DiSTAR Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse
UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II
SCUOLA POLITECNICA E DELLE SCIENZE DI BASE

PhD programme in Earth, Environmental and Resources Sciences

Instructor(s)	Manuela Rossi, DiSTAR - UNINA
Course Title	Systematic Mineralogy of the Somma-Vesuvius Volcanic Complex
Total Number of Hours	12
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Course Description

The Somma-Vesuvio volcanic complex represents a unique natural laboratory for the study of mineralogical phenomena associated with volcanic activity, characterized by alternating explosive and effusive eruptions and periods of quiescence. Vesuvian mineralogy results from complex geochemical processes occurring both near the magma chamber and in peripheral areas affected by circulating fluids of variable composition. Historically, the site has established Naples as a center of excellence in mineralogy, as evidenced by scholars such as Monticelli, Tondi, Arcangelo Scacchi, and Zambonini; internationally, figures like Werner, Romé de l'Isle, and René-Just Haüy, the father of modern crystallography, made foundational contributions. More than 40 mineral species were first described here, and over 200 have been recorded overall. The course aims to introduce students to the extraordinary mineralogical diversity of the complex, exploring the crystallochemistry of type localities and situating mineralogical research within the scientific and cultural history of Naples, offering an integrated experience of science, mineralogy, and history.

Course Contents

1. Module / Topic – **Advanced Crystallochemistry and Systematic Mineralogy**

In-depth review of crystal structures, symmetry, and lattice theory. Systematic mineralogy: chemical classification, solid-solution series, and paragenesis. Analytical methods for mineral characterization, including modern crystallochemical approaches.

2. Module / Topic - **Somma-Vesuvio Volcanic Complex: Mineralogical Framework**.

Eruptive history. Magmatic and hydrothermal processes controlling mineral formation. Type localities, sampling site and historical significance of Naples as a mineralogical hub.

3. Module / Topic - **Minerals of Vesuvian Rocks.** Minerals in lavas, "ejecta" and pyroclastic deposits. Crystallochemical characterization of major and accessory minerals. Minerals first described at Vesuvio: crystallography, chemistry, and occurrence. Historical perspective: Contributions of Arcangelo Scacchi, for modern Vesuvian mineralogy.

4. Module / Topic - **Fumarolic Minerals and Comparative Vesuvian Mineralogy**.

Mineralogy of fumarolic deposits: sulfates, halides, native elements. Minerals first described

at Vesuvio: crystallography, chemistry, and occurrence. Historical perspectives: contributions of Arcangelo Scacchi and Parascandola, and their methodological impact. Case studies: detailed examples of mineralogical investigations in fumarolic fields and other volcanic complexes, highlighting analytical techniques, type localities, and crystallochemical interpretations.

Learning Outcomes

By the end of the course, doctoral students will be able to:

- Demonstrate advanced understanding of **crystallochemical principles** and systematic mineralogy as applied to volcanic environments.
- Identify, classify, and characterize **minerals from Vesuvian rocks**, including both magmatic and fumarolic species, using modern analytical techniques.
- Analyze and interpret **type localities** and their significance in the context of mineralogical research.
- Critically evaluate the **geochemical and paragenetic processes** controlling mineral formation in volcanic systems.
- Integrate **historical and contemporary literature** to contextualize the study of Vesuvian minerals within the broader framework of mineralogical science.
- Design and conduct **case studies or field investigations** on volcanic mineral assemblages, applying rigorous scientific methodology.

Teaching Format

Lectures.

Essential Bibliography

- Alfano, G.B. & Parascandola, A., Il Vesuvio e le sue eruzioni, Edizioni Doppiavoce, 2015
- Kasatkin, A.V., Siidra, O.I., Nestola, F., Pekov, I.V., Agakhanov, A.A., Koshlyakova, N.N., Chukanov, N.V., Nazarchuk, E.V., Molinari, S. & Rossi, M., *Napoliite, Pb_2OFCl, a New Mineral from Vesuvius Volcano, and Its Relationship with Dimorphous Rumseyite*, *Mineralogical Magazine*, 87(5), 711–718, 2023.
- Malcherek, T., Bindi, L., Dini, M., Ghiara, M.R., Molina Donoso, A., Nestola, F., Rossi, M. & Schlüter, J., *Tondiite, $Cu_3Mg(OH)_6Cl_2$, the Mg-analogue of herbertsmithite*, *Mineralogical Magazine*, 78(3), 583–590, 2014.
- Nestola, F., Kasatkin, A.V., Biagioni, C., Škoda, R., Santello, L., Agakhanov, A.A. & Rossi, M., *Manuelarossiite, $CaPbAlF_7$, a New Fluoride from the Vesuvius Volcano, Italy*, *Mineralogical Magazine*, 89(1), 133–140, 2024.
- Ricciardi, G.P., Diario del Monte Vesuvio: venti secoli di immagini e cronache di un vulcano nella città, ESA – Edizioni Scientifiche e Artistiche, 2009

- Rossi, M., Nestola, F., Zorzi, F., Lanza, A., Peruzzo, L., Guastoni, A. & Kasatkin, A., *Ghiaraite: A New Mineral from Vesuvius Volcano, Naples (Italy)*, *American Mineralogist*, 99(2–3), 519–524, 2014.
- Russo, M. & Punzo, I., I Minerali del Somma Vesuvio, Associazione Micro mineralogica Italiana, 2004
- Russo, M. & Campostrini, I., Elenco delle specie minerali del Somma Vesuvio, miscellanea INGV, 2022

Assessment Method

Short written report.