

**Rejtő Sándor Faculty of Light Industry Engineering****Institute of General Engineering and Environmental Protection****Address: Doberdo út 6, H-1034 Budapest, Hungary****Tel.: +36-1-666-5940****Fax: +36-1-666-5909****E-mail: patko@bmf.hu****Website: <http://www.rkk.bmf.hu/intezet/amki/kezdolap.html>****Head of Institute: István Patkó**

## 1 Introduction

The Institute of General Engineering and Environmental Protection of Rejtő Faculty teaches basics of natural sciences and professional knowledge of three branches of academic specialization. The Institute is hosting the environmental engineering education. It also takes part of manager education of Keleti Faculty. These tasks are fulfilled by 15 fulltime and 2 part time lecturers. One senior scientific adviser and two other coworkers belong also to the institute.

The Institute is located in Doberdó út, but our education activity is managed in all building of Budapest Tech in Óbuda and Józsefváros. The institute has several lecturer rooms and environmental, electronic, automation and CAD laboratories.

The Institute originated from Department of Basic Knowledge in the Light Industry Tech. Mechanical engineering group, which was directed by Dr. György Homonnay (1972-1976). The group had become independent department in 1976, managing by Dr. József Bódi and later Gábor Bertalan. This unit took part in the joint education system of Budapest Tech, and changed its name changed to Mechanical Engineering and Safety Techniques under direction of Dr. István Patkó in 1991.

The final version of the institute name has got due to the establishing procedure of Budapest Tech. That time the institute had three branches: mechanical engineering, environmental protection and the quality management. Recently the last one belongs to Institute of Leather, Textile, and Garment Technology Department.

In the followings parts of the text emphasizes the teaching activity of the faculty, mostly the environmental education.

## 2 Educational Characteristics

The Institute teaches basic knowledge of several specializations for hundreds of students. The recent structures of lectures get their shapes due to sequential education reforms, with better and better subjects. The institute manages regular, correspondence and newly introduced distant learning courses.

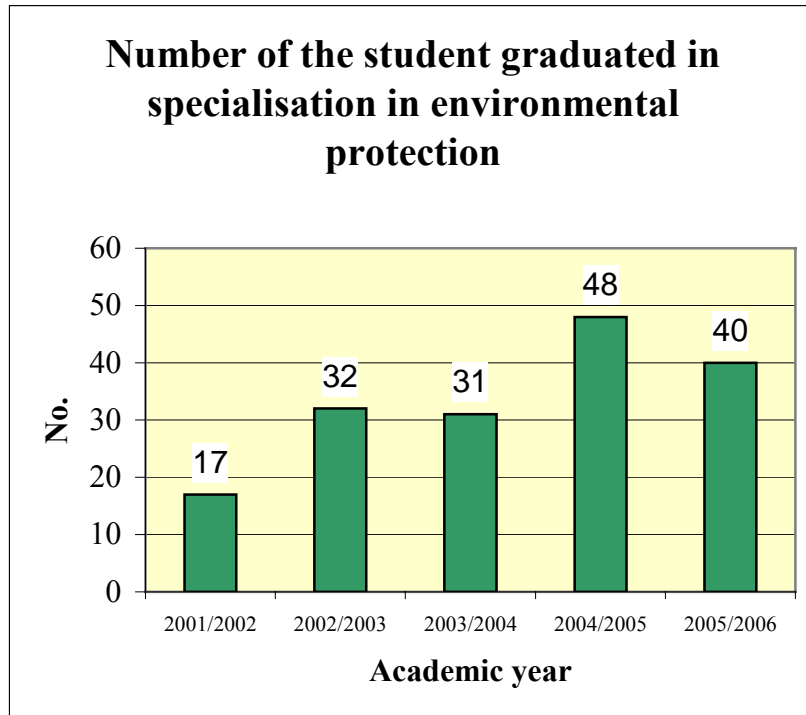
The courses teach not only basic studies, but also many facultative subjects, which help to get deep knowledge in special areas, including interdisciplinary areas. Foreign language courses are held for years, mostly in English. Detailed information of education activities are in the home page of institute (<http://www.kmf.hu/erasmus/angol/index.html>).

The principal trend of educational development was the introduction of environmental studies in the last decade. The first step had been the optional course of the 'Basics of Environmental Protection', which later became compulsory.

The specialization in Environmental Protection was established in 1999, induced by a great demand for environmental engineers. According to the interest of students, the courses of environmental protection or environmental management modules were chosen. The courses had a good and successful atmosphere. In 2001/2002 academic year, 17 students graduated from the first class. Seven other students followed their studies in cooperative education mode.

In this mode, graduating students spent 4 days in their employment as trainees, and one day in the institute conducting their studies. The cooperative education mode offers good abilities to get practice in real life, which is a great advantage in labor market. Several high quality diploma works were written in the topics of the employers. The employers highly appreciated the works of these students, and they offered further cooperation in this form. This is the reason, the cooperative education mode can be also chosen recently.

Specialization in environmental protection taught not only broad spectra of natural sciences, but it gave knowledge of environmental standpoints. The later included the recognition and solution of problems, using up-to-date measuring devices, and selection of environmental friendly technologies. In this way, the students have become qualified for solution, prevention, and organization of tasks in environment. These include protections, developments, damage preventions, and remediation.



Minister of education at 15.12.2003 accredited the college level education of environmental engineering.

The first semester has started in September of 2004. The environmental engineering includes basic natural sciences, humanity, economics, and special environmental knowledge as compulsory studies. The three types of specialized degrees – light, electrical and mechanical industry – offer also several optional specialized courses. The curriculums of specialized degrees are coordinated with the other faculties of Budapest Tech. The specialized degrees offer basic knowledge in the chosen branches taking into consideration of their characteristic environmental problems and optimized solutions of their special environmental matters. **B.Sc. education system**, which was started 2006, aimed at similar purposes to the above-mentioned specializations.

The environmental engineers with bachelor degree have enough recent technical and scientific learning to prevent and decrease the high burden of environment. They can also carry out surveys of the pollutions, and manage the remediation actions. They have deep knowledge of environmental friendly and waste minimization industrial technologies. The ability to make environmental impact assessment studies and environmental audits are essential part of their education.

The two specializations (light and electric industries) give substantial technological knowledge of own industries, not only the topics of environmental subjects. The students become qualified persons to joint together the standpoints of industrial production and environment protection in the management of various companies.

The learned material is appropriate background for high quality work in various industries, services, councils and environmental inspectorates.

The environmental engineering courses are taught in regular education mode, but from the 2006/2007 academic year its correspondence teaching is also started.

The lectures and their topics are coordinated with the universities having M.Sc. courses. In this way, our talented students can follow their studied in harmonized conditions.

The following Universities accept our credits in their M.Sc education:

- University of Pannonia (Veszprém)
- Faculty of Chemical and Bioengineering of Budapest University of Engineering and Economics
- University of Debrecen
- University of Miskolc
- University of Western Hungary
- University of Pécs
- Szent István University (Gödöllő)
- Universitas Scientiarum Szegediensis
- Széchenyi István University (Győr)



Our students regularly participate in national scientific student conferences. The institute supervised several awarded presentations in them. Some awards were also won in the competition of chamber of Budapest and Pest County's engineers.

The students take part in not only lectures and laboratory trainings, but they get trained in field practice and plant visits. The education plans include 2 x 4 weeks compulsory professional summer practices too. The university social life is improved by excursion and cultural events.

### 3 Research and Scientific Activity

According to the structure of Institute, the scientific activity of lecturers divided two parts:

- General engineering
- Environmental protection

#### **General Engineering**

Two university doctorates, 1 Russian type Ph. D. and two habilitation dissertation have defended since the foundation of institute.

Research fields:

- Flow dynamics, mathematical modeling of flow,
- Testing of machinery, maintenance,

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- Potentials of renewable energy and their economics aspects,
- Analytical chemistry, chromatography,
- Pneumatic material transport.

### **Environmental Protection**

Defense of a PhD dissertation is expected in November of 2006, and a habilitation process is finishing soon.

The main research fields:

- Environmental conscious education,
- Development of remediation materials,
- Mathematical modeling of spread of pollution materials.

The students are invited to participate in research activities. The researches of students result in diploma theses, and scientific essays. The institute supervises 2-3 student scientific essays yearly.

### **Tenders, Applications, Competitions**

#### ***Development of structure and thematic of higher education tender, HEFOP/2005/3.3***

The institute, led by Dr. István Patkó general director, won ‘**Development of structure and thematic of higher education**’ tender with cooperation of University of Pannonia. The invitation to tender was launched by managing authority of Human Resources Development Operational Program of (HEFOP) Ministry of Employment and Labor with the assistant of Ministry of Education, and with cooperation of monetary fund directorate of Ministry of Education.

The subject of the HEFOP / 2005 /3.3.1. tender is the creation of an unified Hungarian education system for vocational studies and Environment Engineers (B.Sc.) levels. The members of consortium work out a unified, up-to-date digitalized education plan and database contain scientific and technical data. This project establishes a solid base for starting internationally accepted and accredited academic specialization.

The institute takes part in the development of education plans of ‘Air pollution prevention’ and ‘Technical Manipulation of Environmental Protection’.

The consortium consists of the following partners:

University of Pannonia (coordinator), University of Engineering and Economics, Budapest Tech, University of Debrecen, College of Dunaújváros, College of Eötvös József, University of Miskolc, University of Western Hungary, University of Pécs, Universitas Scientiarum Szegediensis, Szent István University, Széchenyi István University.

The budget of tender is 200 MFt., from which our institute shares in 2 059 254 Ft non-refundable support. The major part of this support was spent for three personal computers and one laptop. Colleagues, who participated in the development of new educational plan, got the remains part of money.

The contract was signed at 06.02.2006. The closing date of the project is 31.08.2007. The finished educational material contains the following subjects: Environmental geology, Environmental management, Soil protection, Pediology, Health protection, Environmental analytical methods, **Technical manipulation of environmental protection**, Ecology, State of the Earth, Environmental chemistry, Water quality protection, **Air pollution protection**, Waste management, Noise and vibration protection, Radiation protection, Nature and landscape conservation, Environmental informatics, Environmental status assessment. After finishing the development, these subjects are available in digitized forms to support the harmonized environmental education in Hungary.

**Ministry of Environmental Protection and Water Management, Green Spring  
2004**

**„7. Partnership, 7.2 Partnership in the environmental education**

Ministry of Environmental Protection and Water Management invited tenders entitled ‘Green Spring - Partnership in the environmental education’ in 2004. This project aimed at an improvement of the environmental and nature protection approach of education and mentality.

Our General Engineering and Environmental Protection institute, lead by Dr. Istán Patkó general director, was successful in this tender. The won 90 000 Ft money was spent according to tender for the improvement of the college teaching. The contract was signed at 09.05.2005., and the money was spent in the 2005/2006 academic year.

The first environmental protection action of the school year was the ‘*Make nicer and cleaner our surrounding*’ events as part of **Word Cleanup Day**. Due to this event, the students, and lecturer make free our college and its surrounding from deposited garbage. Our cooperating partner was Rügyeckék (buds) human and environmental non-government organization. It was a good occasion to learn their practice, and confirm our connections with environmental civil organizations.

We published a flier saying ‘*Do not ask, what you can expect to the Earth. The question is: what can you do for environment*’ in the occasion of day of Earth. This A5 size two pages color brochure draws attention of people the frequently happen environmental damages and their effects. The flier gives also guidelines to avoid these troubles. The main purpose of this publication was, to alert as many as possible people favor of environmental protection. The students edited the whole content of brochure and Keresztes és Jeney Printing Ltd. carried out it.

The fliers are spread among students, colleagues and their friends during collage events.

**Day of birds and trees** was an important event of programs. Its slogan was: Adopt a tree! Trees and evergreens were planted in the garden of college and surroundings. These plants were adopted for symbolic sums. It was emphasized that, the clean and healthy environment is much better and pleasant for learning and working. The programs were good occasions for strengthen the environment friendly thinking in the field of organization and managing. The event was immortalized by a donated marble plate. This plate was situated in the garden of college, close to the planted trees.

Such grouped cooperation events help to build up team spirit and communities. Nowadays, it is very important the reinforcement of the communication, cooperation skills of the people. Our college takes care in great extent to give such abilities to our students. A good, well functioning community was born during the organization of programs.

The talented natural and environmental photographers of the college were donated from the certain part of the tender. The exhibition of their pictures was held in the assembly hall of college. In this way these nice artistic pictures got a great publicity and the students could enjoyed them, getting better filing. The exhibition was open during whole semester and later it was passed to other colleges with same purposes.

Over our education and scientific activities, these events support the evolvement of nature and environment protection attitude of students.

#### **Planned tenders in the next semester**

##### *Austrian-Hungarian Action Fund*

Our institute will soon submit a tender to Austrian-Hungarian Action Fund with following title: 'Examination of potentials of renewable energy sources, and to report results due to education'. This fund supports the Austrian-Hungarian cooperation in the field of research and education. The fund favors projects having great interest in both countries. Such themes include our common history, present days and trends of our developments.

The participants of planned cooperation are European Centre of Renewable Energy (EEE, Güssing, Austria), Energy College of Pinkenfeld, University of Western-Hungary, Budapest Tech. The cooperation includes the creation of a common education and training program. The Austrian and Hungarian lecturers teach the theoretical background of renewable energy sources, which follow one week training in the EEE.

During the training period the students and teachers also do trainings in heating and power plant (Güssinger Fernwärme GmbH), Alternative fuel producing Ltd.



of Burgenland (BAG) and biomass power plant of Güssing (Biomasse Kraftwerk Güssing GmbH & Co KG).

The study-trips are also included project making joint research. These aim at improvement of boiler efficiency, detachment rate and better parameters for the furnace.

The students also learn the principle of solar collectors and solar cells in a special education centre (Solartör), where they take part in laboratory practice too. The Austrian students visit also our college and visit factories in Hungary.

The biomass power station of Güssing was chosen, as a good example, because it produces the overwhelming part of energy consumption of town, with gasification and burning of biomass. On the other hand, biomass is 31.5% from the 36.63% renewable energy source, and most of them used only for heating in Hungary. We can produce considerable amount of electricity, not only heat, with better-designed timbering, according to Austrian practice. Study is necessary for improvement of our biomass resources according to our potentials and conditions. The University of Western-Hungary joins to project in this field. The joint education shows the various possibility of use of renewable energy sources, their technological processes and their future. The economic and environmental aspects of biomass energy are also stressed. The Austrian training helps the student to be familiar to a well managed real life example of biomass based energy network. This experience promotes their environmental engineering activity.

#### *National Scientific Research Fund*

An OTKA (National Scientific Research Fund) grant has applied in May of 2006. The title of the project is the following: Development of New Highly Sensitive and Effective Separation Methods for Determination and Characterization of Environmentally and biologically active substances. The University of Pécs is the main coordinator of this project, and our institute and Institute Pasteur (Paris, France) is sub coordinators in it.

Important targets of this project are the developments of new analytical procedures for endocrine disrupting chemicals (EDC) and pharmaceuticals. These procedures includes the chiral selective analyses too.

The subject of or research will be selected from EDC compounds including industrial additives (e.g. polybrominated diphenylethers, bisphenols), pesticides (e.g. toxaphenes, pyrethroids, phenoxy acids, triazines, endosulphane, methpropene) household products (e.g. antiseptics, detergents), and from pharmaceutical compounds (e.g. antibiotics, non-steroidal inflammatory agents, lipid regulators,  $\beta$ -blockers). We are aiming at to begin the establishment of Hungarian conditions. The analytical procedures of representatively selected compounds will be good basics for the analyses further emerging pollutants. The developed methods open the door further studies to determine the distribution and seriousness of such pollutions.

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During experiments, multistep cleaning and concentration sample pretreatment procedures will be applied. Several, new methods had to be developed. Major part of them will base on solid phase extractions. The applications of immuno-sorbents and polymer beads will be also studied.

*Bilateral education plan*

A Tét grant has been applied. This bilateral grant aims at to tide up our connections with Vietnamese partners. Our further perspective plan is to establish joint, college level education with Vietnamese partner. The lather and textile department will be mostly involved in it. However, other departments (e.g. electric, environmental) will also take part in this education.