

[GAI205] ENERGY STORAGE TECHNOLOGY

GENERAL INFORMATION

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|------------------|------------------------------|-------------------|-----------------|--|
| Studies | DEGREE IN ENERGY ENGINEERING | | Subject | ? |
| Semester | 1 | Course | 3 | Mention / Field of specialisation |
| Character | COMPULSORY | | Language | ENGLISH |
| Plan | 2022 | Modality | Face-to-face | Total hours |
| Credits | 4,5 | Hours/week | 2.08 | 37.5 class hours + 75 non-class hours = 112.5 total hours |

PROFESSORS

IRAOLA IRIONDO, UNAI

REQUIRED PREVIOUS KNOWLEDGE

| Subjects | Knowledge |
|--|----------------------------------|
| (No specific previous subjects required) | (No previous knowledge required) |

LEARNING RESULTS

| LEARNING RESULTS | KC | SK | AB | ECTS |
|--|----|----|----|------------|
| GAR307 - Develops energy storage systems to optimize the efficiency of energy systems | | x | | 3,78 |
| G-RTR1 - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and /or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy | | x | | 0,4 |
| G-RTR2 - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language | | x | | 0,32 |
| Total: | | | | 4,5 |

KC: Knowledge or Content / SK: Skills / AB: Abilities

CONTENTS

Energy storage systems in general. In this part of the subject we see all the storage systems that are used nowadays but not in detail because some of them are hardly seen in different applications. However, it is interesting to review them to talk about the dynamics of the storage systems and its impact in the technology used.

1. Mechanical storage: pumped hydroelectric storage, compressed air energy storage and flywheels.
2. Thermal storage: sensible heat and latent heat storage.
3. Electromagnetic storage: storing energy in huge coils or inductors.
4. Electrostatic storage or supercapacitors. (We see this topic in detail during the second part of the subject)
5. Electrochemical storage: batteries in this case and concretely lithium-ion and lead-acid batteries in this subject (We see this topic in detail during the second part of the subject)

Supercapacitors and batteries. These are the most used storage systems nowadays and here we try to understand, size and model them. We go through different topics:

1. Manufacture them..
2. What is inside and their working principle.
3. Heat losses.
4. Charging and discharging profiles.
5. How to size them.
6. How to model them.

During the PBL project a system which can be supplied by batteries is used. Students have to test a battery in the project in order to characterize it applying certain charge/discharge profiles to learn how to work with batteries.

LEARNING RESOURCES AND BIBLIOGRAPHY

| Learning resources | Bibliography |
|--------------------------|---|
| Technical articles | http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_in k.pl?grupo=ENERGIA31&ejecuta=20 |
| Subject notes | |
| Topic related web quires | |
| Moodle Platform | |
| Class presentations | |
| Video projections | |
| Specific Master Software | |

