MODULE SPECIFICATION

Module Title:	**Drone Design and Construction**	**Level**:	5	**Credit Value**:	40

Module code:	ENG52N	**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:**	September 17

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

Scheduled learning and teaching hours	120 hrs
Guided independent study	280 hrs
Placement	0hrs
Module duration (total hours)	400 hrs

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

Pre-requisites
None

Office use only
Initial approval February 17
APSC approval of modification Version 1
Have any derogations received Academic Board approval? Yes ✓ No ☐

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 Unmanned Air Vehicle (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 the practical skills and knowledge required to build a fully functional UAV as a bespoke drone or from a commercial UAV kit.	KS1	KS2
		KS3	
2	Produce a formal technical record or log which could be used as a basis for a maintenance manual or similar document for UAV system management.	KS1	KS4
		KS5	
3	Program and test all sub-systems in a safe and effective manner.	KS4	KS6
		KS9	
4	Prepare and execute a safe test flight of a UAV system.	KS2	KS3
		KS5	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: Journals of the UAV construction project should be submitted by the student on a weekly basis. These will be regularly assessed and graded with feedback informing the student on any areas that may be improved.

2: The Practical assessment shall comprise an inspection of the UAV built by the student, a functional check and Test Flight.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3	Learning logs/journals	50	N/A	4000
2	4	Practical	50	N/A	N/A

Learning and Teaching Strategies:

The module will be taught with 4 one hour lectures and laboratory and some workshop demonstration sessions. However, the majority of the module will be delivered by supervised hands-on drone construction sessions in the Mechatronics Laboratory. There will also be some practical flight test exercises conducted prior to the inaugural flight testing.

Syllabus outline:

The module shall be carried out as either a group or individual UAV system build and shall be centred on the supervised construction of a bespoke drone or a commercial UAV kit. Instruction shall be given to the students so that they acquire the essential skills required during the construction process. Such as: soldering power systems, assembling the airframe, installing the power system components (Electronic Speed Controllers and motors etc.) installing the Receiver, Flight Control systems, Compass and GPS Navigation equipment.

At a suitable point during the construction programme a lecture shall be given on programing of the UAV's systems and Failsafe features. The student shall also be taught current practice with regard to firmware updating policies.

On completion of the UAV component build the student shall program the basic systems such as: the flight controller (including) PID gain settings; calibration of the ESCs; the control transmitter (including receiver binding), and the GPS system using industry standard software including any firmware updates.

Bibliography:

Essential reading

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