PhD in INGEGNERIA STRUTTURALE, SISMICA, GEOTECNICA / STRUCTURAL SEISMIC AND GEOTECHNICAL ENGINEERING - 41st cycle

THEMATIC Research Field: VALORIZATION OF INDUSTRY NORM RESIDUES IN THE PRODUCTION OF ADVANCED CEMENTITIOUS COMPOSITES

Monthly net income of PhDscholarship (max 36 months)
1500.0 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	The European strategic framework, relying on European Green Deal and the Action Plan for Circular Economy, dictates a breakthrough change in the management of natural resources, pushing for a valorisation of industrial residues, including also Naturally Occurring Radioactive Materials. A first fundamental knowledge and research gap to be filled stands in the combined holistic assessment of the radiological characteristics of NORM residues together with their chemical and physical properties to assess their compatibility to be incorporated as secondary raw materials into the formulation of cement based construction materials. This will also require a robust methodology to evaluate the effects of this incorporation on the mechanical and long term properties of the resulting cementitious composites and dealing with safe use requirements.
Methods and techniques that will be developed and used to carry out the research	The research plan will be tentatively structured as follows: •critical analysis of the state of art on the use of NORM residues in construction industry; •reusability of NORM residues in cement-based materials and characterization methodologies also in collaboration with ENI laboratories San Donato Milanese (Milano); •formulation of suitable concrete mixes and

	characterization of the mechanical and durability performance; •suitable incorporation of the information garnered from previous phases into Life Cycle Assessment (LCA), Life Cycle Costing (LCC) e Social Life Cycle Assessment (SLCA), as per ISO 14040 e 14044. Definition of suitable “synopsis” indices for decision making processes.
Educational objectives	To educate a researcher able to understand the principles of circular economy and life cycle assessment in construction industry as well as to the mechanical and durability characterizations.
Job opportunities	Employment in advanced materials modelling or advanced energy/oil and gas/steel production industry and research centres, universities.
Composition of the research group	1 Full Professors 1 Associated Professors 1 Assistant Professors 10 PhD Students
Name of the research directors	Liberato Ferrara, Estefania Cuenca

Contacts
liberato.ferrara@polimi.it ph. +39-02-23994387 https://onlineservices.polimi.it/manifesti/manifesti/controller/ricerche/RicercaPerDocenti.do?jaf_currentWFID=main&EVN_DIDATTICA=evento&aa=2025&k_doc=64974&lang=IT estefania.cuenca@polimi.it ph. +39-02-23994344 https://onlineservices.polimi.it/manifesti/manifesti/controller/ricerche/RicercaPerDocentiPublic.do?evn_PRODOTTI=evento&lang=IT&k_doc=551998

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents	--

Scholarship Increase for a period abroad	
Amount monthly	750.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Educational activities (purchase of study books and material, funding for participation to courses, summer schools, workshops and conferences): financial aid per PhD student per year. The Ph.D. course supports the educational activities of its Ph.D. students with an additional funding equal to 10% of the scholarship, starting from the first year. Teaching assistantship: availability of funding in recognition of support to teaching activities by the PhD student. There are various forms of financial aid for activities of support to the teaching practice. The PhD is encouraged to take part in these activities, within the limits allowed by the regulations. Computer availability: each Ph.D. student has his/her own computer for individual use. Desk availability: each Ph.D. student has his/her own desk, cabinet and locker