

Liverpool John Moores University

Title: DRONE TECHNOLOGY
 Status: Definitive
 Code: **7010NATSCI** (120879)
 Version Start Date: 01-08-2015

Owning School/Faculty: Natural Sciences & Psychology
 Teaching School/Faculty: Natural Sciences & Psychology

Team	Leader
David Burton	Y
Serge Wich	
Frederic Bezombes	
Francis Lilley	

Academic Level: FHEQ7 **Credit Value:** 40.00 **Total Delivered Hours:** 80.00

Total Learning Hours: 400 **Private Study:** 320

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	30.000
Off Site	40.000
Practical	10.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Practice	AS1	Flight Test of a Drone to BNUC-S Standard including safe operating procedures	30.0	
Report	AS2	Complete a waypoint controlled mission plan including safety factors	30.0	
Report	AS3	Extended proposal/report (circa 3000 words with supporting figures) for a drone application scenario	40.0	

Aims

To provide a comprehensive overview of drone technology at a conceptual and practical level. Special emphasis is placed upon being able to specify, select, install and deploy sub-systems to fulfil the requirements of an application.

Learning Outcomes

After completing the module the student should be able to:

- 1 Have an in-depth knowledge and insight of, and where appropriate use, the correct technical terminology relating to the component elements of a drone system.
- 2 Be fully knowledgeable of the role, limitations and purpose of the various sub-systems that make up a typical drone.
- 3 Perform calculations aimed at determining the power and navigational system requirements for a drone to perform a specified task.
- 4 Specify and select for purchase appropriate systems to create a drone system to complete a specified task.
- 5 Select, operate and analyse standard drone-based sensor packages
- 6 Successfully and safely plan and implement a drone mission

Learning Outcomes of Assessments

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

Practical Flight Assessment	1	5	6	
Mission Planning Project	3	4	6	
Deployment 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, flight controllers, auto-pilots. Performance envelop of drone systems. Navigation and location systems; basics of GPS, inertial navigation systems. Gyro stabilisation systems and gain selection.

Payload Systems Technology:

Gimbels; types, specifications, requirements. Cameras; types, specifications, limitations, video storage and real-time transmission. LIDAR systems. Basic photogrammetry. Other sensor systems; gas sensors, sound sensors, RF detectors and trackers etc.

Drone Operation Technology:

Safe drone operation. Standard manual flight control systems. Way-point operating. Way-point software systems such as "Mission Planner" and "Ground Control System". First-person view systems and their operation. Data analysis techniques;

mosaicking graphics, common data formats, basic data visualisation techniques.

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 at a conceptual and practical level.