MODULE SPECIFICATION

Module Code:	ENG762

Module Title:	UAS Operations and the Law

Level:	7	**Credit Value:**	20

Cost Centre(s):	GAME	JACS3 **code**:	H400

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

Scheduled learning and teaching hours	40 hrs
Guided independent study	160 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered (not including exit awards)	Core	Option
MSc Unmanned Aircraft System Technology	✓	☐
	☐	☐
	☐	☐

Pre-requisites
N/A

Office use only
Initial approval: 19/06/2018 Version no:2
With effect from: 01/09/2018
Date and details of revision: Version no:

Module Aims

- To provide the student with an up to date and in-depth understanding of the legal issues relating to UAV system operations in the UK and abroad and to ensure that the student is fully aware of the legal responsibilities of the Pilot in Command of a UAV mission.
- To provide the student with an advanced understanding of: UAV system operations e.g. Mission programming; Meteorology; Telemetry for UAV system monitoring; UAV transmission systems; Payload stability and security.

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	Critically assess the legal and regulatory aspects of a planned UAS activity and where appropriate be able to advise alternative compliant operational practices.	KS1	
		KS6	
		KS3	
2	Manage complex UAS operational issues both systematically and creatively and make sound judgements relating to UAS operations in accordance with legislation, airworthiness regulations and published advisory material.	KS2	
		KS3	
		KS7	
3	Analyse and predict the implications of data and privacy legislation for UAS operations.	KS1	
		KS5	
		KS9	
4	Critically evaluate the effects of drone operations and predict the operational safety aspects, benefits and restrictions relating to UAS payloads, telemetry and transmission systems.	KS1	KS10
		KS4	
		KS6	

Transferable skills and other attributes

1. Communication
2. ICT Technologies
3. Time management and organisation
4. Interpersonal skills
5. Problem solving
6. Information handling including numeracy

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.

Assessment:

Indicative Assessment Tasks:

Assessment 1: An examination covering learning outcomes 1, 2 and 3.

Assessment 2: An essay based on a critical evaluation of a realistic scenario relating to UAS payloads, telemetry and transmission systems.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3	Examination	50	2 hrs	
2	4	Essay	50		2500

Learning and Teaching Strategies:

This module will be delivered as a series of lectures, case-study seminars and break-out sessions during which students will be encouraged to discuss the legal aspects of various mission scenarios. The student will also be required to undertake significant reading of regulatory material.

Syllabus outline:

Historical milestones in aviation (and drone) legislative history: The Chicago Convention, the Montreal Convention, the Riga Declaration etc. The structure of the ICAO and the major participant airworthiness organisations.

The latest UK Civil Aviation Authority (CAA) and Home Office regulations and guidelines relating to UAV operations. The provisions of the Air Navigation Order CAP 393 and also CAP 722 and CAP 658. The role of JARUS and similar organisations.

The difference between surveillance and non-surveillance UAVs. The responsibilities of the Pilot In Command (PIC) in law. Interpreting restrictions and no-fly zones on Aviation Sector Charts. The transportation of UAV batteries and the law

Nationally recognised qualifications. The requirement to obtain CAA Permission for Commercial Operations (PfCO), NQE organisations and the SUAV pilot competence assessment process. The role and contents of the Operations Manual. Data Protection and privacy laws and their effect on drone operations.

UAV operations and Human factors. Payload stability and security. Understanding meteorology. The implementation of telemetry for UAV system monitoring. Transmission systems: uses, comparisons and limitations of UKRCC 35 MHz and 2.4 & 5.8 GHz links;

Calculating bandwidth requirements; Frequency Hopping Spread Spectrum (FHSS) transmissions and Data security.

Indicative Bibliography:
Essential reading
CAA. (2015) *Unmanned Aircraft System Operations in UK Airspace-Guidance: CAP 722*. Civil Aviation Authority, Gatwick, UK. Available at: http://www.caa.co.uk Marshall,D.M., Barnhart,R.K.,Shappee,E.,Most,M.T.(2016) *Introduction to Unmanned Aircraft Systems, Second Edition*. CRC Press.
Other indicative reading
Air Navigation Order (2016) CAP 393. Civil Aviation Authority, Gatwick, UK. Available at: http://www.caa.co.uk. Model Aircraft: A Guide to Safe Flying: CAP 658. Civil Aviation Authority, Gatwick, UK. Available at: http://www.caa.co.uk.