



PhD in SCIENZE E TECNOLOGIE ENERGETICHE E NUCLEARI / ENERGY AND NUCLEAR SCIENCE AND TECHNOLOGY - 38th cycle

THEMATIC Research Field: ROBUST SEQUENTIAL OPTIMIZATION FOR DRILLING SCHEDULING

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>A critical stage of the development of an oil and gas asset is the planning of the drilling activities, which can have a large impact on the net present value. The main challenges are related to the large uncertainty about the reservoir state and the fact that the decision of drilling a given well allows obtaining information on the reservoir state, which, can, potentially, change the next decisions. In this context, the objective of the research is the development of optimization methods for the identification, before drilling, of the optimal drilling schedule. The solution is required to be robust with respect to the uncertainty on the reservoir state and on the information that will be acquired by performing the drilling. The research will be conducted in collaboration with ENI Spa.</p>
Methods and techniques that will be developed and used to carry out the research	<p>Optimization algorithms to manage the complex sequential decision making issue of planning the drilling in oil and gas plant, i.e. identifying the sequence of actions to be taken in the future that generate the maximum production. Specifically, evolutionary algorithms, such as genetic algorithms, and advanced reinforcement learning algorithms, which combine advanced Artificial Neural Network solutions with adaptive control algorithms will be considered.</p>
Educational objectives	



	To prepare a RAMS (Reliability, Availability, Maintainability and Safety)/Risk and Resilience professional expert and competent researcher with the technical skills, algorithmic knowledge and system analysis capabilities for evaluating and making decisions for preventing and managing the risks of complex technological systems, with specific domain expertise in the energy field.
Job opportunities	RAMS, reliability, maintenance, safety, risk engineer and manager, data analyst and modeller in support of decision making for complex systems (e.g. aerospace, nuclear, chemical, energy generation and distribution, etc.) design, operation, management and regulation.
Composition of the research group	2 Full Professors 1 Associated Professors 1 Assistant Professors 12 PhD Students
Name of the research directors	Enrico Zio

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

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.