



PhD in INGEGNERIA ELETTRICA / ELECTRICAL ENGINEERING - 38th cycle

PNRR_352 Research Field: MACHINE LEARNING MODELS AND TECHNIQUES FOR INNOVATIVE SOLUTIONS OF AUTOMATIC LEARNING AND STRATEGIES OF ADVANCED ALGORITHMIC ENERGY TRADING

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	<p>The doctorate research will be focused on the development of innovative techniques, models and algorithms in the field of artificial intelligence to design machine learning solutions and algorithmic trading strategies through data-driven systems to support decisions, with main applications in the energy commodity market. The role of the industrial partners is devoted to the definition of the industrial needs with respect to a case study to define correct strategies to set prices according to current real market behaviors. The research activity proposed for the study responds to the innovation needs of energy utility companies (PNRR-Missione4-2) and will be aimed at the implementation of a data analytics solution in the context of predictive-prescriptive analysis for management automatic and semi-automatic trading operations in the energy sector (cfr. Digitalization, Innovation, competitiveness and culture).</p>
Methods and techniques that will be developed and used to carry out the research	<p>Circuit theory, evolutionary algorithms, neural computing and numerical techniques for the analysis of engineering problem and systems, device simulation and parameters extraction, modeling of nonlinear phenomena in renewable energy systems and energy market behaviors by means of mixed approaches, digital and optimal signal processing for data estimation and prediction.</p>



Educational objectives	The main educational objective of this research project is to form a highly qualified engineer in a strong motivated and qualified research group, gaining advanced knowledge, experience and skills in cutting-edge technologies of the energy sector, power generation and energy market fields, developing design and data optimization tools with possible involvement in international and EU projects, as well as in the cooperation with leading industries and R&D institutions.
Job opportunities	This research activity will qualify the candidate for future academic and research positions, as well as for a highly qualified professional career in industries or organizations mainly operating in the energy and electrical fields, such as TSO, DSOs, utilities, Energy and Environment consultant companies, and other end user or application service companies, with the aim of promoting the recruitment of researchers from academia to business.
Composition of the research group	2 Full Professors 4 Associated Professors 2 Assistant Professors 5 PhD Students
Name of the research directors	Prof. Francesco Grimaccia

Contacts

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Additional support - Financial aid per PhD student per year (gross amount)

Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad

Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation

Company where the candidate will attend the stage (name and brief description)	A2A S.p.A.
By number of months at the company	6
Institution or company where the	The project promotes collaboration with relevant international



candidate will spend the period abroad (name and brief description)	universities and research centers. The foreign institution will be selected during the 3 years research program in agreement with the industrial partner.
By number of months abroad	6

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

Educational activities: Financial aid per PhD student is available for purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences, instrumentations and computer, etc. This amount is equal to 10% of the annual gross amount, for 3 years.

Teaching assistantship: Availability of funding in recognition of supporting teaching activities by the PhD student. 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.

Computer availability: individual use.

Desk availability: individual use.

Accommodation in Politecnico's Residences (<http://www.residenze.polimi.it>) is available for PhD candidates; special rates will be applied to selected out-of-town candidates (detailed info in the call for application).

Research period abroad: Our candidates are strongly encouraged (6 months minimum is mandatory) to spend a research period abroad, joining high-level, research groups in the specific PhD research topic, selected in agreement with the Supervisor. An increase in the scholarship will be applied for periods up to 6 months.