

# Trends in Engineering Education at the University of Pardubice

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**Abstract:** University of Pardubice has been transformed from University of Chemical Technology to the School with three faculties (Faculty of Chemical Technology, Faculty of Economics and Administration, Jan Perner Transport Faculty) and Institute of Languages and Humanities. The School is a thriving community of nearly 5000 students and staff dedicated to scholarship and learning through teaching and research. The majority of our Bachelor, Master, and Doctoral students are studying programs with close relation with industry and companies operating in transportation. The profile of the Jan Perner Transport Faculty is based on scientific and research projects in technical, technological, economic and social sciences oriented towards the development of transport, communication and information system. The study programme of Transport Engineering and Communication has four specializations. The profile of Faculty of Chemical Technology is based on scientific activities at both fundamental and technological research levels. A number of successful technical projects were completed in cooperation with industrial sector. The majority of students study in the course Chemistry and Technical Chemistry. Students at Faculty of Economics and Administration have possibility to study specializations Public Administration and Regional Development, Economics and Management and Information Systems in Public Administration. The main points discussed at University Pardubice is the level of specialization of graduates, proportion between the number of Bachelor, Master and Doctoral students, how to prepare Bachelors for needs of industry etc.

**Keywords:** chemistry, technology, transport, economics.

## 1. Introduction

The fifty years long tradition of higher education in Pardubice reaches back to the first months after the Second World War and is very closely connected to the development of the transport network, food processing and chemical industry in the city and the region. On June 27<sup>th</sup>, 1950 the Czechoslovak government established the Chemical Institute. In November 1953, the school became an independent body as the Institute of Chemical Technology headed by a Rector. The restructuralisation of the Institute in 1991 meant that two faculties, the faculty of of Chemical Technology and the Faculty of Economics and Administration, became the nucleus of the future University. In 1992, the Institute of Languages and Humanities was established in compliance with a project suggested by the Ministry of Education. Social and economic changes in the society and the formation of the new independent Czech Republic in 1993 became the major stimulus for the establishment of the Transport. Thus the original Institute of Chemical technology has become a University. The transformation of the University was legally recognized by the Czech Parliament in 1994.

## 2. Faculty of Chemical Technology

The Faculty educates students with the aim to give them sound background for their future career in a variety of chemistry - related scientific, industrial as well as entrepreneurial areas. Successful students will proceed from basic courses in mathematics, physics, computing and chemical subjects such as general, organic, inorganic, analytical, and physical chemistry combined with laboratories and pilot plant training to more advanced and more specific courses of their own choice. Well established international contacts make it easy for the students and faculty staff to share their research and training experience with their renowned colleagues abroad, frequently under schemes like

TEMPUS, SOCRATES, AKTION or COST. A significant number of annual scientific conferences and seminars organized within the faculty endorsing efforts to raise the University's international reputation.

The Faculty educates specialists in environmental protection, materials engineering, analytical chemistry, chemical engineering, inorganic and organic chemistry, clinical biology and chemistry, analysis of foods, analysis of biological materials, automation of chemical productions, preserving, at the same time, the original orientation towards fibre technology and fibre-like materials, plastics, pigments and explosives, as well as polygraphy.

The study programmes at the Faculty of Chemical Technology are given below:

#### **Master study – five years**

##### **Chemistry and Technical Chemistry**

- Inorganic and Bioinorganic Chemistry
- Inorganic Technology
- Chemical Technology of Paper and Pulp
- Chemical Engineering
- Material Engineering
- Environment Protection
- Organic Chemistry
- Economics and Management of Chemistry and Foodstuff Industries
- Graphic Arts
- Process Control
- Technical Analytical and Physical Chemistry
- Technology of Organic Specialities
- Technology of Polymers Manufacturing and Processing
- Theory and Technology of Explosives
- Fibres and Textile Chemistry
- Environmental Engineering

##### **Chemistry and Technology of Foodstuffs**

- Evaluation and Analysis of Foodstuffs

##### **Special Chemical and Biological Programmes**

- Analysis of Biological Materials

#### **Doctoral study programmes – three years**

##### **Inorganic chemistry**

##### **Organic Chemistry**

##### **Analytical Chemistry**

##### **Physical Chemistry**

##### **Chemistry and Chemical Technology**

- Inorganic Technology
- Organic Technology

##### **Material Chemistry and Technology**

- Technology of Polymers
- Chemistry and Technology of Inorganic Materials

##### **Chemical and Process Engineering**

- Chemical Engineering
- Technical Cybernetics
- Economics and Management

##### **Environmental Chemistry and Technology**

- Applied and Landscape Ecology

Table 1. Basic statistical data about Faculty of Chemical Technology

Number of	90/91	92/93	93/94	94/95	95/96	96/97	97/98	98/99
<b>Students of bachelor study (total)</b>	<b>0</b>	<b>0</b>	<b>66</b>	<b>91</b>	<b>140</b>	<b>147</b>	<b>166</b>	<b>159</b>
-full-time students	0	0	66	91	123	120	123	112
-part-time students	0	0	0	0	16	27	43	47
-foreign students	0	0	0	0	1	0	0	0
<b>Students of master study (total)</b>	<b>1 058</b>	<b>892</b>	<b>883</b>	<b>738</b>	<b>693</b>	<b>740</b>	<b>720</b>	<b>670</b>
-full-time students	910	844	803	708	639	677	649	606
-part-time students	124	32	67	20	45	58	68	64
-foreign students	24	16	13	10	9	5	3	0
<b>Students of doctoral study progr.</b>	<b>0</b>	<b>49</b>	<b>34</b>	<b>89</b>	<b>117</b>	<b>150</b>	<b>178</b>	<b>203</b>
newly enrolled students (total)	295	295	248	223	264	264	282	280
-of master study progr.	295	295	209	181	186	205	210	214
-of bachelor study progr.	0	0	39	42	78	59	72	66
<b>Graduates (total)</b>	<b>134</b>	<b>164</b>	<b>128</b>	<b>131</b>	<b>160</b>	<b>117</b>	<b>129</b>	<b>170</b>
-of master study progr.	134	164	126	131	155	114	122	152
-of bachelor study progr.	0	0	2	0	5	3	7	18
Participants in lifelong learning	0	0	3	0	97	130	85	72
<b>full-time teachers (total)</b>	<b>165</b>	<b>194</b>	<b>131</b>	<b>118</b>	<b>112</b>	<b>114</b>	<b>127</b>	<b>133</b>
- professors	8	12	17	13	13	14	17	16
- associate professors	51	50	43	37	36	36	34	40
- other categ. of teachers	106	132	71	68	63	64	76	77

### 3. Faculty of Economics and Administration

The faculty was founded in 1991 and has filled out the gap in higher education of skilled, well-trained officials for various kinds of state and municipal administration, non-profit organizations, and for the private sector. Having been accredited for the Bachelor and Master study programmes, the faculty delivers pragmatically oriented courses led by numerous external specialists. The students themselves to some extent determine specialization through their choice of optional subjects. Major subjects include:

- Legal subjects, such as introduction to law, civil law, labour, business and administrative law.
- Economic subjects, such as traditional microeconomics and macroeconomics, management, business economics, economic policy, public finance, financial management, accountancy, budget accounting, personal enterprise, introduction to marketing, and human management.
- Computing science, informatics.
- Language training (English, German and French).

Mathematics and statistics, taught mainly in the first and the second semester, are also among compulsory courses. Besides the above-mentioned courses, sociology and psychology are also compulsory as they support the communicative abilities of graduates in their practical lives.

The study programmes at the Faculty of Economics and Administration are given below:

#### Master study programmes (five years)

##### Economic Policy and Administration

- Economics and Administration

#### Doctoral study programmes (three years)

##### System Engineering and Informatics

- Informatics in Public Administration

Table 2. Basic statistical data about Faculty of Economics and Administration

Number of	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99
<b>students of bachelor study (total)</b>	<b>53</b>	<b>155</b>	<b>275</b>	<b>482</b>	<b>638</b>	<b>822</b>	<b>814</b>	<b>814</b>
-full-time students	53	155	275	364	473	547	586	499
-part-time students	0	0	0	118	165	273	226	313
-foreign students	0	0	0	0	0	2	2	2
<b>students of master study (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>203</b>	<b>254</b>	<b>261</b>
-full-time students	0	0	0	0	0	203	254	261
-part-time students	0	0	0	0	0	0	0	0
-foreign students	0	0	0	0	0	0	0	0
<b>students of doctoral study progr.</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
newly enrolled students (total)	52	106	130	275	386	349	192	228
-of master study progr.	0	0	0	0	74	24	14	0
-of bachelor study progr.	52	106	130	275	312	325	178	228
<b>Graduates (total)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>46</b>	<b>84</b>	<b>108</b>	<b>188</b>	<b>332</b>
-of master study progr.	0	0	0	0	0	0	121	109
-of bachelor study progr.	0	0	0	46	84	108	67	223
Participants in lifelong learning	0	0	0	0	5	151	127	53
<b>full-time teachers (total)</b>	<b>17</b>	<b>32</b>	<b>50</b>	<b>60</b>	<b>66</b>	<b>63</b>	<b>68</b>	<b>56</b>
- professors	0	2	2	4	5	4	4	4
- associate professors	1	4	5	7	11	12	14	12
- other categ. of teachers	16	26	43	49	50	47	50	40

#### 4. Jan Perner Faculty of Transport

Students in all study programmes gain a common two-year background in sciences. This foundation is supplemented by theory of transportation, transportation politics, informatics, logistics and operational research.

The field of study "Transport Management, Marketing and Logistics" is oriented to the problems of modern methods in economic operation, i.e. logistic management including productics, ergonomics and synergics, and at the problems of prognostic economic models including acquisition and marketing. Graduates of the study branch "Technology and operation of transport" the graduates gain fundamental knowledge in technology and operation of transport, theory of transport, logistics, law and economy. Graduates in the study branch "Means of Transport" are prepared for making decisions on means of transport (rail vehicles, road vehicles and vehicles of mass urban transport). The main courses deal with operation and effective exploitation, innovation, reconstruction, diagnostics and maintenance of means of transport. The graduates are high-qualified experts on all levels of management and operation of state and private organizations.

There are two different specializations of study in the field of study "Transport Infrastructure". The specialization in "Transport Structures" is designed as an operational (building) study programme to educate specialists with broad theoretical knowledge of operation, maintenance and reconstruction of transport structures. The programme is set up to enable the graduates to make independent decisions in establishing the technical parameters of transport way, preparing projects for tenders and evaluation of preliminary projects. They will be able to make decisions in the area of repairing and reconstruction of the particular transport way. The specialization "Electronic Devices in Transport" oriented at the communication, feeding and security networks and systems in railway, road, tramway and trolleybus transport as well as in metro transport. The specialization provides a comprehensive and general view of the problems of electronic networks in transportationsystems and to their mutual coupling and conflicts. The specialization in Electronic Devices in Transport deals with communication feeding and security networks and systems in rail, road, tram, trolleybus and underground rail transport. This specialization provides a comprehensive and general view of the problems of electronic networks in transportation systems. Graduates are qualified experts in operating, maintaining and reconstructing electronic devices for transport systems, and they can find employment in the public or private sector. The graduates are qualified to manage transport structure maintenance, reconstruction at all levels of transport operation, in investment bodies and in management.

The study programmes at the Jan Perner Faculty of Transport are given below:

### Master Study Programmes (five years)

#### Transport Engineering and Communications

- Transport Management, Marketing and Logistics
- Technology and Operation of Transport
- Transport Means
- Transport Infrastructure

### Doctoral Study Programmes (three years)

#### Technique and Technology in Transport and Communications

- Technology and Management in Transport and Telecommunications
- Transport Means and Infrastructure

Table 3. Basic statistical data about Jan Perner Faculty of Transportation

Number of	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99
<b>students of bachelor study (total)</b>	-	-	<b>36</b>	<b>42</b>	<b>18</b>	<b>36</b>	<b>25</b>	<b>45</b>
-full-time students	-	-	36	42	18	0	1	4
-part-time students	-	-	0	0	0	36	24	44
-foreign students	-	-	0	0	0	0	0	0
<b>students of master study (total)</b>	-	-	<b>405</b>	<b>648</b>	<b>825</b>	<b>1 028</b>	<b>1 090</b>	<b>1039</b>
-full-time students	-	-	319	517	641	747	835	804
-part-time students	-	-	86	131	184	281	255	234
-foreign students	-	-	0	0	0	0	0	1
<b>students of doctoral study progr.</b>	-	-	<b>0</b>	<b>0</b>	<b>31</b>	<b>52</b>	<b>62</b>	<b>86</b>
newly enrolled students (total)	-	-	206	275	284	328	250	277
-of master study progr.			170	261	266	301	250	254
-of bachelor study progr.			36	14	18	27	0	23
<b>Graduates (total)</b>	-	-	<b>0</b>	<b>9</b>	<b>90</b>	<b>83</b>	<b>63</b>	<b>133</b>
-of master study progr.	-	-	0	9	90	83	54	133
-of bachelor study progr.	-	-	0	0	0	0	9	0
Participants in lifelong learning	-	-	0	0	20	63	119	101
<b>full-time teachers (total)</b>	-	-	<b>28</b>	<b>35</b>	<b>42</b>	<b>59</b>	<b>72</b>	<b>77</b>
- professors	-	-	3	5	5	7	7	7
- associate professors	-	-	5	9	12	15	19	21
- other categ. of teachers	-	-	20	21	25	37	46	49

### 5. Institute of Languages and Humanities

In order to satisfy an urgent demand for qualified primary and lower secondary school teachers in foreign languages, the Institute was established to provide teacher education in English and German. The students undertake a three-year Bachelor study programme, which differs significantly from traditional five-year study programmes. The Institute has recently introduced two Bachelor courses: "The Language and Socio-Cultural Studies" combine broad language instruction (English, German, Spanish and French) with a quality background in different areas of social life relating to European integration. The programme of "Cultural History" includes, besides the study of two modern languages and Latin for historians, a professional preparation module consisting of courses in history, psychology, museum science, history of art, literary history and gender studies.

### 6. Conclusions

The students of master study programmes at the University of Pardubice are involved in the scientific activities of the faculties at both basic and technological research. A number of successful projects were completed in cooperation with the industry and a wide range of scientific papers are published annually. The main points discussed now at the University Pardubice is the structured study programmes, level of specialization of graduates,

proportion between the number of Bachelor, Master and Doctoral students, how to prepare Bachelors for needs of industry etc.