

Course Syllabus for  
*Smart and Sustainable Industry PhD Program*  
 (years 2024-25 / 2025-26)

<b>Course title</b>	<b>Energy storage</b>
<b>Scientific Discipline Sector</b>	ING-IND/08
<b>Hours of instruction</b>	20 hours
<b>CFU</b>	2 CFU
<b>Semester</b>	Second
<b>Goal</b>	The course addresses the topic of energy storage with a multidisciplinary approach, analyzing the differences between thermal and electrical storage from a global perspective
<b>Syllabus</b>	<p>This course examines different energy storage technologies, empowering the reader to make informed decisions on which system is best suited for their specific needs.</p> <p>Decarbonization is a crucial step towards a sustainable future, and renewable energy plays a vital role in making this transition possible. However, the intermittency of some sources such as wind and solar energy requires the use of energy storage systems. The course contains a detailed study of the fundamental principles of energy storage operation, a mathematical model for real-time state-of-charge analysis, and a technical analysis of the latest research trends, providing a comprehensive guide to energy storage systems. From battery storage systems to hydrogen storage systems, this course provides the tools to effectively manage energy and ensure that excess energy is utilized during times of deficit and signposts the likely future development and lines of research enquiry for each technology discussed.</p>
<b>Bibliography</b>	Energy Storage Systems: Fundamentals, Classification and a Technical Comparative, José Manuel Andújar Márquez, Francisca Segura Manzano, Jesús Rey Luengo
<b>Examination method</b>	Written