

## GEOLOGICAL EDUCATION IN SOFIA UNIVERSITY – INTEGRATION OF TRADITIONS AND KNOWLEDGE IN PRACTICE

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**Abstract:** Sofia University “St. Kliment Ohridski” is the first Bulgarian and the highest academic institution with more than a century long educational and scientific traditions. Geology is part of the university from the very beginning in the area of Natural sciences. It is an example of the effective interaction between the educational processes and implementation of science, technology and innovation. The scientific activities of Sofia University have been developing along with the research priorities, lecture courses, field work and their implementation into practice.

The degree programs in Geology were set up at the end of the 19<sup>th</sup> century, just 3 years after foundation of the Sofia University. The first lectures in Geology and Mineralogy dates back to 1891 when the Department for Natural History at the Sofia University started. They both form the basis of education and research in the field of Geology in Bulgaria. The main contribution in the beginning for the development of teaching and research belongs to remarkable scientists like Prof. Georgi Zlatarski, Prof. Georgi Bonchev, Prof. Stefan Bonchev, Prof. Lazar Vankov, Prof. Dimitar Yaranov and so many others. Faculty of Biology, Geology and Geography inherits the Faculty of Natural History, but is later divided.

Faculty of Geology and Geography in Sofia University was formed in 1963 and till now the geology is studied in a regular form of education. There are Bachelor, Master and PhD degrees with duration of 8, 3 and 6 semesters respectively. The Bachelor Degree provides fundamental knowledge in all geological disciplines. The Master Degree covers a wide range of educational and scientific research work carried out in specialized, well-equipped laboratories for investigation of geological objects. PhD Degree is a basic form of organized training for highly qualified graduates in all spheres of geological science and practice.

The teaching process in the Faculty focuses on the lectures and seminars, as well as on the individual forms of education – tasks, course and diploma thesis works, laboratory and field practices. The educational practices - stationary and field trips to certain geological, mining or economic sites are regularly held after the end of the summer semesters. Modern profile of Geology means that students obtain detailed knowledge on structure, tectonics, geological features, underground and surface processes of the Earth as well as regularities for the accumulation and distribution of ores, non-metalliferous raw materials, coal, oil and gas.

The implementation of geological education into practice is supported by student membership in various society and sections. The specific activities focus student interests in organized working groups, participation in field trips and applied research. These non-profit organizations integrate in the best way geological traditions from the industry and knowledge from university into the future career development of young people. The Sofia University SEG Student Chapter supports student field trips with the idea to provide understanding of main geological characteristics of the visited geological sites and obtain specific skills of investigation and mining exploration. The Sofia University Student Chapter of AAPG actively contributes to student community growth, enriching educational culture and expanding geological expertise of its members in the field of Petroleum geology.

**Keywords:** Geology, fundamental knowledge, exploration, field trips.

## ГЕОЛОЖКОТО ОБРАЗОВАНИЕ В СОФИЙСКИЯ УНИВЕРСИТЕТ - ИНТЕГРИРАНЕ НА ТРАДИЦИИ И ЗНАНИЯ В ПРАКТИКАТА

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**Резюме:** Софийският университет "Св. Климент Охридски" е първата българска и най-висша академична институция с повече от век образователни и научни традиции. Геологията е част от университета от самото начало в областта на природните науки. Това е пример за ефективно взаимодействие между образователните процеси и интегрирането на науката, технологиите и иновациите. Научноизследователската дейност на

Софийския университет се развива заедно с изследователските приоритети, лекционните курсове, теренната работа и прилагането им на практика.

Учебните програми по геология са създадени в края на 19 век, само 3 години след основаването на Софийския университет. Първите лекции по "Геология" и „Минералогия" датират от 1891 г., когато стартира факултетът по Естествена история към Софийския университет. Двете научни дисциплини формират основата на образованието и научните изследвания в областта на геологията в България. В началото основен принос за развитието на преподаването и научните изследвания имат такива забележителни учени като проф. Георги Златарски, проф. Георги Бончев, проф. Стефан Бончев, проф. Лазар Ванков, проф. Димитър Яранов и много други. Факултетът по биология, геология и география наследява факултета по Естествена история, но по-късно отново се разделя.

Геолого-географският факултет в Софийския университет е създаден през 1963 г. и досега геологията е изучавана в редовна форма на обучение. Има бакалавърски, магистърски и докторски степени с продължителност съответно от 8, 3 и 6 семестъра. Бакалавърската степен осигурява фундаментални знания във всички геоложки дисциплини. Магистърската степен обхваща широк спектър от образователни и научни изследвания, извършвани в специализирани, добре оборудвани лаборатории за изследване на геоложки обекти. Докторантурата е основна форма на организирано обучение за висококвалифицирани висшестепни във всички сфери на геоложката наука и практика.

Учебният процес във Факултета се фокусира върху лекциите и семинарите, както и върху индивидуалните форми на обучение - задачи, курсови и дипломни работи, лабораторни и практически упражнения. Учебните практики - стационарни и полеви до определени геоложки, минни или икономически обекти се провеждат редовно след края на летните семестри. Съвременният профил по геология означава, че студентите получават детайлни познания за структурата, тектониката, геоложките особености, подземните и повърхностните процеси на Земята, както и закономерностите в натрупването и разпространението на руди, нерудни суровини, възлища, нефт и газ.

Интегрирането на геоложкото обучение в практиката се подкрепя от членството на студенти в различни дружества и секции. Специфичните дейности фокусират интересите на обучаващите се в организирани работни групи, участие в полеви екскурзии и приложни изследвания. Тези организации с нестопанска цел интегрират по най-добрия начин геоложките традиции от индустрията и университетските знания в бъдещото професионално развитие на младите хора. Секцията на SEG в Софийския университет подпомага студентски полеви екскурзии с идеята да се разберат основните геоложки характеристики на посетените геоложки обекти и да се придобият специфични умения за търсене и проучване на полезни изкопаеми. Секцията на AAPG активно допринася за разрастване на студентската общност, обогатява образователната култура и разширява геоложкия опит на своите членове в областта на петролната геология.

**Ключови думи:** Геология, фундаментални знания, търсене и проучване, полеви практики.

## 1. INTRODUCTION

Sofia University "St. Kliment Ohridski" is the first Bulgarian and the highest academic institution with more than a century long educational and scientific traditions. In the university, initially the Geology is part of the Natural sciences and finally transferred to the Earth sciences becoming an example of the effective interaction between the teaching disciplines and implementation of science, technology and innovation. The educational and scientific activities of Sofia University include but not limited to lectures, field trips, work on projects, course and graduate degree theses. The major goal is to achieve a high quality of education along with the research priorities and their implementation into practice.

The teaching in Earth sciences began in the late 19<sup>th</sup> century when the Department for Natural History at the Sofia University was opened. Eventually, after decades of development and transformations in 1963 Faculty of Geology and Geography in Sofia University was formed and till now the Geology is studied in a regular form of education.

## 2. GEOLOGY IN SOFIA UNIVERSITY

Sofia University "St. Kliment Ohridski" is an educational institution that follows the traditions of its development and research achievements. The significant part of the best Bulgarian scholars in all fields of science studied at Sofia University. The scientific activities have been evolving in compliance with the accredited by the academic community Strategy for the Development of Scientific Research [1]. It defines the priority research areas and adheres to the rules to protect the freedom of the lecturers of their choice of specific objectives and tasks. The strategy at Sofia University aims at creating conditions for the sustainable development of a science potential that will guarantee its students successful professional career and realization in practice. It also delineates the long-term

plan for systematic activities that will provide solutions of the society demands for economically effective and ecologically save energy and mineral resources.

The higher school geological education in Bulgaria dates back to 1891 when the Department for Natural History at Sofia University was founded. The lectures in Geology and Mineralogy started in the same year both forming the basis of education and research in the field of Earth sciences. The degree programs in Geology and Geography were set up also at the end of the 19<sup>th</sup> century. The main contribution for the development of both teaching and research belongs to some remarkable scientists like Prof. Georgi Zlatarski, Prof. Georgi Bonchev, Prof. Stefan Bonchev, Prof. Lazar Vankov, Prof. Dimitar Yaranov and so many others.

Today the Faculty of Geology and Geography has about 1176 full-time and part-time Bulgarian and foreign students in the four speciality programs: Geology, Geography, Tourism and Regional Development & Politics. Recent years the Departments of Geology and Geochemistry teach between 150 and 180 students in a regular form of education and in an academic year basis (Fig. 1).



*Fig. 1. Full lecture room in Geology lectures.*

There are Bachelor, Master and Doctoral degrees with respective duration of 8, 3 and 6 semesters. The Bachelor Degree provides fundamental knowledge in all major geological disciplines. The Bachelor students graduate with a written state exam. The Master Degree subjects studied at Sofia University include Paleontology and Stratigraphy, Geotectonics and Structural Geology, Mineralogy and Crystallography, Petroleum Geology, Coal Geology, Economic Geology, Geochemistry, Geology and Environment and etc. Many of the disciplines are connected each other giving students the fundamental knowledge needed for their future professional career, especially in the field of exploration of mineral and fossil fuels resources. The Master students graduate with a master thesis which is prepared during the third semester along with the educational process. PhD Degree is a basic form of organized training for highly qualified graduates in all spheres of geological science and practice.

Educational and scientific research is carried out in specialized, well-equipped laboratories for investigation of geological samples from bore holes and outcrops. Some of the laboratory facilities are donated by a consortium of sponsor companies at the Faculty – Total E&P Bulgaria, OMV and Repsol (Fig. 2). The following laboratories for polishing/petrographic, chemical, X-ray, spectral, infrared spectroscopy, Raman spectroscopy, atomic absorption, flammable photometry, coal petrology and organic chemistry are available, where undergraduates, graduates and postgraduates work on their educational or scientific projects.

There are two museums where students and wider circle of visitors could see the large collection of different rocks, minerals, precious stones and fossils. The Museum for Paleontology and Geology and Museum for Mineralogy,



Petrology and Economic Geology are perfect examples for successful integration of traditions and geological knowledge into modern educational approaches.



*Fig. 2. A PhD student and the former General Manager of Total E&P Bulgaria discuss the advantages of the new equipment in the Microscope lab [2].*

### 3. TRADITIONS AND KNOWLEDGE IN PRACTICE

The scientific research strategy in Sofia University asserts project funding as the main tool of financing scientific and research work. Today Sofia University focusses on projects funded by national and European programs, ministries, national agencies, NGOs, and business enterprises [1]. The University is good example in terms of its scientific research and educational activities, both of them enjoying wide economic and social significance. The higher institution contributes significantly to the Bulgarian participation in the global development of science and education. It is the center of the science and the education of students in all disciplines and domains of Earth sciences. The University is a pronounced academic and scientific nest of Bulgarian standing which meet European quality standards and the leading world criteria. The institution aims at maintaining the level of the best practices in the development, management and the implementation of scientific achievements in vitally important fields of economy and especially in Geology. The University does its best to assert its leadership position in education and science by participation in key national and international projects.

The implementation of geological education into practice is supported by student membership in various society and sections [3, 4, 5, 6]. The specific activities focus student interests in organized working groups, participation in field trips and applied research not only in Bulgaria (Fig. 3).



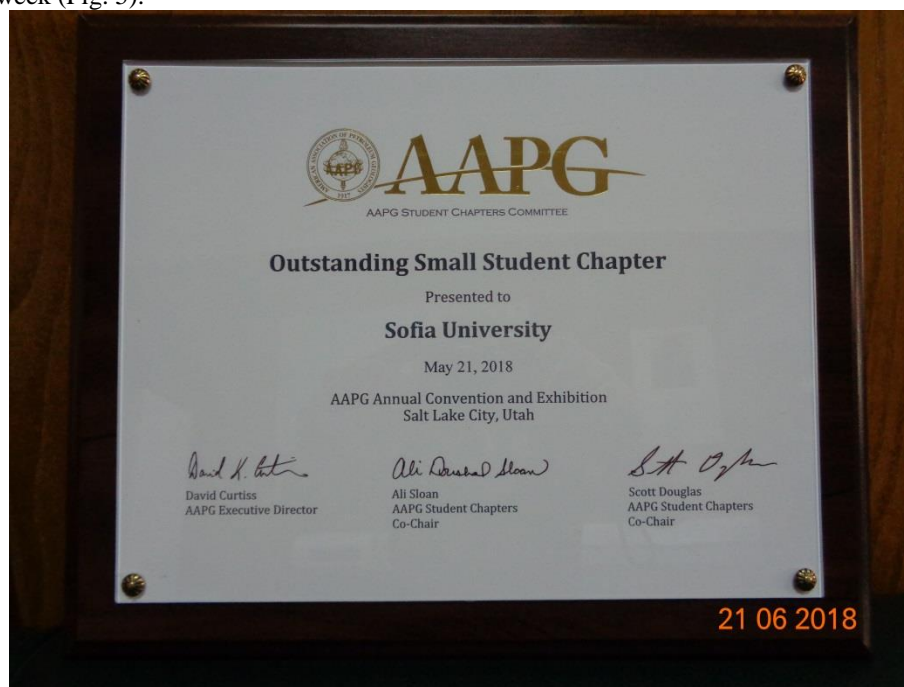
*Fig. 3. Mineral deposits of Czech Republic field trip 2017 [6].*

These non-profit organizations integrate in the best way geological traditions from the industry and knowledge from university into the future career development of young people (Fig. 4). The Sofia University SEG Student Chapter supports student field trips with the idea to provide understanding of main geological characteristics of the visited geological sites and obtain specific skills of investigation and mining exploration.



*Fig. 4. The Oil and Gas practical field trip in Romania 2017 [7].*

In 2018<sup>th</sup> the Sofia University AAPG Student Chapter was awarded the Outstanding Small Student Chapter title. This honorable prize comes with a commemorative plaque at the AAPG Annual Convention and Exhibition in Salt Lake City last week (Fig. 5).



*Fig. 5. The AAPG award granted to Sofia University Student Chapter in 2018 [8].*

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The AAPG Student Chapter actively contributes to student community growth, enriching educational culture and expanding geological expertise of its members in the field of Petroleum geology.

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#### 4. CONCLUSION

Sofia University “St. Kliment Ohridski” is developing the predominant part of scientific and educational potential of Bulgaria. The up to date emphasis is on creating programs which are supposed to integrate knowledge in practice. The implementation of such a mission is in direct relationship with the reaching of the strategic aim of the scientific development of the University.

The scientific activities in Geology have become an obligatory parcel and part of the teaching process. Nowadays in the "Geology" profile specialists are prepared for many geological areas of knowledge like Structure and geological history of the Earth, Underground and surface processes on the Earth, Regularities for accumulation and distribution of ores, non-metalliferous raw materials and fossil fuels.

The graduates from Departments of Geology and Geochemistry in Sofia University work as professionals in Prospecting and Mining Companies, Laboratories and Institutions related with preservation and environmental recultivation, Construction companies, Laboratories investigating rocks, ores, oil, gas and coals.

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