



ЦЕНТЪР ЗА ОБУЧЕНИЕ – БАН

1000 София
ул. „Сердика“ № 4
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тел.: 02 987 31 67
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Basic Information:

Course Title: SEISMOLOGY – THEORY AND PRACTICE

Lecturer: Assos. Prof. Plamena Raykova - Tsankova, PhD; Prof. Dimcho Solakov, PhD, D. Sc., Corr. Member of BAS

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Total Teaching Hours: 30 Hours

Annotation:

The course will be of interest for PhD students, students in the field of seismology, the internal structure of the Earth, seismic hazard and environmental protection. Seismology is the science of earthquakes. As in the concept of "earthquake" a broad content is included, determined by the completeness of the resulting phenomena and the multidirectionality of the consequences. Seismology is science rich enough in cognitive objects, problems and methods. For the development of seismology, in addition to the purely cognitive principle, a significant role is also played by the natural need of humanity for protection and active reaction against the disastrous consequences of earthquake phenomena.

Of social importance, tasks such as assessing the earthquake hazard and the field of impact on the earth's surface with a view to reducing the adverse consequences of earthquakes and developing methods and searching for means for predicting earthquakes should be put in the first place, but here it is worth emphasizing that for the effective solution of the two mentioned tasks, full-fledged results of research tasks are necessary.

Course content:

Topic 1: Theory of elastic deformations. Deformations and stress – equations and relationships.

Topic 2: Seismic waves – velocities and propagation in different media. Kinematic and dynamic parameters of seismic waves (time travel, velocity, azimuth, amplitude, period).

Topic 3: Internal structure and models of the Earth. Structure of the Earth's crust and upper mantle. Oceanic and continental crust.

Topic 4: Energy of seismic waves and sources. Magnitude, magnitude scales, macroseismic scales – types and relationships.

Topic 5: Seismological stations and networks. Seismic catalogs and bulletins.

Topic 6: Fore-aftershock events, swarm-type seismicity. Spatial and temporal distribution of clusters.

Topic 7: Seismic hazard. Basic methods for assessment.

Topic 8: Earthquakes of the Earth's. Earthquake activity of Europe, the Balkans and Bulgaria.

Topic 9: Earthquake Forecasting. Early Warning Systems.

Teaching and assessment methods

The training is carried out through lectures. The course concludes with a presentation prepared and presented by the doctoral student on a problem set from the topic of the lectures, and a discussion.



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

At the end of the training, students will acquire basic knowledge of elastic deformations, seismic waves and the internal structure of the Earth. They will develop skills in seismic data analysis, seismic hazard assessment and investigation of the spatial and temporal distribution of earthquakes.

Students will develop an understanding of global and regional seismicity, with a focus on Europe, the Balkans and Bulgaria, as well as forecasting methods and early warning systems, for the purpose of effective seismic risk management.

Literature:

Людмил Христосков „Сеизмология. Част 1: Сеизмични вълни в изотропни среди“

Людмил Христосков „Сеизмология. Част 2: Земетръсни източници и вълново поле на Земята“

Иван Петков „Обща геофизика – част 1: Сеизмология“

William H.K. Lee, Hiroo Kanamori, Paul C. Jennings, Carl Kisslinger. International Handbook of Earthquake and Engineering Seismology. Academic Press / Elsevier, Volumes: Two primary volumes (A, 2002; B, 2003) and a supplement (2003)

Jens Havskov and Lars Ottemöller (2010). Routine Data Processing in Earthquake Seismology. ISBN 978-90-481-8696-9, DOI 10.1007/978-90-481-8697-6, Springer Dordrecht Heidelberg London New York, 245-282.

Gutenberg. B., and C. Richter (1949). Seismicity of the Earth. Princeton Univ. Press.

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