



# PhD in INGEGNERIA MECCANICA / MECHANICAL ENGINEERING - 38th cycle

**Research Area n. 3 - Engineering Design and Manufacturing for the Industry of the Future**

**PNRR\_352 Research Field: ADVANCED NUMERICAL TECHNIQUES FOR OPTIMAL  
RESOURCES ALLOCATION**

<b>Monthly net income of PhDscholarship (max 36 months)</b>
<b>€ 1325.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

<b>Context of the research activity</b>	
<b>Motivation and objectives of the research in this field</b>	<p>The hydropower plants have been one of the most important points in the secure operation of the system in the last period. The massive introduction of the renewable energy sources with a variable production, determined the hydropower plants to become a major player in the power system control, helping stabilize fluctuations between demand and supply. The availability, flexibility and reliability of power production and also the quality of energy in hydropower plants determine an appropriate control of the system behavior in normal operating conditions, and in the ones improper. Numerical modelling tools are required in order to optimize the operation of hydropower reservoirs under uncertainty.</p>
<b>Methods and techniques that will be developed and used to carry out the research</b>	<p>The candidate will analyse the state of the art in order to address the methods for the identification of the optimal operation of hydropower plants. A comparative analysis between genetic algorithms, particle swarm optimization, invasive weeds optimization and linearized techniques. The activity will focus on the identification optimization techniques in stochastic environments and on the implementation of these techniques in the specific case-study of a complex hydropower system. The candidate will also focus on the hystorical data for the identification of price and flow variability, as well as on the identification</p>



	of regression models for the abovementioned variables.
<b>Educational objectives</b>	The PhD programme aims at extending the knowledge about the hydropower plants stochastic programming through research. The PhD student will develop the competencies needed to be an effective researcher in this field.
<b>Job opportunities</b>	Job opportunities may be found at A2A, RePOWER, CVA, Dolomiti Energia, Alperia, Edison, Enel. Our last survey on MeccPhD Doctorates highlighted a 100% employment rate within the first year and a 35% higher salary, compared to Master of Science holders in the same field.
<b>Composition of the research group</b>	3 Full Professors 5 Associated Professors 2 Assistant Professors 15 PhD Students
<b>Name of the research directors</b>	Prof. Marco Tarabini

<b>Contacts</b>	
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<b>Additional support - Financial aid per PhD student per year (gross amount)</b>	
<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--

<b>Scholarship Increase for a period abroad</b>	
<b>Amount monthly</b>	662.5 €
<b>By number of months</b>	6

<b>National Operational Program for Research and Innovation</b>	
<b>Company where the candidate will attend the stage (name and brief description)</b>	MAS Consulting S.r.l.
<b>By number of months at the company</b>	6
<b>Institution or company where the candidate will spend the period abroad (name and brief description)</b>	to be defined
<b>By number of months abroad</b>	6



**Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information**

Financial aid is available for all PhD candidates (purchase of study books and materials, funding for participation in courses, summer schools, workshops and conferences) for a total amount of euro 5.401, 42.

Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD candidate. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.