

DEVELOPMENT TRENDS AND POSSIBILITIES FOR UNIVERSITY COURSES IN MINING AND GEO-TECHNOLOGY*

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A short review of university courses in Slovenia, with long tradition, is given. Permanent organized research, development, rationalization and modernisation in the courses in geo-technology and mining, and cooperation are accentuated.

Ključne riječi: Sveučilišni studiji, Istraživanje, Razvitak, Racionalizacija, Modernizacija, Slovenija

Izložen je kratak pregled univerzitetskih studija i duge tradicije u Sloveniji. Naglašeni su stalno organizirana istraživanja, razvitak, racionalizacija, modernizacija i studija rudarstva i geotehnologije, te kooperacija.

Introduction

The University of Ljubljana has 80 years of solid experience and a very successful history of its courses in mining-related subjects. During that time, it has awarded the following qualifications:

- 31 first-level degrees in Mining Engineering (during 1965-1988)
- 713 Bachelor degrees in Mining Engineering (since 1923)
- 2 Bachelor degrees in Geo-technology (1998)
- 34 Master's degrees in Mining Sciences
- 23 Ph.D. degrees in Mining Sciences

We live at the dawn of the new millennium and can expect great changes in the economic and political areas. Introducing the market economy, integration into the European Union and environment awareness are the main trends in Slovenia. We have been vigorously adapting to these and will continue to do so in the future. The changes affect the development of mining and geo-technology university courses, globally as well as locally. Any future development will also be affected by the current economic state in mining-related areas, as well as the general state of the economy itself. The scale and orientation of geo-technology and mining courses and demand for such expertise have to be synchronised with the Slovenian economic development and the development of the mining and geo-technology sectors.

The study of mining has a long tradition and with it comes rigidity - this only increases the need to adapt to the newly developed situation. Being a new field, the study of geo-technology has yet to find its space within the Slovenian economy and is therefore heavily influenced by long-term economic trends. With the view of adapting to new economic and political conditions, some changes have already been made. The introduction of the geo-technology university course is one such step, as is the introduction of a diploma course (as opposed to a full university course).

Similarly as with the rest of Europe, mining has lately been characterised by the closing of classical mines, most of them more than a century old. The reasons for this vary and include economics, environmental awareness and the fact that many sites have simply been exhausted. However, I must emphasize that in no way does this signify the de-

cline of the mining industry, in Slovenia or globally. We cannot imagine life on this planet without any mining activity, let alone the development of humanity and ensuring higher standards of life. Many objects, which we would consider essential, are, in fact, made out of materials that are obtained by some mining activity. If I could name but a few:

- buildings and transport infrastructure (houses, roads, railways)
- all metal products (from a heavy truck down to a needle)
- non-metal products (glass, ceramics, artificial materials)
- energy (coal, gas, oil, uranium)

All of the above are based on mineral and fuel-providing materials. Special knowledge is required to obtain such goods and it is possessed by mining experts. This expertise is also required in other areas such as:

- underground construction
- construction (in general)
- waste disposal
- ecological reform
- water-related economic activities
- measurements, etc.

University courses

From the above we can draw certain conclusions about the future of mining-related university courses:

1. *Mining is and will, in long-term, play an important part in the industry. Every country needs mining experts who are capable of using environmentally friendly methods of processing ore, whether locally or abroad, for domestic needs. Therefore mining remains an important university course.*

2. *Specialist knowledge, acquired by mining experts, is very much sought after in connection with environmental friendly technologies. This applies in particular to all sorts of underground construction, from tunnels to underground waste disposal, separating industrial waste from secondary materials, deep drilling for research in geo-technical construction, geophysical research, explosives etc. Students of geo-technology acquire this expertise, without which we cannot guarantee environmental friendliness in Slovenia. Hence the course in geo-technology (begun in 1992) is to be continued.*

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We will continue to develop these two courses by means of both undergraduate and post-graduate study possibilities.

Mining course

Educates engineers of a broad profile. They are familiar with the techniques of exploring and opening of possible sites and mines, the technology of surface and underground mining and processing/enriching both mineral and fuel-providing raw materials.

Geo-technology course

Educates engineers of a broad profile. They are fully qualified in the construction of all kinds of underground chambers and geo-technical constructions, waste-handling, explosives and geo-physical measurements.

Undergraduate courses

- Diploma course
6 semesters, 6 months of industry placement, graduation
- University course
8 semesters, 2 months of industry placement, graduation

Postgraduate courses

- Master's
4 semesters and a project
- Ph.D.
doctoral dissertation

Research and Development

It is essential that the teaching activity at the department be interleaved with its research and development. Therefore every teaching member of staff at the department also needs to be involved in research in some particular field.

This interleaving of the two sides of the department is functioning to some extent, but is not tight enough and therefore irrational and uneven.

Without permanent organised research and development, there can be no progress in any field. It is therefore necessary to gradually transfer the R&D solely onto the university itself. All of the R&D potential at the university, institutes and companies needs to be moulded into a single institution. This will create the sufficient conditions for a research and development process, which will involve engineers working in industry and students, as well as research staff at the university and institutes.

Cooperation with other technical schools and universities

Further to the above, it is essential to cooperate with other technical schools and universities.

The Society of Mining Professors, which now consists of more than 100 university professors from all over the world, is a basis for exchanging ideas and experience, course content coordination and also joint study courses. We should gradually introduce some lectures and practical work in English, with home and foreign lecturers, and also attract foreign students. For specialist subjects for which we have the world's top experts, entire lecture courses should be converted into English. Such subjects include

coal excavation in thick seams, tunnel excavation in weak rock, geo-statistics, environmentally-friendly mining, etc.

Rationalization and modernisation of the study courses

The development of the courses in geo-technology and mining demands rationalization, coordination and constant modernisation of the courses' contents.

Above all, we need to synchronize courses done at different technical faculties. By introducing a credits system, which is already being prepared, university courses will be synchronised at a university level.

University courses are constantly adapting to the needs of the economy and new experience in the industry. Nonetheless, I must point out that they are still lagging behind the most current developments in the fields of management, organisation and economics.

As there is no reason to expect any major changes in the development of Slovenian and, indeed, European mining, we need to consider the possibilities of unifying the courses of mining and geo-technology.

Future development of the two courses needs to be directed in such a way that graduates will have a good fundamental knowledge of the natural sciences, geology and engineering technology; and a thorough knowledge of geo-mechanics.

They should also acquire specialist knowledge such as surface and underground mining, drilling and explosives, measurements in geo-technology and mining, deep drilling, applied geo-physics, underground construction, waste-handling, mechanical processing techniques etc. There would be a strong emphasis on economics, management, organisation and sociology.

A future Geo-technological engineer will be able to use this knowledge to adapt to current industry needs. They will be able to find employment both in the field of mining and technology, i.e. in the broad field of geo-sciences.

Summary

1. The Department of geo-technology and mining implements both **undergraduate** and **postgraduate** university course in the following subjects:

MINING and GEOTECHNOLOGY

2. Future development of studies at the departments is oriented towards unifying the two courses into a single course in **geo-technology**. Graduates of such a course will cover the entire field of geo-scientific activities.

3. Some common policy in research and development. Teaching staff need to be active in research. Gradual nation-wide integration of the entire research and development potential in the field of mining and geo-technology.

4. Cooperation with other technical schools and universities.

5. Rationalisation, coordination and modernisation of university courses in mining and geo-technology.

6. Development of specialist expertise that is only taught at the Department of geo-technology and mining.

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