Wrexham glyndŵr UNIVERSITY

MODULE SPECIFICATION

Module Title:	Drone Technology and Operations	**Level**:	4	**Credit Value**:	20

Module code:	ENG481D	**Is this a new module?**	YES	**Code of module being replaced**:	

Cost Centre:	GAME	**JACS3 code**:	H400

Trimester(s) in which to be offered:	1, 2	**With effect from:**	March 18

School:	Applied Science, Computing & Engineering	**Module Leader:**	R.Bolam

Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BEng (Hons) Drone Technology and Operations	✓	☐

Pre-requisites
None

Module Aims

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

- To gain a knowledge of drone technology at a conceptual and working level.
- To be able to specify, select and assemble flight and payload components and sub-systems suitable to a particular UAV application.
- To acquire the skills required to safely operate a drone.

Intended Learning Outcomes

Key skills for employability

KS1   Written, oral and media communication skills
KS2   Leadership, team working and networking skills
KS3   Opportunity, creativity and problem solving skills
KS4   Information technology skills and digital literacy
KS5   Information management skills
KS6   Research skills
KS7   Intercultural and sustainability skills
KS8   Career management skills
KS9   Learning to learn (managing personal and professional development, self-management)
KS10   Numeracy

At the end of this module, students will be able to		Key Skills	
1	Demonstrate an in-depth knowledge of the correct terminology relating to the component elements of a drone system.	KS1	KS4
		KS6	
2	Explain the role, limitations and purpose of the components that comprise a UAV.	KS1	KS4
		KS5	
3	Calculate the power required for a UAV to carry out a specified task.	KS3	KS4
		KS10	
4	Safely conduct a drone mission.	KS1	KS2
		KS3	KS7

Derogations

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Assessment:

1: Practical: Plan, execute and review a drone mission which complies with safety specifications prevailing within the sector.
2: Report: Prepare a Mission Plan for a drone mission.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,4	Practical	40	N/A	N/A
2	2,3	Report	60	N/A	1500

Learning and Teaching Strategies:

The module will be taught with lectures, laboratory and workshop sessions, actual and simulated flight exercises including, team exercises, mock missions and mission planning using way-point flying techniques.

Syllabus outline:

Unmanned Air Vehicle (UAV) System Technology
The anatomy of a drone. Types of drones: fixed wing and multi-rotor designs. Aerodynamics. Power storage and Propulsion systems. Control technology: Transmitters and Receivers, Flight Controllers, auto-pilots. Operational and performance envelopes. GPS, Inertial Navigation Systems. Gyro stabilisation and gain selection.

Payload Technology
Freight conveyancing techniques, Camera technology, video storage, Real-time video transmission systems. Photographic equipment capabilities and limitations. LIDAR systems. Time-of-Flight cameras and 3D photographic techniques. Gas detectors, Sonic actuation and sensing technologies. Radio frequency detectors and trackers.

Drone Operations
Mission planning and Risk Assessment for safe drone operation. UK Airspace operating principles. Airmanship and aviation safety. Navigation and charts. Waypoint flying and associated software systems. Practical flying exercises both simulated and real.

Bibliography:
Essential reading

Civil Aviation Publication CAP 393 The Air Navigation Order, CAA.
Civil Aviation Publication CAP 722 Unmanned Aircraft System Operations in UK Airspace, CAA.

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

Other indicative reading

Juniper, A. (2015) *The Complete Guide to Drones.* Octopus Publishing Group