UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Escola Superior d'Enginyeries Industrial, Aeroespacial i Audiovisual de Terrassa

GUIA PENDENT D'APROVACIÓ

General description

Name of the course**: Introduction to Cubesats**

Department: 710

ECTS: **3 ECTS**

Degree: **ETI/ETA/EVA/ELO/MEC**

Level: ?????

Language: **English**

Code: **205234**

Type: **Elective**

Lecturers

Main teacher: David Gonzalez Diez

Others: Javier Gago Barrio

General learning objectives of the course

Competencies

Specific competencies	I
Generic competencies	

Credits: total hours of student work

		Dedication	
		Hours	%
Directed learning	Large Group (G)	27	36%
Autonomous learning		48	64%

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Modules

Module 1: Overview	Dedication: 2 hours	Large group: 2 hours Autonomous learning: 1 hours
Description	Introduction to Cubesats and "New Space Era" scenario. Review of Cubesats history, companies, commercial products available, launchers, deployers, missions, etc.	
Related activities (*)	Lectures	

Module 2: Electric Power System	Dedication: 5 hours	Large group: 5 hours Autonomous learning: 10 hours
Description	Description of the EPS general architecture and its main components: PV arrays, batteries, DC/DC power converters and MPPT algorithms.	
Related activities (*)	Lectures, computer simulations, lab sessions	

Module 3: Attitude Control System	Dedication: 10 hours	Large group: 10 hours Autonomous learning: 20 hours
Description	Description of the ACS, control algorithms and actuators (magnetorquers and reaction wheels)	
Related activities (*)	Lectures, computer simulations, lab sessions	

Module 4: Communications	Dedication: 5 hours	Large group: 5 hours Autonomous learning: 10 hours
Description	Description of Communication system and its main components. Fundamentals of codification & modulation. Spacecraft-Ground Station communications. OPS-SAT.	
Related activities (*)	Lectures, computer simulations, lab sessions	

Module 5: Final presentations & discussion	Dedication: 5 hours	Large group: 5 hours Autonomous learning: 7 hours
Description	Presentation & discussion of all results obtained during the course. We will foster the active participation of all students in the open discussion of the topics	
Related activities (*)	Public presentations	

Grading system (assessment)

The assessment is based on the delivery of three tasks and a final presentation summarizing all the work developed during the subject.
Assignment 1: 20%
Assignment 2: 20%
Assignment 3: 35%
Final presentation: 15%

Teaching methodology

The teaching methodology is based on three kind of activities:

- Theoretical lectures, where lecturers will deliver

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- Practical sessions, where students will develop, alone or in a group, some assignments. These sessions can be held in the laboratory, depending on the topic of the assignment. It will consist of some hardware development, test procedures, modelling, etc.
- Presentation and discussion, where students will present and discuss their results in front of his fellows and lecturers.

MATLAB/Simulink will be used as main simulation tool.

References

Basic	"Spacecraft System Engineering", P. Fortescue et al. Ed. Wiley. 2011
Complementary	"Cubesat Design Specification", Rev.13. California Polytechnic State University. "Cubesat Standards Handbook", 2017. http://librecube.net