



ENGINE Final Conference

12-15 February, 2008
Vilnius, Lithuania



Geothermal Education and Training Recommendations

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UNU GTP class of 2007

United Nations University
Geothermal Training Programme
<http://www.unu.edu/iceland/geothermal>
and
University of Iceland
<http://www.hi.is>
Reykjavik, Iceland

Current Status of Geothermal Education and Training

From the identification of the resource to its exploitation, a geothermal project requires specialists in many fields of expertise. The success of a geothermal project largely depends on the good collaboration between specialists in these different fields of science and technology. Therefore, each member of a successful team has to be able to communicate with many other members of that team. Each member needs to have some basic knowledge in a wide range.

Basic training in related fields is currently available in most, if not all, European countries, but only in very few geothermal is specifically mentioned in the course (less in B.S. programs, slightly more in M.S. or Ph.D. programs).

On-the-job in-house training still quite common, and will probably remain so in the near and mid-term future. Research and industrial entities are employing people with basic education in the fields of activity they need and are training them in the specialties they are active in.

Specialised geothermal training programs have been organised in New Zealand, Japan, and Italy, but have stopped their activity due to lack of financial support.

The only regular program still in operation is the United Nations University Geothermal Training Programme in Reykjavik, Iceland. Fellowships are available for selected students from developing countries. The programme offers 9 lines of specialised training, with an initial general course on geothermal for all students:

- Geological exploration;
- Borehole geology;
- Geophysical exploration;
- Borehole geophysics;
- Reservoir engineering;
- Drilling technology;
- Environmental studies;
- Chemistry of thermal fluids;
- Geothermal utilisation.

The International Geothermal Association (IGA) has a Roster of Lecturers available and willing to share their knowledge, most of them free of charge. The IGA also has an official school, the International Summer School for the Direct Application of Geothermal Energy, which organises short courses and other educational events mainly in Europe (at present, mainly in countries eligible for GeoFund program of the World Bank).

Latest News

Reykjavik Energy Graduate School of Sustainable Systems (REYST) was officially launched December 3rd 2007 at Reykjavik Energy headquarters in Reykjavik, in collaboration with Reykjavik University and the University of Iceland. The program is characterized by its focus on sustainable energy use, especially geothermal energy, practical experience in the field and ready access to on-site work with experts on various subjects (<http://www.reyst.is>).



Suggested "route" for geothermal training in Europe

EXPLORATION

Generally available B.S. programs in Earth Sciences: Geology, Geophysics, Hydrogeology, etc.

M.S. and Ph.D. programs oriented to geothermal available in few countries (e.g. Iceland, Germany, Greece, Turkey):

- University of Iceland, Reykjavik;
- RWTH Aachen University, Aachen;
- Geothermal Centre of the University of Applied Sciences (Fachhochschule) Bochum;
- Aristoteles University of Thessaloniki;
- Middle East Technical University, Ankara;
- Dokuz Eylül University, Izmir.

Advanced training available at the UNU Geothermal Training Programme in Reykjavik, Iceland, but no fellowships are available any more for students from European countries.

Other universities intend to start M.S. programs which include geothermal (e.g. Univ. de Neuchâtel, Switzerland).

EXPLOITATION

B.S., M.S. and Ph.D. programs available in many countries in Oil and Gas (Petroleum) schools, with specialization in: Well drilling, completion and exploitation, Well testing and logging, and reservoir engineering. Specific aspects of geothermal reservoirs, EGS included, are usually not presented.

M.S. program including courses on Deep drilling technology, Borehole geophysics and Reservoir engineering available at the Geothermal Centre of the University of Applied Sciences (Fachhochschule) Bochum, Germany.

No example yet in Europe similar to the Stanford University, CA, USA, where the B.S. program in Petroleum Engineering was no longer very attractive and has been renamed to Energy Resources Engineering and oriented to renewables, mainly geothermal, followed by a M.S. program with the same name that also includes geothermal resources.

UTILISATION

B.S., M.S. and Ph.D. programs available in all European countries in Mechanical Engineering (heat engines, etc.), Civil Engineering (heating systems, etc.), Energy Engineering (Power plants, Thermal energy engineering, etc.), but most of them do not include specific courses on the utilization of geothermal energy. Some known exceptions:

- M.S. program at the Geothermal Centre of the University of Applied Sciences (Fachhochschule) Bochum, Germany;
- M.S. program in Renewable energy engineering (including geothermal) at the University of Iceland, Reykjavik;
- B.S. program in Thermal energy engineering oriented to renewable energy sources, including geothermal, M.S. program in Utilization of geothermal and solar energy, Ph.D. including geothermal energy utilization at the University of Oradea, Romania.

Ph.D. on geothermal energy utilization might be available elsewhere too.

Recommendations for developing geothermal education and training

1. **Capitalize** the ENGINE material gathered during the coordination action by making all information collected in the ENGINE project easily downloadable from the website (e.g. the CD's of all workshops and conferences);
2. **Use** the ENGINE network to compile existing trainings by creating a list of the universities offering higher education programs of all levels in fields of interest for geothermal exploration, exploitation and utilization, with contact people potentially interested, to be informed about the project;
3. **Encourage** the ENGINE partners to contact the IGA Secretariat (iga@samorka.is) and register for the IGA Roster of available lecturers, if willing to share their knowledge at training events organized or sponsored by the IGA;
4. **Create** a consortium, possibly based on the ENGINE consortium, to prepare and submit to the EC for funding a proposal for a series of summer schools focused on specific topics of geothermal exploration, exploitation and utilization. This consortium should have close links with all EC funded projects related to geothermal energy, to facilitate the inclusion of newest research results in the appropriate existing courses and to develop new courses.

University of Applied Sciences (Fachhochschule)
Geothermal Center
Bochum, Germany
<http://www.geothermie-zentrum.de>

RWTH Aachen University
E.ON Energy Research Centre
Aachen, Germany
<http://www.igeo.rwth-aachen.de/>
<http://www.idealeague.org/geophysics/>

University of Oradea
Romania
<http://www.uoradea.ro>

National Research Council
Institute of Geosciences and Georesources
Pisa, Italy
<http://www.igg.cnr.it>

International Summer School for the
Direct Application of Geothermal Energy
Skopje, FYR of Macedonia
Official school of the IGA
Contact: Prof. Kiril Popovski (kpopovski@mac.com)

Aristoteles University of Thessaloniki
Greece
<http://www.aubt.gr>

Dokuz Eylül University
Izmir, Turkey
<http://www.deu.edu.tr>

Middle East Technical University
Ankara, Turkey
<http://www.metu.edu.tr>



Geothermal summer school in Izmir, Turkey, 2006

