

**Scienze Chimiche, Geologiche e Ambientali,  
curr. Scienze dell'Ambiente**  
**Chemical, Geological and Environmental Sciences,  
curr. Environmental Sciences**

<b>Progetto di ricerca Research project</b>	“Detection and monitoring the presence of nanoplastics in freshwater alpine environments” (SCGA.4)
<b>Tipo/Type</b>	Borsa finanziata da MUSE – Museo delle Scienze di Trento e Eurac Research Scholarship funded by MUSE – Museo delle Scienze di Trento e Eurac Research
<b>Borse/Scholarships</b>	1
<b>Abstract</b>	This project proposal will be developed within the agreement between the University of Milano Bicocca (dept. Earth and Environmental Science -DISAT), the MUSE-Museo delle Scienze of Trento (Climate and Ecology Unit) and the Eurac Research (Institute for Alpine Environment). The focus is on plastic pollution, a topical global environmental issue on which knowledge is still scarce, especially on nanoplastics. This project will contribute to i) define new protocols for quantifying the presence of NPs in the aquatic environment and wildlife, with a specific focus on rivers and the insects that inhabit alpine wetlands; ii) map the current level of NPs' contamination of high mountain freshwaters in the Italian Alps, which are still considered by many to be uncontaminated; iii) to evaluate, with laboratory experiments, the effects induced by bioaccumulable NPs in aquatic organisms by considering the entire river trophic network. The project also aims to contribute to raising awareness, training and involvement of companies, administrations and citizens on the issue of plastics, i.e. promote Citizen Science activities for plastic collection in mountains, promote participative processes involving all potential stakeholders, companies involved in the production or "management" of "end-of-life" plastics, citizens and in particular young people (including associations).
<b>Tutor</b>	Antonio Finizio (supervisor UniMib: Sara Villa)
<b>Supervisor MUSE- EURAC</b>	Valeria Lencioni (MUSE) e Roberta Bottarin (Eurac Research)
<b>I.P.</b>	<b><i>Intellectual property clauses agreed with the Company apply to this scholarship</i></b>

**Scienze Chimiche, Geologiche e Ambientali,  
curr. Scienze Chimiche**  
**Chemical, Geological and Environmental Sciences,  
curr. Chemical Sciences**

<b>Progetto di ricerca Research project</b>	“Developing novel AI generative and predictive algorithms for drug design” <b>(SCGA. 5)</b>
<b>Tipo/Type</b>	Borsa finanziata da Italfarmaco S.p.A. Scholarship funded by Italfarmaco S.p.A.
<b>Borse/Scholarships</b>	1
<b>Abstract</b>	<p>The application of artificial intelligence (AI) in drug discovery is rapidly expanding, with significant growth in research, patents, and funding, and with applications ranging from small molecule discovery to understanding disease mechanisms. In particular, AI can significantly accelerate new drug development by designing novel drug candidate molecules and optimizing their properties in-silico, making the process faster, more efficient and more likely to succeed, thus also reducing need of animal testing.</p> <p>This project will be conducted in collaboration with Italfarmaco, an Italian pharmaceutical company based in Milan, and it will focus on the application of AI in structure-based drug design. More specifically, novel generative chemistry algorithms will be developed, also drawing inspiration from other realms of application of generative AI (e.g. 3D image generation). In addition, in order to provide a robust evaluation of the newly generated chemical entities, alternative scoring strategies and AI-based property prediction will be explored during the course of the project.</p>
<b>Tutor</b>	Prof. Claudio Greco. Supervisor: Prof. Ugo Cosentino.
<b>Supervisor Italfarmaco</b>	Dr. Grazia Rovelli
<b>I.P.</b>	<b><i>Intellectual property clauses agreed with the Company apply to this scholarship</i></b>

**Scienze Chimiche, Geologiche e Ambientali,  
curr. Scienze Geologiche**  
**Chemical, Geological and Environmental Sciences,  
curr. Geological Sciences**

<b>Progetto di ricerca Research project</b>	“Experimental and numerical study of Artificial Ground Freezing (AGF): assessing various technologies and their environmental impact in real-world applications” <b>(SCGA.6)</b>
<b>Tipo/Type</b>	Alto Apprendistato con Groutfreezlab s.r.l./High Apprenticeship with Groutfreezlab s.r.l.
<b>Borse/Scholarships</b>	1
<b>Abstract</b>	<p>Artificial Ground Freezing (AGF) serves as a relevant ground improvement technique supporting both open-pit and underground construction projects. This method reduces soil temperature using heat exchangers, commonly referred to as freezing pipes, which are supplied with various liquid coolants such as liquid nitrogen, brine, or liquid CO<sub>2</sub>.</p> <p>The primary objectives of this study are to gain comprehensive insights into the physical processes underlying artificial ground freezing through a combination of experimental testing and 3D numerical modeling. The project unfolds across three distinct phases:</p> <p>Phase 1 focuses on conducting experimental studies to clarify the process of artificial freezing and thawing of soils. This involves the development of freezing pipes fed with different refrigerants, the design of a versatile testing system capable of accommodating varied conditions, and the execution of tests with comprehensive evaluation using strategically positioned temperature sensors. Insights gained from this phase will inform improvements in experimental methodologies.</p> <p>Phase 2 regards the application of numerical models, particularly finite element modeling (FEM) codes, to compare with experimental results and real-world case studies. Through this phase, we aim to validate numerical calculation codes against experimental observations and extend their applicability to practical scenarios.</p> <p>Phase 3 addresses the environmental impact assessment and sustainability considerations of the AGF technique. With a detailed understanding of the artificial freezing and thawing processes, we shift focus towards evaluating the method's sustainability and resilience, particularly concerning climate change mitigation and CO<sub>2</sub> emissions reduction.</p> <p>By systematically progressing through these phases, this research is aimed to enhance our understanding of AGF, bridge the gap between experimental and numerical approaches, and contribute valuable insights towards the sustainable application of this technique in construction projects.</p> <p>inquadramento professionale di partenza: quinto livello inquadramento professionale d'arrivo: terzo livello numero ore settimanali: 40 retribuzione lorda annuale: 22.549,10 (14 mensilità) retribuzione netta mensile: 1.300,00 per 14 mensilità starting professional classification: fifth level target professional classification: third level number of hours per week: 40 gross annual salary: 22.549,10 (14 montly payments) net monthly salary: € 1,300 (14 montly payments)</p>
<b>Tutor</b>	Tutor Unimib: Prof. Giovanni Crosta/Tutor Groutfreezlab s.r.l.: Andrea Maria Romildo Pettinaroli