
Use of a real-time executive in a safety critical environment.
Device interfacing and control.

Safety Critical Design:
Examination of robust design, failure tolerance and failure recovery

Avionics - The commercial and military environment:
Examination of the current avionic system design and future directions
Control theory for open and closed loop control of flight manoeuvres and flight simulation
An overview of the construction of a flight simulator and the integration of its sub-systems
Knowledge of the sub-systems especially for control and flight
The basics of the typical software systems and architecture in flight simulators, real-time systems and I/O computers
Flight computer and flight models, aerodynamic considerations and approximations
Simulation of aircraft control systems to achieve specified objectives
The human-in-the-loop – stabilisation and full control authority: safety aspects
The use of flight simulators in aircraft design, stability and control studies, flight handling, pilot-training, and research

Teaching and Learning Methods: Large group lecture supported by small group tutorial sessions. Study time outside of contact hours will be spent on going through exercises and example problems.

Practical sessions will provide experience of empirical methods, modelling and simulation and will require time outside for assignment preparation.

Scheduled learning includes lectures, practical classes and workshops;

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion etc.

Contact Hours:

Activity:
Contact: 72 hours
Assimilation and skill development: 88 hours
Coursework: 120 hours
Exam preparation: 20 hours
Total: 300 hours

Contact hours include workshop time under technician supervision.

Part 3: Assessment
Component A consists of a two hour exam on Avionic Systems component and contains an assessed Avionic Systems tutorial preparation and tasks. Component B consists of a Flight control group project demonstrating key skills and thus includes: flight control, flight stability and automation.

First Sit Components	Final Assessment	Element weighting	Description
Project - Component B		25 %	Report and background files showing individual contributions, plus personal log books
In-class test - Component A		37 %	Assessed tutorial preparation and tasks
Examination - Component A	✓	38 %	Examination (2 hours)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Written Assignment - Component B		25 %	Individual assignment - report and personal logbook
Examination - Component A	✓	75 %	Examination (2 hours)

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will be able to:

	Module Learning Outcomes
MO1	Design avionics systems to achieve performance, operational and logistic requirements (Avionics)
MO2	Examine and differentiate the configuration of avionics architectures in civil and military aircraft (Avionics)
MO3	Interpret the interactions between real time data and a complex system and the interfacing analogue data sources to analogue and digital systems (Avionics)
MO4	Schedule and manage multiple streams of digital data in a high integrity, time critical and safety critical environment via the utilisation of a real-time kernel (Avionics)
MO5	Design a micro-controller circuit and real-time programming in a high level language (Avionics)
MO6	Design, develop and implement real-time control interactions in a complex non-linear environment (Flight Control)
MO7	Break down the composition of a flight simulator in terms of its sub-systems, and determine the interaction between the system elements (Flight Control)
MO8	Formulate and implement control algorithms to modify the flight characteristics of an aircraft to meet predefine desired flying qualities (Flight Control)
MO9	Validate and verify robust real-time control interventions within the flight simulation environment (Flight Control)
MO10	Define and develop a suitable testing procedure for evaluating a system (Flight Control)

Contact Hours

Contact Hours	
Independent Study Hours:	
Independent study/self-guided study	228

	Total Independent Study Hours:	228
	Scheduled Learning and Teaching Hours:	
	Face-to-face learning	72
	Total Scheduled Learning and Teaching Hours:	72
	Hours to be allocated	300
	Allocated Hours	300
Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufmfl7-30-3.html	