



ЦЕНТЪР ЗА ОБУЧЕНИЕ – БАН

1000 София
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Basic Information:

Course Title: ISOTOPE GEOLOGY

Lecturer: Prof. Dr. Irena Peytcheva; Prof. Dr. Svetoslav Georgiev

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Total Teaching Hours: 30 hours of lectures or 20 hours of consultations; 10 hours of practical exercises

Annotation (up to 150 words)

The aim of the ISOTOPIC GEOLOGY course is to provide basic knowledge of isotopic methods and their applications in geology, archaeology and other scientific fields. The decay of natural radioactive isotopes is the basis of isotope geochronology using methods as U-Pb, K-Ar, Rb-Sr, Sm-Nd, Re-Os, etc. and measuring geological time from the creation of the Earth to the present day. They have significantly changed the ideas about its history, evolution of the crust and mantle and the main processes of Earth's interior: magmatism, volcanism, ore formation, etc. Isotopic methods are used to determine sources and trace the evolution of magmas and ore-bearing fluids, sediments and metamorphites.

Isotope fractionation is characteristic for the elements with a small atomic mass (H, C, N, O, S) that depends on the environmental conditions during their formation: temperature, acidity, oxidation-reduction processes, biogenic processes. This allows to define the physicochemical parameters of geological processes that occurred millions of years ago and continue to this day.

Course content (brief description by topics or modules)

Topic / Module 1: Radiogenic isotopes (geochronology and isotope geochemistry)

Topic / Module 2: Stable isotopes (fractionation and parameters of process)

Topic / Module 3: Applications using LA-ICP-MS

Teaching and assessment methods

30 hours of lectures or 20 hours of consultations; 10 hours of practical exercises

Graded exam (2 to 6) or creditable learning with protocol

Competencies acquired as a result of training (3–5 points)

Knowledge of isotopic methods of geochronology;

Knowledge of the use of light and medium stable isotopes in geology and related scientific fields;

Applications using LA-ICP-MS (sample preparation and analyses);

Skills for presenting data from isotopic studies.

Literature:

1. Allerge, C. 2008. Isotope geology. - Cambridge University Press, www.cambridge.org/9780521862288; ISBN-13 978-0-511-45524-7 – eBook; 508 pp.
2. Dickin, A. 2005. Radiogenic Isotope Geology. - Cambridge University Press, 509 pp.
3. Faure, G. 1998. Principles and Applications of Geochemistry, 2nd ed. - Prentice-Hall, 600 pp.



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4. White, W. M. 2003. Geochemistry. - An on-line textbook: <http://www.geo.cornell.edu/geology/classes/geo455/Chapters.HTML> (достъпна у нас)

5. Й. Хёфс, “Геохимия стабилных изотопов”, Изд. Мир, Москва, 1983 /

Jochen Hoefs. 2021. Stable Isotope Geochemistry. Springer Textbooks in Earth Sciences, Geography and Environment, Springer Cham, 504 pp. <https://doi.org/10.1007/978-3-030-77692-3>

Additional information (optional) (e.g., special requirements, laboratory equipment, prior knowledge)

Basic knowledge of geology (bachelor's or master's level)