

**Information on the postgraduate doctoral
programme:
Education in Engineering**

Faculty of Natural Sciences and Mathematics, March 2008

4.2.2.1 Splošni opis

General description

QUALIFICATION AWARDED

- **Doctoral programme on “Education in Engineering”**

Qualification rewarded: Dr. Ph. Degree of Technique in the education

Duration of studies: 3 years

ADMISSION REQUIREMENTS

- Successfully completed graduate of the second stage university programme;
- Successfully completed graduate university programme, accepted before the enforcement of the Higher Education Act 2004;
- Successfully completed master programme in the technical field, accepted before the enforcement of the Higher Education Act 2004;
- Successfully completed professional study programme, accepted before the enforcement of the Higher Education Act 2004;
- Successfully completed study programme, that educates for the occupation, regulated by EU, which worths 300 ECTS.

Number for entry: full time study: 0, part time study: 15

Entry limitation

In case of entry limitation, the final grade of the completed study programme is considered (an average grade 30 %, master work 30 % and success at optional course from suitable field 40 %).

The transition from the other post graduate technical study programme is also possible if the student meets the entry criteria and if there is no entry limitation. The student from another study programme has to hand in the official confirmation of completed obligations. The Department of technology appoints the obligations, that student have to finish for graduating the Ph.D..

EDUCATIONAL AND PROFESSIONAL GOALS

Basic goals of the programme

- Hand on the improved knowledge of technique in the education and introduce wideness, role, meaning and interdisciplinary of the representative field to the students;
- give them the necessary organizational and professional knowledge about development and research on the field of technique and pedagogic education as well;
- qualify students for using the methods and working technology, following the profession developing trends with performing modern methods and working technology on the technical field;

- qualify students for independent planning of education process and professional developing of specific subject field;
- perform the newest didactic and pedagogic access and teaching methods and make students familiar with modern trends from the learning technology;
- deepen the theoretical knowledge about subject didactics and make methodological knowledge for solving the exacting technical, technological, organizational and developing tasks and projects wider;
- qualify students for independent international competition research in the education of technique.

Common competences achieved through the programme

- Ability of thinking systematically;
- ability to get critical and self-critical judgement;
- ability and readiness for team work in domestic and international environment;
- ability to use the theory in problem solving;
- improved knowledge of experimental and other methods for proving the scientific theories;
- ability to search different sources of knowledge in professional problem solving;
- ethical reflection and professional ethic standard commitment in technique and education;
- initiative and independence in decision-making and leading the professional and scientific projects.

Subject specific competences achieved through the programme

- Profound knowledge about educational system on the technical field in different time-frames and educational systems;
- knowledge about the individual and team research work in the education of technique;
- ability to present the results of scientific research on the scientific or professional conferences and journals as well;
- using of information – communication technology in the education of technique;
- ability to classify the scientific research methods into the concepts and models of educational process at technical subjects in all level of education;
- improved knowledge of project work at lectures planning;
- managing qualitative research in the education of technique;
- managing statistical methods in the education of technique;
- managing methodology of planning, supervision and evaluating results and achievements at research work.

ACCESS TO FURTHER STUDIES

Doctoral university programme *Education in Engineering* is a supreme degree of university study in the area of technique in the education.

COURSE STRUCTURE DIGRAM WITH CREDITS

Complete curricula in the doctoral programme *Education in Engineering* is given in the following pages. All the courses (obligatory and elective) are given together with the semester of study, the amount and type of the contact hours and the assigned number of the ECTS credits.

Doctoral Programme “*Education in Engineering*”

The postgraduate doctoral programme consists of:

- 3 obligatory courses (18 ECTS);
 - 2 elective courses (12 ECTS) from the selection of the pedagogical elective courses;
 - 2 elective courses (12 ECTS) from the selection of the technical elective courses;
 - 1 elective course (6 ECTS) from the selection of the pedagogical-didactical elective courses;
 - 2 elective courses (12 ECTS) from the selection of the comparable postgraduate study programme modules of other home or foreign Universities,
 - individual research work (90 ECTS),
 - composition and defence of the Doctoral Thesis (30 ECTS),
- in total summ of 180 ECTS.

The abbreviations in the curriculum have the following meaning:

L – lectures

S – seminar

T – tutorial

IW – individual work

1st year, 1st semester

Course title		Type of subject	Professor	Range of realization (hours)			Total contact hours	IW	Total hours/ ECTS
				L	S	T			
1.	Advanced material and production technologies	obligatory	B. Aberšek	15	10		25	155	180/6
2.	Dimensioning of Machine Parts and Structures	obligatory	S. Glodež	15	10		25	155	180/6
3.	Concepts and models of technical didactics	obligatory	A. Papotnik	15	10		25	155	180/6
4.	Elective course from the selection of the pedagogical elective courses ¹⁾	elective		15	10		25	155	180/6
5.	Elective course from the selection of the pedagogical elective courses ¹⁾	elective		15	10		25	155	180/6
Total hours/ ECTS				75	50		125	775	900/30

¹⁾ The student chooses any optional course from the set of five pedagogical elective courses (Curriculum Theory, Theory of Education, Psychology in education, Methodology of pedagogical research, Special pedagogy/Special education).

1st year, 2nd semester

Course title		Type of subject	Professor	Range of realization (hours)			Total contact hours	IW	Total hours/ ECTS
				L	S	T			
6.	Elective course from the selection of the pedagogical – didactical elective courses ²⁾	elective		15	10		25	155	180/6
7.	Elective course from the selection of the technical elective courses ³⁾	elective		15	10		25	155	180/6
8.	Elective course from the selection of the technical elective courses ³⁾	elective		15	10		25	155	180/6
9.	Individual research work I (IRW I)	obligatory						360	360/12
Total hours/ ECTS				45	30		75	825	900/30

²⁾ The student chooses any optional course from the set of pedagogical-didactical elective courses or the set of five pedagogical elective courses if he/she didn't choose it already in the 1st semester.

³⁾ The student chooses any optional course from the set of technical elective courses.

2nd year, 3rd semester

Course title		Type of subject	Professor	Range of realization (hours)			Total contact hours	IW	Total hours/ ECTS
				L	S	T			
10.	Elective course from the selection of the technical elective courses ⁴⁾	elective		15	10		25	155	180/6
11.	Elective course from the selection of the pedagogical elective courses ⁵⁾	elective		15	10		25	155	180/6
12.	Individual research work II (IRW II)	obligatory				10	10	530	540/18
Total hours/ ECTS				30	20	10	60	840	900/30

⁴⁾ The student chooses the suitable technical elective course from any doctoral study programme of any home or foreign university. The student can choose also the optional course from the set of the technical elective courses from the suggested doctoral programme *Education in Engineering*, if he/she didn't choose it already in the 1st year of study.

⁵⁾ The student chooses the suitable pedagogical elective course from any doctoral study programme of any home or foreign university. The student can choose also the optional course from the set of the pedagogical elective courses or the set of pedagogical-didactical elective courses from the suggested doctoral programme *Education in Engineering*, if he/she didn't choose it before.

2nd year, 4th semester

Course title		Type of subject	Professor	Range of realization (hours)			Total contact hours	IW	Total hours/ ECTS
				L	S	T			
13.	Individual research work III	obligatory				10	10	890	900/30

	(IRW III)								
Total hours/ ECTS					10	10	840	900/30	

3rd year, 5th semester

	Course title	Type of subject	Professor	Range of realization (hours)			Total contact hours	IW	Total hours/ ECTS
				L	S	T			
14.	Individual research work IV (IRW IV)	obligatory				10	10	890	900/30
Total hours/ ECTS						10	10	840	900/30

3rd year, 6th semester

	Course title	Type of subject	Professor	Range of realization (hours)			Total contact hours	IW	Total hours/ ECTS
				L	S	T			
15.	Doctoral Dissertation, Publication of scientific paper	obligatory				20	20	880	900/30
Total hours/ ECTS						20	20	880	900/30

FINAL EXAMINATION

There is no final examination other than the defence of the doctoral thesis.

EXAMINATION AND ASSESSMENT REGULATIONS

The examinations are usually written and oral. Some of the courses involve the preparation of a seminar work which is usually defended by an oral presentation. The oral examination is usually preconditioned by the successful completion of the written exam and the seminar work where required. In individual work, the student's successful start, one third-, two third-accomplishments and finishing of the investigations are assessed. Timetables of examinations are issued individually in a consense between the student and the lecturers. Otherwise, timetables of examinations are issued yearly by the Faculty Senate at the beginning of the academic year and are published on the faculty web page and on the notice boards. There are at least 6 examinations for each course per academic year and students are free to choose the date of examination. The students need to register for examination 7 days before the examination date. The examination can be cancelled no later than 3 days before the examination date. The use of literature and other items during the examination is determined by the lecturer and may vary from course to course.

The Ph.D. thesis is publicly presented and defended before an examination board, chaired by an internationally recognized academician, who is an expert in the field. The members of the board are also the Dean of the Faculty, the mentor, co-mentor and one or two internationally recognized academicians, who are experts in the field.

ECTS DEPARTMENTAL CO-ORDINATOR

ECTS departmental co-ordinator is the actual head of the department.

4.2.2.2 Seznam predavanj

List of Courses

No.	Course title	The type of course O-obligatory, E-elective	ECTS
The obligatory courses			
1.	Concepts and models of technical didactics	O	6
2.	Advanced material and production technologies	O	6
3.	Dimensioning of Machine Parts and Structures	O	6
The pedagogical elective courses			
4.	Curriculum Theory	E	6
5.	Theory of Education	E	6
6.	Psychology in education	E	6
7.	Methodology of pedagogical research	E	6
8.	Special pedagogy/Special education	E	6
The pedagogical – didactical elective courses			
9.	Technical creativity by lectures and activities	E	6
10.	Educational competences	E	6
11.	Ergonomics in the technical education	E	6
12.	Information and communication technologies in education of engineering	E	6
13.	Engineers pedagogy and didactic	E	6
14.	Multimedia technologies in education of engineering	E	6
15.	Advance methods for technical/technological education	E	6
16.	Communicating for Engineers	E	6
17.	Distance learning	E	6
The technical elective courses			
18.	Computer Aided Dimensioning and Design	E	6
19.	Alternative Energy and Energetic	E	6
20.	Rapid Manufacturing	E	6
21.	Integrated manufacturing systems	E	6
22.	Mechanisms	E	6
23.	Fuzzy control systems	E	6
24.	Modelling and Identification	E	6
25.	Planning and Production Management	E	6
26.	Driving technique	E	6
27.	Computer-aided 3D Modelling	E	6
28.	Robotics	E	6
29.	Technical regulations	E	6
Individual research work			
30.	Individual research work I (IRW I)	O	12
31.	Individual research work II (IRW II)	O	18
32.	Individual research work III (IRW III)	O	30
33.	Individual research work IV (IRW IV)	O	30
The doctoral thesis			
34.	Composition and defence of the doctoral thesis	O	30

