

Course guide

300082 - ASR - Airspace Structure and Regulation

Last modified: 27/11/2020

Unit in charge: Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: 748 - FIS - Department of Physics.

Degree: MASTER'S DEGREE IN APPLICATIONS AND TECHNOLOGIES FOR UNMANNED AIRCRAFT SYSTEMS (DRONES) (Syllabus 2017). (Compulsory subject).

Academic year: 2020 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: Defined in the infoweb of the course

Others: Defined in the infoweb of the course

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Basic:

CB6 DRONS. (ENG) CB6 DRONS Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación
CB10 DRONS. (ENG) CB10 DRONS Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

Specific:

CE5 DRONS. (ENG) CE5 DRONS Analizar las limitaciones y oportunidades que plantean las legislaciones actuales y las que se prevén en el futuro sobre el uso de drones.
CE6 DRONS. (ENG) CE6 DRONS Identificar los aspectos particulares de la legislación actual que pueden afectar a una misión concreta y tomar las medidas adecuadas para adaptarse a tal legislación.

Generical:

CG1 DRONS. (ENG) CG1 DRONS Proyectar e implantar soluciones viables y rentables utilizando sistemas basados en aeronaves no tripuladas (drones) en entornos nuevos o poco conocidos dentro de contextos más amplios y multidisciplinares.

Transversal:

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

TEACHING METHODOLOGY

The teaching methodology combines the following concepts:

- Class lectures that encourages students' participation through short questions and discussions
- Problem solving related to class lectures
- Practical activities for knowledge consolidation
- Autonomous work in specific use cases to consolidate concepts

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course the student should be able to:

1. Describe the current regulatory framework governing the operation of drones in civil airspace, especially the Spanish and European ones.
2. Describe the ethical code of conduct for drone pilots.
3. Describe the taxonomy of civil airspace and the rules of the air.
4. Analyze and evaluate the risk involved in performing an operation with a drone.
5. Describe the future trends of drone integration in civil and non-segregated airspace.



STUDY LOAD

Type	Hours	Percentage
Hours small group	27,0	24.00
Self study	85,5	76.00

Total learning time: 112.5 h

CONTENTS

Drone regulation in Spain

Description:

An in-depth description of the current state of the art of drone regulation at the Spanish level.
Description of the stakeholders.
Timeline for adaptation to the new European regulation.

Related activities:

Short evaluation exercise

Full-or-part-time: 20h

Laboratory classes: 9h

Self study : 11h

Drones: Surveillance, ethics and privacy in civil applications

Description:

- Detailed study of the impact of drones on essential aspects of human rights such as the right to privacy.
- Description of an ethical reference framework based on studies carried out by the European Commission on risks related to privacy, data protection and ethics in drone operations.

Related activities:

Short consolidation exercise

Full-or-part-time: 6h

Laboratory classes: 2h

Self study : 4h

International legislation on drones and recommendations for drones over 25 and 150kg

Description:

- Description of the delegated directives and regulations currently in force by the European Commission and a comparison with legislative initiatives in other countries.
- Exploration of the legal requirements for the operation of drones over 25 kg

Related activities:

Worldwide rule benchmark exercise

Full-or-part-time: 3h

Laboratory classes: 2h

Self study : 1h



Airspace structure and management

Description:

- Organization of the current airspace and description of the rules of the air in force.
- Description of airspace classes and their relationship to the provision of separation and traffic information.
- Initiatives to adapt current airspace management for drones operating at very low altitude.

Related activities:

- Specific Operations Risk Assessment exercise. Assess the safety of your own drone operation

Full-or-part-time: 44h

Laboratory classes: 7h

Self study : 37h

Drone integration into non-segregated airspace

Description:

- Description of the regulatory and technical requirements that are being carried out to allow the operation of drones in non-segregated airspace.
- Description of the initiatives that are being carried out in the USA (UTM) and in Europe (U-space)

Related activities:

- Applying U-Space airspace taxonomy to Barcelona's greater metropolitan area

Full-or-part-time: 27h

Laboratory classes: 7h

Self study : 20h

Research project

Description:

Application and extension of the knowledge acquired on an assigned topic from a list of proposals made by teachers. Each proposal clearly defines the objective of the project and the expected results. The results of the research project will be documented in the form of a research paper.

Related activities:

- Preliminary version of the research paper.
- Evaluation of the preliminary version of at least two classmates.
- Final version of the research paper. (20%)

Full-or-part-time: 12h 30m

Self study : 12h 30m

GRADING SYSTEM

Assessment

- Final exam (40%)
- Activities (40%)
- Research project (20%)

Attendance is mandatory (min 80%)



BIBLIOGRAPHY

Basic:

- Mike Lissone. "RPAS activities in Europe". 2013 Integrated Communications, Navigation and Surveillance Conference [on line]. IEEE [Consultation: 23/11/2020]. Available on: <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6548693>.
- Mikko Huttunen. "The U-space Concept". Air & Space Law [on line]. SSRN [Consultation: 23/11/2020]. Available on: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3408673.
- Organització de l'Aviació Civil Internacional. Annexes to the Convention on International Civil Aviation [Recurs electrònic]. Montreal: ICAO, [19??]-. ISBN 9291942405.
- Victor Alarcón et al.. "Procedures for the Integration of Drones into the Airspace Based on U-Space Services ". Aerospace [on line]. MDPI Available on: <https://www.mdpi.com/2226-4310/7/9/128/htm>.

Complementary:

- Kerasidou, Xaroula and Buscher, Monika and Liegl, Michael . "Don't drone?:negotiating ethics of RPAS in emergency response ". Proceedings of The 12th International Conference on Information Systems for Crisis Response and Management [on line]. Lancaster University [Consultation: 23/11/2020]. Available on: <https://eprints.lancs.ac.uk/id/eprint/74881>.