

# MECHANICAL ENGINEERING

## Mechanical Energy Storage and Conversion

<b>Funded By</b>	Ministero dell'Università e della Ricerca - MUR [P.iva/CF:96446770586]
<b>Supervisor</b>	BONISOLI ELVIO - elvio.bonisoli@polito.it
<b>Contact</b>	
<b>Context of the research activity</b>	<p>The proposed Ph.D. program, in agreement with the PNRR objectives, aims to the reinforcement of the strengthened basic and applied research with in-depth synergy between the university and the industry, in order to favour the technological development and the innovation processes required by the market. The project focus is the “energy” area of PNRR, in particular the spoke on Energy Storage. Since the transversal experiences of the research group gained on mechanical systems with kinetic accumulation and the structural and topological optimisations aimed at maximising the conversion efficiency of energy systems.</p>
	<p>The PHD student activity will be addressed in a multidisciplinary environment mainly related to mechanical engineering skills.</p> <p>In particular the activity will be focused on the following topics:</p> <ul style="list-style-type: none"><li>• energy kinetic storage and power conversion systems modelling and simulation;</li><li>• multiphysics modeling and optimisation for performance analysis of storage capability;</li><li>• development of a parametric technological demonstrator capable of</li></ul>

## Objectives

kinetically accumulating energy, with minimum energy dissipation.

The main challenges reside in the development of innovative modelling, experimental validation and optimization of these topics.

The doctoral program will include a training period at foreign universities to promote interdisciplinarity, through the use of qualified operational and scientific facilities for study and research activities. A potential period at industrial partner facility aims at the development of intersectoral skills, essential for promoting innovation and the developed technology with possible consequences on the national economic and production system. The Valeo group has expressed interest as a business partner in the proposed program.

## Skills and competencies for the development of the activity

- Excellent background and interest in Mechanical Engineering,
- appropriate competencies in English speaking and writing,
- knowledge of principle and methods of kinematics, dynamics, rotordynamics and mechanical components,
- team working,
- competencies in Matlab-Simulink, dynamic simulations SW,
- CAD design, Multibody and Finite Elements competences will be highly appreciated, according also to experimental experience, acquisition software knowledge, post-processing capabilities.