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**Program of pedagogical education of
engineers**

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Tekst jest udostępniony do wykorzystania w ramach
dozwolonego użytku.

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PROGRAM OF PEDAGOGICAL EDUCATION OF ENGINEERS

Introduction

On the pedagogical education of engineers focuses International Society for Engineering Education that was founded in 1972 at the University of Klagenfurt (Austria) by Adolf Melezinek. Establishing an engineering pedagogy was a step forward at that time, engineering and pedagogy had never been linked before on a scientific level. What is meanwhile known worldwide as the “Klagenfurter Ingenieurpädagogische Schule” (Klagenfurt School of Engineering Pedagogy) was established starting with the 1. International Symposium of Engineering Pedagogy in 1972, symposia of IGIP are now held each year.

International Society of Engineering Education created an international register of engineering educators, which since then guarantees minimum standards in technical expertise and a well-balanced competence profile for engineering educators. The register lists qualified educators who had gone through a curriculum which has been approved by IGIP. Those registered are International Engineering Educators and can use the title ING-PAED IGIP.

IGIP accredits training centers for “International Engineering Educators”, whose teaching matter conforms to IGIP’s curriculum for engineering pedagogy¹.

Pedagogical education of engineers on the VŠB – Technical University of Ostrava

The course entitled “Engineering Pedagogy” is organized via a three-semester program entitled “Additional pedagogy studies for teachers of specialist subjects”, starting in the winter semester of the first year of the masters’ level and ending after the winter semester of the second year. It is open to all students of the masters’ level of all faculties of VŠB-Technical University of Ostrava. The program consists of 300 hours worth 35 credits (Table 1), it is accredited by the Ministry of Education, Youth and Sports of the Czech Republic and it takes place in accordance with the study plan that is outlined below. Pursuant to Sec. 9 Par. 2 Letter b) of the law number 563/2004 Coll., the gradu-

¹ URL: <http://www.igip.org> [2011.08.15.]

ates will receive certification of pedagogical qualification (ref. no. 7773/2008-25-205) to teach specialist subjects at higher schools.

Table 1.

Engineering Pedagogy – study plan

	1. semester	2. semester	3. semester	crd
	Le – Sem	Le – Sem	Le – Sem	
Introduction to the study	4 – 0 C			0
Teaching ethics	12 – 6 C,Ex			1
Human Biology	10 – 5 C,Ex			1
Pedagogy general and comparative	15 – 15 C,Ex			4
Educational Communications	10 – 15 C,Ex			2
General and developmental psychology		10 – 15 C,Ex		3
Didactics general		10 – 15 C,Ex		3
Creating and use of educational media		9 – 6 C		2
The theory and methodology of education		10 – 5 C,Ex		2
Social pedagogy		8 – 7 C		2
Seminar for the final work		5 – 0 C		1
Education and Social Psychology			10 – 15 C,Ex	3
School Management			11 – 2 C	2
Didactics technical subjects			15 – 15 C,Ex	4
Supervised practice teaching			40 C	5
Total	92	100	108	35

Le – Lecture C – Credit
Sem – Seminary Ex – Exam

Course of studies

Continuous evaluation and grading

The studies span across three semesters, the instruction is organized at regular times every week, and these times will be agreed between the students and lecturers at the beginning of each semester. Class participation is registered with the use of signup sheets. Students will be allowed to take the final exam once they have fulfilled all prerequisites for being granted the credit for the course. Exam terms are arranged between a student and a lecturer in advance, exams are graded as follows: “Excellent, Very Good, Good, Failed”. In case a student does not succeed he or she has a second and a third chance, whereas the terms for these exams will be determined by the lecturer upon agreement with the student.

Conclusion of studies

The issuance of the certificate of pedagogical qualification is subject to fulfilment of **all** tasks and assignments, by passing all **individual exams** in individual courses, the submission of a **portfolio** (a set of all works, preparations, presentations, teaching aids, tests, games, tasks, drawings), **final exam** in psychology, pedagogy, didactics of specialist subjects and **defense** of a final thesis with the use of a PowerPoint presentation in front of a commission.

Final thesis

A student shall elaborate his or her own final thesis at the end of his or her studies under the supervision of a university educator who is concerned with that particular branch of science to which the topic of the thesis belongs. A thesis is one of the tasks that one must fulfil in order to graduate successfully. This thesis has both **revisory** and **demonstrative** functions. By submitting his or her final thesis a student proves he or she managed to master the basic knowledge of the branches he or she studied, both on theoretical and practical level. The final thesis must be at least 35 pages long and must consist of theoretical and practical part.

Standards for engineering pedagogy graduates

Pedagogical, social, psychological and ethical competences

When in class, a graduate is able to activate his or her pupils and to motivate them in the process of learning, he or she can realize feedback, and create a pleasant social atmosphere in accordance with a code of ethics of an educator, choose the most advantageous structure of a learning unit based on educational objectives, curriculum, or individual personalities of pupils. He or she is able to make use of optimal teaching forms and methods. He or she can use optimal teaching aids and didactic technology, and to react accordingly to eventual technical difficulties.

The ability of a graduate to plan educational process in a specialist subject

A graduate prepares for individual lectures by elaborating concepts that include goals that pupils shall achieve by learning; curriculum that pupils shall master; motivation methods to be used; methods and organizational forms; teaching aids and didactic technology to be used; method of verification of learning and comprehension by the pupils.

Methodological competences

A graduate can create his or her own educational program, and he or she can create, change, update or innovate pedagogical work plans according to current needs. He or she shall direct the process of learning in case of pupils (students) of a particular age in relation to psychological, social and causal aspects. He or she masters a range of evaluation tools; he or she is capable of reflection and self-reflection.

Evaluation and diagnostic competences

The graduate is capable of creating a pleasant atmosphere in class during oral exams, he or she monitors the level of progress of individual pupils regularly, by selecting the most appropriate diagnostic methods, he or she can grade not only the pupils' performance as such, but also their endeavour (process) and conditions, he or she takes oral exams as feedback and he or she makes use of them to improve his or her teaching procedures. He or she can diagnose relationships among pupils or the atmosphere in class.

Organizational (managerial) competence

He or she has knowledge of laws, documents and other regulations relating to the profession of educator, as well as of the conditions and processes of operation of educational institutions, he or she can handle appropriate administrative procedures.

Competences related to self-evaluation and self-development

According to his or her pedagogical knowledge and experience, a graduate is able to improve his or her educational influence continually, he or she is capable of creative approach to teaching, he or she looks for new ways of organizing the work in class, he or she changes the teaching forms and methods in accordance with actual situation, he or she is creative in using teaching aids and didactic technology, he or she is creative in providing a pleasant social climate.

Communication and collegial competences

He or she is able to communicate effectively with pupils (students) in various pedagogical situations, as well as with colleagues, superiors, subordinates, he or she can contribute to the creation of faculty team spirit, he or she can communicate with parents (get them to participate).

Institutional Resources

Courses take place in a room that is equipped with the didactic technology that is listed below, as well as with tools and software that is necessary for the courses.

Didactic technology:

- typical class board,
- overhead projector,
- data projector that can be connected to a computer,
- multimedia computer,
- data projector connectible to an interactive board,
- interactive board,
- projection screen,
- visualiser,
- digital camera,
- digital camcorder.

Data projectors are mounted to the ceiling of the room; one is used for projections on a roll-down screen, while the other one is used with an interactive board. Computer and visualiser are installed in a board in which they can be easily operated by a teacher or students.

Teaching aids:

Original items and real-life items:

- original natural substances – borrowed from specialized departments,
- pedagogized – borrowed from specialized departments.

Illustration and demonstration of objects and real-life aspects:

- models – static, functional, kit-sized – borrowed from specialized departments,
- static and dynamic displays, as presented through didactical technology.

Software to be used within individual courses:

- Microsoft Excel – spreadsheet application,
- Microsoft Word – text editor,
- Microsoft PowerPoint – software for creating PPT presentations,
- InterWrite – software for communication between a PC and an interactive board,
- SMART Board – software for communication with an interactive board,
- Windows Movie Maker – software for digital video editing,
- Windows Media Player – software for video and audio file playback,
- Adobe Photoshop – software for digital photo editing.

Course participants have the opportunity to use computer rooms and terminals in the premises of VŠB-Technical University of Ostrava. All computers have access to internet.

Quality control and feedback

Participants' attendance, their credits and exams taken will be registered via their "Student ID's". Each student will receive his or her ID at the beginning of their studies during the first orientation meeting.

Continuous evaluation of course effectiveness:

The level of achievement of particular educational goals in individual courses is continuously observed via a system of evaluation of tasks given to students, and via credits granted to students at the end of a semester, and by an oral exam that the students must pass.

- Each course has its expert guarantor who carries out direct observations in order to monitor the models of education used by individual lecturers.

Final evaluation of course effectiveness:

- Fulfilment of the main educational goals is verified by passing of a final exam from pedagogy, psychology, and didactics of expert courses and via thesis defense (at least 35 pages of text).

Students' evaluation of the course and effectiveness thereof:

- After completion of the course the participants receive a questionnaire that is focused on the assessment of quality of educational activities of lecturers, learning

aids, communication with lecturers and relevance of individual topics from the curriculum. They can also use the questionnaire to provide critical remarks to the curriculum of individual courses and to suggest appropriate changes in relation to the needs of the region and school educational programs of vocational schools.

- After a certain time lapse (cca. 2 years) the course participants will receive a questionnaire requesting them to provide information on their professional success.

All course graduates will receive a certificate of qualification in teaching of expert courses at high schools, in the branch corresponding to their university qualification.

The entire agenda - application acceptance, correspondence, issuance of student ID's, evidence of fees, inspection of student ID's prior to final exam signup, certificate issuance – will be administered by the secretariat of the Department of Teacher Training in Specialist Subjects of VŠB-Technical University of Ostrava.

Conclusion

High school teachers of technical subjects usually acquire their pedagogical qualification within their university studies. Technical university graduates who want to teach specialized high school subjects can supply their education by studying pedagogy, psychology and didactics in the accredited curriculum. In case the curriculum is certified by International Society for Engineering Education, the certificate of graduation entitles the graduate to submit the request for obtaining the degree ING-PAED IGIP and enlistment into the IGIP registry with the right to teach specialized subjects at foreign schools. The request has to be supplied with certificate of examination from foreign language (English, French, German, or Spanish) and certificate of at least one-year education experience. The request is available on the IGIP website: URL: <http://www.igip.org> [2011.08.15.].

Translation: Jiří Svoboda

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Program of pedagogical education of engineers

The report is four further training college teachers of technical subjects in consonance with IGIP (Internationale Gesellschaft für Ingenieurpädagogik) standards focused. The course entitled “Engineering Pedagogy” is at VŠB – Technical University of Ostrava accredited.

Translated by Jiri Svoboda

Program pedagogicznej edukacji inżynierów

Omówiony w tekście raport dotyczy dokształcania nauczycieli akademickich uczących przedmiotów technicznych, który jest zgodny ze standardami IGIP (Międzynarodowe Towarzystwo Pedagogiki Inżynierskiej). Kurs nosi nazwę „Pedagogika inżynierów” i jest akredytowany na Uniwersytecie Technicznym w Ostrawie.

Tłumaczyła Dorota Ciechanowska