



PhD in INGEGNERIA ELETTRICA / ELECTRICAL ENGINEERING - 39th cycle

PNRR 117 Research Field: REINFORCEMENT AND DEEP LEARNING TECHNIQUES FOR NOVEL QUANTITATIVE TRADING MODELS IN ENERGY CROSS-MARKETS APPLICATIONS.

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 models, algorithms and tools in the field of computational intelligence to design deep learning solutions and quantitative trading strategies through data-driven systems to support decisions, with main applications in the energy cross-market operations. 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>Evolutionary algorithms, neural computing and circuit theory emulations will be adopted and applied for the analysis of engineering problems and energy market behaviours by means of mixed approaches, digital and optimal signal processing for data estimation and prediction. The most common basic statistics theory and computer science tools will be employed to measure final research outcomes and results.</p>
Educational objectives	<p>The main educational objective of this research project is to form a highly qualified engineer in a strong motivated and qualified academic and industrial research group,</p>



	gaining advanced knowledge, experience and skills in cutting-edge technologies of the energy sector, power-gas 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 foreign 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 (e.g. TSO, DSOs, utilities, Energy and Environment consultant companies) or other end user or application service companies in the trading field, with the aim of promoting the recruitment of researchers from academia to business.
Composition of the research group	3 Full Professors 4 Associated Professors 0 Assistant Professors 8 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 candidate will spend the period abroad	The foreign institution will be selected during the 3 years research program in agreement with the industrial partner (e.g. Fraunhofer



candidate will spend the period abroad (name and brief description)	program in agreement with the industrial partner (e.g. Fraunhofer SCAI: Institute for Algorithms and Scientific Computing, SUPSI (CH), other)
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.