

Liverpool John Moores University

Title: DRONE TECHNOLOGY AND OPERATIONS
Status: Definitive
Code: **7110NATSCI** (123679)
Version Start Date: 01-08-2021

Owning School/Faculty: Biological and Environmental Sciences
Teaching School/Faculty: Biological and Environmental Sciences

Team	Leader
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Academic Level: FHEQ7 **Credit Value:** 40 **Total Delivered Hours:** 80
Total Learning Hours: 400 **Private Study:** 320

Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	20
Off Site	40
Practical	20

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Practice	Practice	Flight Test of a Drone to BNUC-S Standard including safe operating procedures	30	
Report	Report	Complete a waypoint controlled mission plan including safety factors	40	
Report	Report	Extended proposal/report (circa 3000 words with supporting figures) for a drone application/operations scenario	30	

Aims

To provide a comprehensive overview of drone technology, practical operation, mission planning, regulations and data processing

Learning Outcomes

After completing the module the student should be able to:

- 1 Demonstrate knowledge and insight of, and where appropriate, use the correct technical terminology relating to the component elements of a drone system.
- 2 Be knowledgeable of the role, limitations and purpose of the various sub-systems that make up a typical drone.
- 3 Plan an automated drone data capture mission using ground control software packages
- 4 Select the appropriate drone and sensor package for applications.
- 5 Select, operate and analyse standard drone-based sensor packages
- 6 Successfully and safely plan and implement a drone mission within the current regulatory framework for the UK and the LJMU operations manual

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Practical Flight Assessment	1	3	5	6
Mission Planning Project	3	4	6	
Drone Operation Project	1	2	3	4

Outline Syllabus

Drone Systems Technology:

Anatomy of a typical drone system. Types of drones; fixed-wing and multi-rotor. Power and propulsion systems. Control systems; radio equipment, auto-pilots. Performance envelope of drone systems.

Payload Systems Technology:

Sensors; types (RGB, NIR, Thermal), specifications, applications, limitations, video storage and real-time transmission. LIDAR systems. Basic photogrammetry.

Drone Operation:

Safe drone operation. Regulations. Flying, flight modes. Way-point operating. Way-point software systems such as "Mission Planner". Simulator practice.

Learning Activities

The module will be taught by a combination of lectures; practical laboratory based sessions, centred around setting up and maintaining drones, fitting and testing payloads; workshop sessions involving mission planning for way-point flying; fieldwork involving testing actual drones and mission plans in the field centred initially around basic exercises then expanding to mimicking typical operations.

Notes

An overview of drone technology and operations at a conceptual and practical level.