Module specification

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Module Code	ENG763
Module Title	UAS Construction
Level	7
Credit value	20
Faculty	FAST
HECoS Code	100114
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
MSc Unmanned Aircraft System Technology MSc Unmanned Aircraft System Technology with Advanced Practice	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	5 hrs
Placement tutor support	0 hrs
Supervised learning e.g., practical classes, workshops	25 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**30** hrs
Placement / work-based learning	0 hrs
Guided independent study	170 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	Jun 2018
With effect from date	Sept 2022
Date and details of revision	Aug 2022: learning outcomes and assessment update in Engineering revalidation
Version number	3

Module aims

To support the development of the student in the following areas:

- To gain an advanced knowledge of drone technology at a conceptual and working level.

- To be able to specify, select and assemble flight and payload components and subsystems suitable to a particular UAV application.

- To acquire the skills required to safely operate a drone.

Module Learning Outcomes - at the end of this module, students will be able to:

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: **M1, M2 & M5.**

1	Demonstrate the construction techniques required to build a fully functional bespoke UAV and manage UAS operational issues by executing a safe and successful test flight of a UAV system.
2	Critically evaluate current research to produce formal technical records resulting in a maintenance manual or similar document for UAS management.
3	Evaluate and safely solve problems found in UAV airframe or systems design.

Assessment

Indicative Assessment Tasks:

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Assessment 1: An individually prepared portfolio consisting of a range of assessments such as case studies, laboratory work and Moodle Quiz, introducing the topic areas of each learning outcomes. Guidance material will be provided, which the students will use to generate a Portfolio of work. Assessment one is an individual prepared portfolio and represents 100% of the overall module mark.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1-3	Portfolio	100%

Derogations

Credits shall be awarded by an assessment board for those Level 7 modules in which an overall mark of at least 50% has been achieved with a minimum mark of 40% in each assessment element.

Learning and Teaching Strategies

The module will be taught with lectures combined with structured supervised hands-on drone construction sessions in the UAS laboratory workshop with appropriate demonstration

sessions in the use of tools, equipment, fixtures etc. There will also be practical flight test exercises conducted prior to the inaugural flight testing. This module will also follow the ALF (Active Learning Framework) guidelines, which will include alternative methods of assessment and a blended approach to delivery, with some theory and software sessions being delivered online (depending on requirements and student experience).

Indicative Syllabus Outline

- Design and construction of a bespoke drone or alternatively the assembly and commissioning of a commercially available UAS kit that must be modified to facilitate safe autonomous operation.

- Basic & advanced airframe construction techniques, covering/skinning, aerodynamic considerations, airframe design and modification, propeller performance and lift generating surfaces (of fixed wing drones).

- The use of airframe materials and how these are shaped, formed, joined, finished, inspected, tested and repaired.

- Essential skills to be focussed on during construction process: soldering power systems, assembling an airframe using fixtures, installing the power system components, installing and integrating the Flight Receiver, Flight Controller, Compass and GPS Navigation equipment.

- Programming of UAV's systems and Failsafe features.

Indicative Bibliography:

Essential Reads

K. Shacklock, *Aircraft Workshop: Learn To Make Models That Fly.* Special Interest Model Books, 2000.

Other indicative reading

A. Elliott, *Build Your Own Drone Manual. The Practical Guide to Safely Building, Operating and maintaining an Unmanned Aerial Vehicle (UAV).* California: Haynes, 2016.

A. J. Keane, et. al., *Small Unmanned Fixed Wing Aircraft Design – A Practical Approach.* Chichester: Wiley, 2017.

M. Pressnell, *Model Planes Aerofoils and Wings.* Robert Hale, 2015.

Plus, various others to be signposted on Moodle

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

Core Attributes
Engaged
Creative
Ethical

Key Attitudes
Commitment
Curiosity
Resilience
Confidence
Adaptability

Practical Skillsets
Digital Fluency
Organisation
Leadership and Team working
Critical Thinking
Communication