

2015 –  
2020

# DEVELOPMENT STRATEGY



University of Zagreb  
Faculty of Chemical  
Engineering and Technology



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Engineering and Technology

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## **Development Strategy of the Faculty of Chemical Engineering and Technology of the University of Zagreb for Period 2015 - 2020**

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Name of the evaluated higher-education institution:

**University of Zagreb, Faculty of Chemical Engineering and Technology**

Name of the University the evaluated higher-education institution is a component of:

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**Zagrebačka banka, IBAN: HR7223600001101338626**

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## 1. Introduction

The Republic of Croatia has become, on July 1<sup>st</sup>, 2013 the 28<sup>th</sup> member state of the European Union. This fact implies – among other things – harmonisation of the higher education system with the fundamental documents and directives of the responsible European bodies in the area of higher education. According to this, the University of Zagreb (The University) and the Faculty of Chemical Engineering and Technology (the Faculty) as one of its components aim at achieving the ever greater degree of harmonisation by organising their activity in the fields of:

- continuous transformation of the all-European higher education area
- intense involvement in the European Research (ERA) and Higher Education (EHEA) Area
- harmonisation with the European Qualifications Framework (EQF)
- development of Life-long Learning programmes
- development of programs for fostering mobility of teachers and students
- development of the quality assurance system.

Having the above mentioned in mind, the Faculty rendered the decision on the strategic document aimed at planning its development in the five years period. However, this does not mean that there is no look into the further future at the Faculty. Nevertheless, precise long-term planning is impractical in continuously changing surroundings and might endanger the competitive position of the Faculty with respect to other institutions, particularly on the international level.

The Faculty grounds its Development Strategy on the Self-Evaluation Report of the present state as well as on the criteria and conditions of its functioning, on the European trends<sup>1-9</sup>, the Science and Higher Education Act (NN 123/03, 198/03, 105/04, 174/04, 2/07–OUSRH, 46/07, 45/09, 63/11, 94/13, 139/13 and 101/14–O and RUSRH)<sup>10</sup>, national Strategy of Education, Science and Technology<sup>11</sup>, Self-Evaluation Report of the University of Zagreb<sup>12</sup> as well as on the corresponding Evaluation Report<sup>13</sup>, strategic documents of the University of Zagreb<sup>14</sup>, other acts and ordinances of the University and the Faculty, Dean's Programme etc.

### 1.1. Historical Framework

The University of Zagreb was officially founded on September 23<sup>rd</sup>, 1669 by Emperor and King Leopold I Habsburg who issued a decree granting the status and privileges of a university to the Jesuit Academy of the Royal Free City of Zagreb. Therefore, the University celebrates 1669 as the year of its foundation. The gradual development of science and ever changing social circumstances forced the University to change its organisational framework superposed onto its continuous growth.

In year 1919 the Technical Institute was founded in Zagreb; one of its departments was the Chemical Engineering Department, the first Dean of which, Prof. Vladimir Njegovan, Ph.D., from the very beginning strove to ensure the teaching and scientific activity modelled upon European and American higher-education institutions. He very soon gathered the first group of distinguished teachers, such as Ivan Marek, a well-known inventor of the furnace for elemental analysis of organic chemicals Ivan Plotnikov, a world renowned photochemist, Franjo Hanaman, an inventor of a Tungsten filament for electric bulbs and later on, Vladimir Prelog, a future Nobel laureate. The Technical Institute very soon became the part of the University of Zagreb, from 1926 holding the name of the Technical Faculty of the University of Zagreb. Following the restructuring of the Technical Faculty in 1956, the Chemical Technology programme of study was taught at the Faculty of Chemical, Food and Mining Technology, and from 1957 within the newly-founded Faculty of Technology. In 1978 the Faculty of Metallurgy and in 1980 the Faculty of Food Science and Biotechnology became separate faculties. Finally, on 16 November 1991 the Faculty of Technology split into the Faculty of Chemical Engineering and Technology and the Faculty of Textile Technology, and the long lasting wish of the Faculty to become independent came true. From the very beginning of the higher education at the Faculty (and its predecessors) more than 6000 students graduated and over 1100 M.Sc. theses as well as around 650

doctoral dissertations were defended. All of this points to the long-lasting tradition of the Faculty and on its potential in educating well-trained engineers as well as on its capability of dealing with the most demanding research and professional topics.

## 1.2. The Faculty Today

Today, the Faculty gathers 16 Departments and one Chair as well as the Library and Information Centre (BIC, *Bibliotečno-informacijski centar*) of the Faculty. The Faculty has premises in four buildings situated at the three main locations; none of the buildings is owned by the Faculty. The Faculty has 11 lecture rooms and two IT classrooms, the Faculty Council hall, 56 laboratories with associated minor facilities, a number of teacher offices, as well as auxiliary premises. The quality of the premises is below the standard and it is planned to migrate the Faculty to the Borongaj Research and Education Centre. At the same time, the Faculty rendered a decision on its restructuring which intends to reduce the number of Departments from present 16 to future four.

The basic activities of the Faculty are teaching, scientific and research activity, professional activity as well as socially responsible activity in the areas of chemical engineering, other fundamental technical sciences, interdisciplinary technical sciences and chemistry.

The Faculty carries out four undergraduate and graduate programmes of study, respectively, one postgraduate doctoral programme of study as well as one postgraduate specialist programme of study. In the two postgraduate interdisciplinary programmes of study the Faculty acts as the coordinator institution. The Faculty is able to meet the entire enrolment quota for undergraduate programmes of study (220) and graduate programmes of study (125) on regular basis. The number of students per year who complete graduate programmes of study of the Faculty varies from 60 to 100. The overall count of students exceeds 1000 if doctoral students are included. The Faculty employs 57 teachers holding academic ranks, three teachers holding teaching ranks and 15 teaching assistants. 37 junior researchers are engaged in the teaching process as well. In addition, there are two professional associates, technical staff amounts to 18, administrative staff to 20 and auxiliary staff to 21.

**The scientific activity** is commonly organised via national scientific projects financed by the Croatian Science Foundation (five projects), and to a much lesser extent via programme contracts financed by the Ministry of Science, Education and Sports (and distributed by the University in a form of so-called short-term financial support of investigations). However, the scientific potential of the Faculty is much better illustrated by the number of 34 so-called Z-projects by the Ministry of Science, Education and Sports that expired recently; those projects formed a basis for high scientific output of the Faculty for many years. The Faculty regularly applies to the international calls and occasionally some top-class projects (FP6, FP7, Horizon 2020) are selected for funding. According to the Web of Science (tertiary database), from the beginning of 2009 to the end October 2014 the scientific output of the Faculty amounts to 517 publications. The figures for Current Contents (tertiary database) and Scopus (secondary database) are 501 and 586, respectively. Those numbers (normalised by the number of staff) position the Faculty to the very top of scientific productivity in the Republic of Croatia. The Faculty itself is a publisher; its editions include university textbooks and handbooks, a number of popular science items as well as a journal cited in Current Contents and Web of Science tertiary databases (*Chemical and Biochemical Engineering Quarterly*). The Faculty is involved in four CEEPUS projects, two COST projects and one NEWFELPRO project.

**The professional activity** is best illustrated by 61 projects started in the last five years as well as a number of other activities, such as organisation of professional meetings and excursions, coordination and involvement in many professional societies, execution of summer schools and professional courses, occasional laboratory analyses, providing of professional opinions and expertises etc. In December 2014, the first spin-off company owned by the Faculty and University was founded. In addition, the Faculty hosts its alumni organisation for the last 25 years – the Association of Graduate Engineers and Friends of Chemical and Technological Studies, *Almae matris alumni chemicae ingeniariae Zagrabiensis* (AMACIZ).

### 1.3. About the Strategy

The Faculty Development Strategy adopted by the Faculty Council at the session held on February 23<sup>rd</sup>, 2015 defines the:

- mission and vision of the Faculty
- strategic objectives
- measures and action plans
- benchmarks to monitor the progress of the Strategy execution
- persons and bodies needed for execution of particular measures as well as for monitoring the Strategy benchmarks.

The realisation of the Strategy will largely depend to one ambitious venture – the migration of the Faculty to the new building situated at the Borongaj Research and Education Campus. The time frame of this venture is beyond the control of the Faculty itself. Hence, the Faculty has to assure its continuous activity in present premises in Zagreb Downtown.

The realisation of the Strategy will depend on the engagement of all of its employees as well. Therefore, the execution of strategic activities was aimed to be distributed as equally as possible onto a large number of responsible persons. In this manner the Strategy might be accepted as a directive for personal development of an individual within a rather large system.

The Strategy is based on a large number of documents accepted earlier, such as the Statute of the Faculty, ordinances, Dean's decisions, entitlement of courses lists, syllabi, learning outcomes... Some of them are permanent in nature; others are adopted periodically, for each particular academic or calendar year. In any case, however, the Faculty strives to ensure the complete public insight into its activity by publishing the document on the Faculty website, <http://www.fkit.unizg.hr/>.

## 2. Mission and Vision

Upon inspection of the previous strategic document of the Faculty from 2008, it is determined that the then defined mission and vision of the Faculty hardly need to be changed. Therefore they are defined as follows.

### 2.1. Mission

The mission of the Faculty is to promote chemical engineering, applied chemistry, materials engineering and environmental protection engineering as scientific disciplines by establishing links between science and technology and economy, industry and public activities, with the aim of achieving sustainable development, increasing the general level of innovation in the society, accelerating knowledge transfer, that is creating and promoting new entrepreneurship.

Mission as such is defined primarily by the field of interest of the Faculty which did not change since. The Faculty was active and plans to be active in the field of technical sciences, academic area of chemical engineering, academic area of fundamental technical sciences and academic area of interdisciplinary technical sciences, as well as in the field of natural sciences, academic area of chemistry. The Faculty was dealing with, and plans to be dealing with a) analysis and advancement of existing and development of novel chemical processes and products and their industrial implementation, b) development of novel materials as well as all the aspects of introduction of novel materials into industrial production and everyday application and c) analysis of the processes in environment brought about by the interaction of a human as a social being as well as a human as a technology being with various elements of the environment such as soil, water, air and other living

beings. In addition, mission is shaped by the **European trends**, which define higher education institution as a place where *teaching* (at undergraduate, graduate and doctoral levels as well as in Life-long Learning programmes) intertwines with *research*, both components then meet *professional activities* in collaboration with the industry and – finally – those three elements act in a concerted manner in a wider *social environment* to promote standards and ethics of the profession. The third element that determines the mission is the **legislation** of the European Union, the Republic of Croatia as well as legal framework of the University and the Faculty itself. The Faculty acts proactively to the legislation, and above the legislation – it pays respect to the general moral and ethical principles.

## 2.2. Vision

The vision of the Faculty is to become recognised in the Central European region as a venue of “good vibrations”, a focal point of partnership- and cooperation-based gathering at the international, national and local level, in the projects developing innovative and improving current chemical processes, products, that is materials and in the environmental protection projects. The students who complete their undergraduate, graduate and postgraduate programmes at the Faculty will be sought as excellent and broadly educated human resources competent in finding efficient problem solutions within their scope of activity. The public at large will recognise the Faculty as an institution showing corporate social responsibility within the scope of its scientific, educational and professional activity.

To approach the set vision, we need not be the best scientists, neither the best professionals, nor the best teachers. The only two important things are the continuous desire for learning from the better ones (i.e. for promoting the culture of quality) and the willingness for passing our knowledge to those who know less than us (i.e. for being socially responsible).

## 3. Strategic Objectives, Indicators and Measures

In each of the seven strategic areas, corresponding to those set up in the self-evaluation report, single strategic objective shall be defined. In advance to those, “zeroth” strategic objective shall be defined as well.

### 3.1. Strategic Objectives

STRATEGIC OBJECTIVE 0:

- To migrate the Faculty to the new location of Borongaj Research and Education Campus

STRATEGIC OBJECTIVE 1: (Management of the Higher Education Institution and Quality Assurance)

- To implement the rendered decision on the Faculty restructuring

STRATEGIC OBJECTIVE 2: (The Programmes of Study)

- To analyse and optimise permanently the programmes of study by interacting with all stakeholders of education system

STRATEGIC OBJECTIVE 3: (Students)

- To increase the input quality level of undergraduate students

STRATEGIC OBJECTIVE 4: (Academic Staff)

- To modernise the teaching process and thus to increase its quality level

#### STRATEGIC OBJECTIVE 5: (Scientific and Professional Activity)

- To confirm and raise the indicators of scientific and professional productivity

#### STRATEGIC OBJECTIVE 6: (Mobility and International Cooperation)

- To intensify the mobility and international cooperation

#### STRATEGIC OBJECTIVE 7: (Resources)

- To increase the financial autonomy

Strategic objectives are not lone islets; reaching one of them would affect reaching all the others. For example, migration of the Faculty to the new location would enable the achievement of full effect of implementation of the Faculty restructuring, which would then be transferred by the logical decision-making pathway and quality assurance procedures into all other strategic areas. Regardless of the migration, which is anyhow far beyond the financial reach of the Faculty and depends on the interest and investment of the state funds, more modern and increased-quality programmes of study and more motivated teachers would attract better – indigenous and foreign – students; this would in turn reduce the average duration of study and make it cheaper which would affect the financial result as well. Working with better students would be less exhausting for teachers, which could in turn put more effort into science and professional work with the involvement of the very same students. This would raise the indicators of productivity as well as increase the financial autonomy by the income generated by transfer of knowledge into industry. Better indicators of productivity would increase the level of international recognition and number of international contacts, facilitate the outgoing mobility of academic staff and students as well as attract more money from international projects. This would in turn raise the productivity level even further and so on. Beside the direct financial effect, better indicators of scientific and professional activity would increase the sphere of influence of the Faculty in the society – particularly with respect to those responsible for funding the migration to the new location of Borongaj Research and Education Campus.

### 3.2. Measures and Action Plans

#### STRATEGIC OBJECTIVE 0:

- To migrate the Faculty to the new location of Borongaj Research and Education Campus

The Faculty has done everything that could have been done on our own. A decision has been rendered on the Faculty restructuring which is closely related to the migration; the migration is not a prerequisite for restructuring, however we think that the opposite is true – the restructuring has to be done prior to migration. In addition, a decision has been rendered on adoption of the proposal for the preliminary design of the building of the Faculty on the Borongaj Research and Education Campus. The collaboration with Deloitte company has been initiated with involvement of the University; the company shall prepare the project documentation needed for the application to the available (co)funding sources for the construction and equipment of the new building. The Faculty Commissioners for collaboration with Deloitte has been appointed including present and former Dean and Vice-Deans.

In spite of everything done, it is quite obvious that the migration stays far beyond the reach of the Faculty. Therefore it is difficult to state here precisely defined measures with the necessary activities, plans, benchmarks and terms. The responsible person is nevertheless the Dean; he has to “sense the heartbeat” of the social environment, to recognise the opportunities and to conform concrete activities according to them.



## **STRATEGIC OBJECTIVE 1:**

- To implement the rendered decision on the Faculty restructuring

Measure 1.1. To bring into full operation the adopted organisational scheme of the Faculty.

*Action plan 1.1.* The process begins with adjustment of the legal framework. The Dean, Secretary, Vice-Deans, the Commission for the Faculty Development Strategy and the Faculty Council are all involved in preparing, harmonising and adopting the new Statute of the Faculty. Based on the new Statute, the decisions are rendered on the abolition of existing and institution of new Departments, as well as on electing their steering bodies.

Measure 1.2. To impose the annual report / self-evaluation of the Faculty.

*Action plan 1.2.* The Dean is due to submit annual oral report each October in the Faculty Council session. The existing obligation has to be made more formal, i.e. converted into a consistent written report. Regarding the fact that the common present Dean's report is both exhaustive and extensive, it is expected that its conversion into a "mini" annual self-evaluation form would not generate too large an additional effort. The oral report originating from the October session of the Faculty Council that covers the academic year has to be completed with the data tables (some of them pertaining to calendar year) and submit for adoption to the Faculty Council in February. Those annual self-evaluation report would then greatly facilitate preparation of "large" self-evaluation reports in the process of reaccreditation of the Faculty.

Measure 1.3. To perform consistently the activities laid down in the Ordinance on Quality Assurance System of the Faculty, Ordinance on Quality Assurance System of the University of Zagreb as well as in the Faculty Quality Assurance Manual

*Action plan 1.3.* All the bodies laid down in the above mentioned documents, such as the Dean, Faculty Council, Commission for Quality Management at all other bodies appointed when necessary perform their duties duly and on time.

## **STRATEGIC OBJECTIVE 2:**

- To analyse and optimise permanently the programmes of study by interacting with all stakeholders of education system

Measure 2.1. To carry out periodical self-evaluation of undergraduate and graduate programmes of study.

*Action plan 2.1.* Vice-Dean for Education and the Commission for Education of the Faculty have sessions at least twice a year, after end of each semester and more often when needed, to analyse execution of the programmes of study, to detect their deficiencies, to suggest improvements and adjustments. The topics such as overlapping of the programmes, enrolment quota, admission criteria, pass rate, learning outcomes, working load estimation, improvement of content etc. Incentives and regulations of the University, Ministry of Science, Education and Sports (MZOS, *Ministarstvo znanosti, obrazovanja i sporta*), Croatian Agency for Science and Higher Education (AZVO, *Agencija za znanost i visoko obrazovanje*) on the periodical external evaluation are used for systematisation and documenting of implemented changes. All the changes, according to regulation, are confirmed by the Faculty Council as well as the authorised bodies of the University, MZOS, AZVO, etc.

Measure 2.2. To develop and broaden the concept of Life-long Learning.

*Action plan 2.2.* Consistent execution of measures 2.1 and 4.1 creates, at undergraduate and graduate level, the programmes of study that are in constant interaction with external stakeholders of the education system and are therefore permanently changing, evolving and advancing. Beside classical institutionalised forms of Life-long Learning – regular or occasional courses, meetings, workshops and similar, the Commission for the Faculty Development Strategy as well as the future Business Council of the Faculty have to consider the possibilities and modes for opening some regular courses of undergraduate or graduate programmes of study for perpetual and free admission to all those interested in renewing or upgrading the present knowledge. This is actually done at the moment, for all the interested students coming from other components of the University and for all the international exchange students. In execution of this measure the Faculty Council shall be involved within the range of its authority.

### **STRATEGIC OBJECTIVE 3:**

- To increase the input quality level of undergraduate students

Measure 3.1. To promote the programmes of study among the high school students as well as among the students of other higher education institutions.

*Action plan 3.1.* Sessions mentioned in Measure 2.1 (Vice-Dean for Education and the Commission for Education of the Faculty) deal with topics belonging to the area of promotion of the programmes of study among potential students, where the Commission for the Faculty Visibility comes into action as well. The both Commissions support the activities such as the Open Door Day, the Fair of the University of Zagreb, regular publishing of printed promotional material as well as other promotional activities. It is expected that that the actions such as those mentioned will attract candidates of better quality, as well as higher share of student transferees. The general quality and pass rate level can be raised by a careful variation of enrolment quota, whereby labour market demands have to be taken into account.

Measure 3.2. To increase the influence of students on the teaching process.

*Action plan 3.2.* Raising the entry level of quality of candidates shall raise the quality of the teaching process as well as increase the output level of the graduates. However, mistakes might be expected as well. Therefore it is important to ensure the impact of students on all the areas of Faculty activity that are of direct students' concern. The Faculty and the University have elaborated the mechanisms that are to be consistently complied with. This area is partially covered by the Ordinance on Studying in Undergraduate and Graduate Programmes of Study of the Faculty, Ordinance on Quality Assurance System of the Faculty, Ordinance on Quality Assurance System of the University of Zagreb, Faculty Quality Assurance Manual as well as some Dean's decisions. Relevant stakeholders are the Students' Union, the Secretary of the Faculty, the Students' Ombudsperson, student representatives in the Faculty Council, student representative in the Commission for Education, the Commission for International Cooperation (regarding the student exchange and international grant issues). Relevant mechanisms are the student surveys, the anonymous system of reporting of unacceptable conduct in the academic community, student rewards and certificates of merit, scholarships for students with low material status, workshops for support of student. Satisfaction of students with the teaching process and gather competences has to be checked after graduation, by performing corresponding surveys. AMACIZ, the *alumni* organisation of the Faculty may be of great help there.

#### **STRATEGIC OBJECTIVE 4:**

- To modernise the teaching process and thus to increase its quality level

Measure 4.1. To modernise permanently the teaching process at undergraduate and graduate levels.

*Action plan 4.1.* Sessions mentioned in Measure 2.1 (Vice-Dean for Education and the Commission for Education of the Faculty) comprise the topics from the area of modernisation of teaching process. The topics under consideration are: introduction of e-learning, some courses or courses parts taught in English (which is related to the strategic area of mobility and international cooperation), field instruction, practical instruction et al. A continuous increase of all the numerical indicators on a yearly basis is to be achieved. To bring this into reality, it is important to conduct the education of the instructors as well as to ensure the technical support required.

Measure 4.2. To distribute evenly the teaching load.

*Action plan 4.2.* Sessions of the Dean and the Commission for the Faculty Development Strategy and partially sessions of the Electoral Commission are the points where human resource policy of the Faculty is discussed. The courses are entitled (the teachers are appointed) by the Departments, the entitlement of courses lists are consolidated by the Vice-Dean for Education, who prepares the annual teaching load reports. The conclusions/documents are adopted by the Faculty Council. Recently, a lot has been done on levelling of the teaching load among the teaching staff as well as among the junior researchers and teaching assistants. It is expected that the problem of uneven load among the Departments would be resolved by implementing Measure 1.1 (To bring into full operation the adopted organisational scheme of the Faculty). The Faculty has to continue with the recent efforts.

Measure 4.3. To increase the number and quality of teaching materials.

*Action plan 4.3.* Sessions of the Vice-Dean for Education and the Commission for Education are the first points where a deficit of teaching materials is identified. It is expected that the number and quality of teaching materials shall increase largely within following years, via reviewing procedure involved in the regular process of re-election or promotion of academic staff, which is discussed in the Electoral Commission sessions. The measures of financial support for publishing textbooks taken to date did not have much effect. However, they should be retained in the future – within the discussed strategic period a large number of teachers come into the mature teaching age where ventures like textbook writing are much easily undertaken.

Measure 4.4. To introduce the self-evaluation of teachers as well as internal evaluation procedures of the teaching process.

*Action plan 4.4.* So far, the teaching process and teachers were evaluated merely by the students. Components of evaluation by the colleagues and the teachers themselves were lacking. The Commission for Education, the Commission for the Faculty Development Strategy and the Commission for Quality Management should in the near future decide on the mode of execution of self-evaluation of teachers (most probably using concise questionnaires) as well as on the mode of execution and timetable of internal evaluation procedures of the teaching process. The Commission for Education would then analyse the results and propose measures for possible improvement.

## **STRATEGIC OBJECTIVE 5:**

- To confirm and raise the indicators of scientific and professional productivity

Measure 5.1. To involve more intensively in international scientific projects.

*Action plan 5.1.* The Faculty is at the very top of scientific productivity on the national level, but there is a rather large gap when comparing to relevant international institutions. A step forward can be achieved only by the more intensive involvement in international scientific projects. The activities done in this area will be sensed in the Strategic Objective 6 as well. The activity carriers are the Vice-Dean for Science and International Cooperation and the Commission for International Cooperation, as supporting and consulting bodies. The awareness of the need for such projects is immanent, and there are individual and persistent efforts. The expected amount of work is not as large as to justify establishing the Office for International Cooperation of the Faculty at this moment, but the situation has to be carefully monitored and – if changed – the reaction has to be immediate. The experience of the International Office of the University, MZOS, AZVO and the Agency for Mobility and EU Programmes (AMPEU – *Agencija za mobilnost i programe Europske unije*) has to be thoroughly exploited. The potential applicants for project proposals have to be encouraged to take part in national and international workshops and conferences, available web portals for gathering project consortia have to be used, etc. In addition, members of the Office for Material Transactions and Financial Management of the Faculty have to be trained in order to be able to provide financial services in the international environment more efficiently.

Measure 5.2. To involve more intensively in national competitive scientific projects.

*Action plan 5.2.* The repealed so-called Z-projects have been replaced by projects of the Croatian Science Foundation (HRZZ – *Hrvatska zaklada za znanost*) and – to a lesser extent – programme contracts financed by MZOS (and distributed by the University in a form of so-called short-term financial support of investigations). The overall level of financing decreased nevertheless in comparison to the previous period. The Faculty has to push more effort into HRZZ calls, but one cannot expect a significant increase because there are many applicants for a relatively small amount of money. The activity carriers are the Vice-Dean for Science and International Cooperation and all the academic staff as potential applicants. Members of the Office for Material Transactions and Financial Management of the Faculty have to be permanently trained in order to be able to provide financial services more efficiently.

Measure 5.3. To persist in the scientific excellence of doctoral programmes of study.

*Action plan 5.3.* In the past period the Faculty has accepted completely the provisions of the Ordinance on Doctoral Programmes of Study at the University of Zagreb in all details of the procedure. The procedure is aimed at shortening the period of study and it should be insisted upon. At the same time, the Faculty has for the sake of rationalisation merged its two doctoral programmes of study into a single one entitled Chemical Engineering and Applied Chemistry. In addition, the Faculty has adopted the criterion on publishing articles within the doctoral programme of study that is more stringent in comparison to the one of the University. The Faculty should continue to insist upon it to retain the scientific rigor. The incoming mobility on the doctoral programme level is to be supported. In the sessions of the Council of the Doctoral Programme of Study (up to ten sessions annually) topics such as the introduction of new content in the doctoral programmes, introduction of new teachers in the entitlement of courses list, etc. are to be discussed. The activity holders are the Vice-Dean for Science and International Cooperation and all the academic staff as potential applicants. The activity carriers are the Vice-Dean for Science and International Cooperation, the counsellor(s) of the programme of study, the Council(s) of the Doctoral Programme of Study and the Faculty Council within range of its competence.

Measure 5.4. To introduce the system of awarding the most successful scientists.

*Action plan 5.4.* The Faculty believes that it is a sort of redundancy to award the academic staff for the scientific merit. Namely, the scientific merit is the criterion for promotion and is therefore awarded in that way. Nevertheless, junior researchers/teaching assistants/doctoral students/post-docs form the category of employees to be stimulated by awarding procedure. They are all fixed-term employees and every award or certificate of merit positively affects their *curriculum vitae*. It is proposed to award the most productive/successful scientific author from the category. The Dean of the Faculty in cooperation with the Vice-Dean for Science and International Cooperation and other Vice-Deans shall invent the criteria and prepare the decision. The Head of the Library and Information Centre shall collect and elaborate the scientific output data within a calendar year. Based on the data, the Vice-Dean for Science and International Cooperation shall prepare the awarding proposal to be adopted by the Faculty Council; the award is to be given on occasion of the Day of the Faculty.

Measure 5.5. To intensify the collaboration with the business sector.

*Action plan 5.5.* By the summer of 2015 the Business Council of the Faculty is to be constituted to gather active and interested members of the academic staff as well as recognised professionals – friends of the Faculty coming from the business sector. The Business Council shall hold regular sessions twice a year and discuss the possibilities for promoting collaboration in the promising areas. Moreover, the Business Council shall support and coordinate actions of the Faculty in direction of regulating the profession of chemical engineers in Croatia. The members of the Business Council would contribute in defining the competences of their future employees, within setting up the standards of profession and qualification framework. Another way of cooperation is establishment and initial support of spin-off companies in areas of mutual interest. Collaboration with the business sector has to be exploited for the two-way transfer of knowledge. The most valuable results are to be published in scientific or professional journals and collected intellectual property is to be protected by patent applications or corresponding confidentiality and non-disclosure agreements.

Measure 5.6. To refresh and modify the content of university postgraduate specialist programmes of study.

*Action plan 5.6.* The activity carriers are the Vice-Dean for Science and International Cooperation, the Counsellors and Councils of specialist programmes of study, the future Business Council as an advisory body and –within range of their competence – the Faculty Council and the Dean. The regular sessions of the Council of the Specialist Programme(s) of Study (up to ten sessions annually) should be used to discuss the topics such as the introduction of new courses in the programme(s) curriculum, introduction of new teachers in the entitlement of courses list, inventing new specialist programmes of study, renewal of the programmes of out-of-date specialist programmes of study, etc.

## **STRATEGIC OBJECTIVE 6:**

- To intensify the mobility and international cooperation

Measure 6.1. To magnify the mobility figures of academic staff and students by involvement in exchange networks.

*Action plan 6.1.* The Faculty has to institutionalise the support for all activities in the field of mobility and international cooperation. Probably the most important measure here is in fact Measure 5.1 from the previous strategic area. Beside everything mentioned there, the exchange of students, academic staff and non-teaching staff is to be supported within the programmes Erasmus+, COST, CEEPUS, bilateral and multilateral projects, bilateral and multilateral agreements, etc. The activity carriers are the Vice-Dean for Science and International Cooperation, the ECTS Coordinator and the Commission for International Cooperation. In case of large increase of the amount of work establishing the Office for International Cooperation of the Faculty is to be considered as the possibility. The services, knowledge and contacts of the International Office of the University, AMPEU, European offices and others are to be extensively used. A compulsory reporting on the results of outgoing mobility is to be introduced, preferably in form of oral reports, for example within the scientific colloquia series organized by AMACIZ. Outgoing student mobility is to be supported, for example by granting the travelling costs.

## **STRATEGIC OBJECTIVE 7:**

- To increase the financial autonomy

Measure 7.1. To decrease the operating costs (expenses) by retaining the present level of functioning of the Faculty.

*Action plan 7.1.* The expenses can be drastically reduced only by achieving the Strategic Objective 0 – that is by migrating to the Borongaj Research and Education Centre, of course under the assumption of loan commitments not overly burdening the Faculty financial balance sheet. Until this objective achieved, one has to take care of the daily functioning of the Faculty, besides high costs of utility bills and investment maintenance. At the same time, for all material expenses the good business practice of state budget users has to be consistently applied. Rationalisation with respect to staff costs is of course necessary, and the Faculty shall take care of it, primary by considering the actual working load requirements on occasions of retirement of members of administrative and auxiliary staff. However, due to central budgetary funding of the salaries, such a rationalisation shall not be visible in the financial balance of the Faculty. The responsible bodies for this area are the Dean, the Vice-Dean for Business Affairs and the Faculty Council.

Measure 7.2. To increase the revenues of the Faculty.

*Action plan 7.2.* This measure would be more easily achieved by fulfilling the Strategic Objective 0 – that is by migrating to the Borongaj Research and Education Centre, as well. The scholarship revenues on undergraduate and graduate level are determined by MZOS and it is difficult to affect their level. The increased revenues from scholarships on doctoral and postgraduate specialist level are raised by the actions within Measure 5.3 and 5.5, respectively. Revenues from projects are covered by Measure 5.1 and 5.2, respectively, where one can expect some increase. Additionally, the revenues can be lifted by collaboration with the business sector, which is covered by Measure 5.4. Therefore, scientific and professional excellence directly affects the level of income of the Faculty. The responsible bodies for this area are the Dean, the Vice-Dean for Business Affairs and the Faculty Council.

Measure 7.3. To improve the material assets for studying and research.

*Action plan 7.3.* Reaching the Strategic Objective 0 would save much effort here as well. Meanwhile, the Faculty has to try to solve neuralgic points of the present instruction process – outdated IT infrastructure and limited availability of textbooks in BIC – at a minimum expense. The responsible bodies for this area are the Vice-Dean for Business Affairs, the Vice-Dean for Education, the Commission for Education, IT professionals of the Faculty as well as the Head of BIC. The increase of financial autonomy of the Faculty shall facilitate planning of renewal and maintenance of the existing and acquiring new capital research equipment. The responsible bodies for this area are the Dean and the Faculty Council.

## 4. SWOT Analysis

The main advantages and drawbacks of the programme, staff and material assets of the Faculty are shown in the common form of analysis of strengths, weaknesses, opportunities and threats (**SWOT** analysis).

### Strengths

- Traditionally well substantiated teaching practice by scientific and professional activities
- Experiment- and problem-oriented science- and research-based teaching approach in compliance with the principles of contemporary organisation of instruction
- Academic staff with international scientific reputation and a large number of competent junior researchers and teaching assistants, as a guarantee of scientific production

### Weaknesses

- Poor working conditions of the Faculty (premises)
- A lack of financing by line ministries as a result of a poor economic situation

### Opportunities

- Foreseen migration to the new building at the Borongaj Research and Education Campus
- Broad level of knowledge of Faculty scholars in the field of natural and technical sciences, which in addition to scientific excellence, also facilitates understanding of a broad spectrum of issues encountered by the industry and the public sector
- Interdisciplinary approach based on tradition and activities of researchers in the fields of natural and technical sciences

### Threats

- Claims filed by some employees on account of special working conditions
- A drop in quality of primary and secondary school education in combination with insisting on the pass rate, which directly affects the level of knowledge of applicants and as a consequence exerts pressure to lower the criteria in the higher-education system
- Difficult situation in the chemical industry which resulted in phasing out of a portion of chemical manufacturing plants and reduced the labour market demands

## 5. Tabular Overview of the Activities

Measure	Performed by	Recorded by	Indicator	Time frame
1.1.	D, T, PD, PovSR	PovOK	Adoption of the new Statute of the Faculty in the FV session	December 2015
			Adoption of the new Statute of the Faculty in the SS session	March 2016
			Establishment of new Departments	September 2016
			Election of the managing bodies of new Departments	September 2016
1.2.	D, PD	PovOK	Briefs by the D	October
			Annual self-evaluation report (in written)	February
1.3.	PovOK, D, PD	D	Annual reports on the quality assurance system	December
			Annual plans of the quality assurance system	December
2.1.	PN, PovN, SS, MZOS, AZVO	D, PovOK	Briefs from the PovN sessions	November, April, more often if needed
			Introduction of the amended undergraduate curricula starting from academic year 2015/2016	October 2015
			Adoption of the amended graduate curricula in academic year 2014/2015	September 2015
			Introduction of the amended undergraduate curricula starting from academic year 2016/2017	October 2016
			Decisions of the SS, MZOS, AZVO	Off the competence of the Faculty
2.2.	PovSR, GV	D, PN, PZMS, PovOK	Briefs from the PovSR sessions	After the sessions held (3 – 6 times a year)
			Briefs from the GV sessions	November, April
			Indicators of the Life-long Learning programmes – number and type of programmes, number of participants, revenues	Included in the GS
			Documentation of the Life-long Learning programmes	After creation of the programmes
3.1.	PN, PovN, PovPIM	D, PovOK	Briefs from the PovN sessions	After the sessions held (3 – 6 times a year)
			Briefs from the PovPIM sessions	After the sessions held (2 – 4 times a year)
			Briefs from the promotional events	After events taken place
			Promotional material (printed matter, films, media excerpts...)	After events taken place
			Average entry grade point of enrolled students	Included in the GS
			Number of students transferees	Included in the GS
			Pass rate indicators	Included in the GS
Enrolment quota	January or February every year			



Measure	Performed by	Recorded by	Indicator	Time frame
3.2.	SZ, T, SPB, Students in PovN, PovMS	D, PovOK	Briefs from the SZ sessions	After the sessions held (10 times a year)
			Student survey results	March, November
			Graduate students exit survey results	November
			Average exit grade point of the graduated students	Included in the GS
			Indicators of the employment success	Data of the Croatian Employment Service in October, included in the GS, more exhaustive data every three years, first time in July 2017
			Number of students awarded with certificates of merits and grants	Included in the GS
			Membership count of AMACIZ	Included in the GS
4.1.	PN, PovN	D, PovOK	Briefs from the PovN	After the sessions held (3 – 6 times a year)
			Training plan	January 2016
			Indicators of the training programmes for teachers – number and type of programmes, number of participants	Included in the GS
			Number and share of e-courses of levels 2 and 3	Included in the GS
			Results of the contests for the best e-course	Once a year
			Number and share of courses with field work	Included in the GS
			Indicators of the pass rate	Included in the GS
4.2.	D, PovSR, PovI, PN	PovOK	Briefs from the PovSR sessions	After the sessions held (3 – 6 times a year)
			Briefs from the PovI sessions	After the sessions held (up to 10 times a year)
			Indicators of new employment and retirement	Included in the GS
			Annual lists of entitlement of courses	May
			Annual reports on the teaching load	April
4.3.	PN, PovN, PovI, PovID	PP, PovOK	Briefs from the PovN sessions	After the sessions held (3 – 6 times a year)
			Briefs from the PovI sessions	After the sessions held (up to 10 times a year)
			Number of reviewed teaching materials available on the Faculty website	Included in the GS
			Number of new university textbooks	Included in the GS
4.4.	PovN, PovSR, N, PovOK	PN	Briefs from the PovN sessions	After the sessions held (3 – 6 times a year)
			Briefs from the PovSR sessions	After the sessions held (3 – 6 times a year)
			Collected questionnaires from the self-evaluation of teachers	March, October
			Semestral reports on the self-evaluation of teachers	April, November
			Plan of the internal evaluation of instruction process	January 2017
			Annual reports on the internal evaluation of instruction process	November

Measure	Performed by	Recorded by	Indicator	Time frame
5.1	PZMS, PovMS, SUMS, MZOS, AZVO, AMPEU	D, PP, PovOK	Briefs from the PovMS sessions	After the sessions held (2 – 4 times a year)
			Number of project proposal applications, number of accepted project proposals and their financial effect	Included in the GS
			Number of attended workshops and conferences on the project proposal applications	Included in the GS
			Number of appearances on the Internet portals	Included in the GS
			Number of attended workshops on the accounting of international projects	Included in the GS
			Number of publications / patents / innovations originating from international scientific and research projects	Included in the GS
			Number of mobilities originating from the international scientific and research projects	Included in the GS
5.2.	PZMS, N, Z, R	D, PP, PovOK	Number of project proposal applications, number of accepted project proposals and their financial effect	Included in the GS
			Number of attended workshops on the project accounting	Included in the GS
			Number of publications / patents / innovations originating from national competitive scientific and research projects	Included in the GS
5.3.	PZMS, VodDS, VDS	D, PovOK	Briefs from the sessions of the Council(s) of the Doctoral Programme of Study	After the sessions held (10 times a year)
			DrSc01 – DrSc11 forms according to the adopted procedure	Continuously
			Annual lists of entitlement of courses	November
			Indicators of the success in the doctoral programmes of study – share of completion, duration of the study, number of publications originating from the dissertations	Included in the GS
			Financial indicators of the doctoral programmes of study	February
5.4.	D, PZMS, VodBIC	PovOK	Decisions of the D on the criteria	May 2015
			Report of the VodBIC	February
			Decision on the proposal given by PZMS	May

Measure	Performed by	Recorded by	Indicator	Time frame
5.5.	GV, PP	D, PovOK	Briefs from the GV sessions	November, April
			Number of professional projects / contracts and their financial effects	February
			Briefs on the advancement in process of regulating the profession of chemical engineers in Croatia	Occasionally
			Number of established <i>spin-off</i> companies and their financial indicators	Included in the GS
			Number of publications originating from the collaboration with the business sector	Included in the GS
5.6.	PZMS, VodSS, VSS, GV, D	PP, PovOK	Briefs from the VSS sessions	After the sessions held (up to 10 times a year)
			Briefs from the GV sessions	November, April
			Annual lists of entitlement of courses	November
			Elaborate(s) on the novel university specialist programme(s) of study	After creation, not before January 2017
			Number of publications / patents / innovations originating from collaboration with the business sector	Included in the GS
6.1.	PZMS, KorE, PovMS, SUMS, MZOS, AZVO, AMPEU	D, PovOK	Briefs from the PovMS sessions	After the sessions held (2 – 4 times a year)
			Number of signed agreements within the Erasmus+ programme as well as bilateral and multilateral agreements of the Faculty	Included in the GS
			Number of CEEPUS exchange projects	Included in the GS
			Number of COST projects	Included in the GS
			Number of bilateral and multilateral projects	Included in the GS
			Number and duration of incoming and outgoing mobilities of academic staff, students and non-academic staff	Included in the GS
			Briefs on the outgoing mobility, including reports on the use of a sabbatical leave facility	Occasionally, after the mobility realised
			Number of approved grants for outgoing student mobility	Included in the GS
			Number of publications / patents / innovations originating from mobility and international cooperation (in addition to Indicator 5.1.6)	Included in the GS
7.1.	D, PP	PovOK	Regular financial reports	February
			Other financial report	Occasionally
			Level of expenses	Continuously

Measure	Performed by	Recorded by	Indicator	Time frame
7.2.	D, PP	PovOK	Regular financial reports	February
			Other financial report	Occasionally
			Level of revenues	Continuously
7.3.	D	PP, PovOK	The average age of IT infrastructure	Included in the GS
			Number of textbooks available for students	Included in the GS
			Database of the capital equipment of the Faculty	Continuously

#### Notes regarding the table

The term report implies a self-standing written document. The term brief stands for the oral or written, presented directly or indirectly in the sessions of the Faculty Council. All the reports are then explicitly included in the printed material for the sessions of the Faculty Council, and all the briefs implicitly in the minutes of the sessions. Therefore, all the activities foreseen in this strategic document are monitored by the Faculty Council, which is hence never mentioned explicitly in the table as a competent or responsible body.

Name of a month without designation of a year denotes a regular annual indicator.

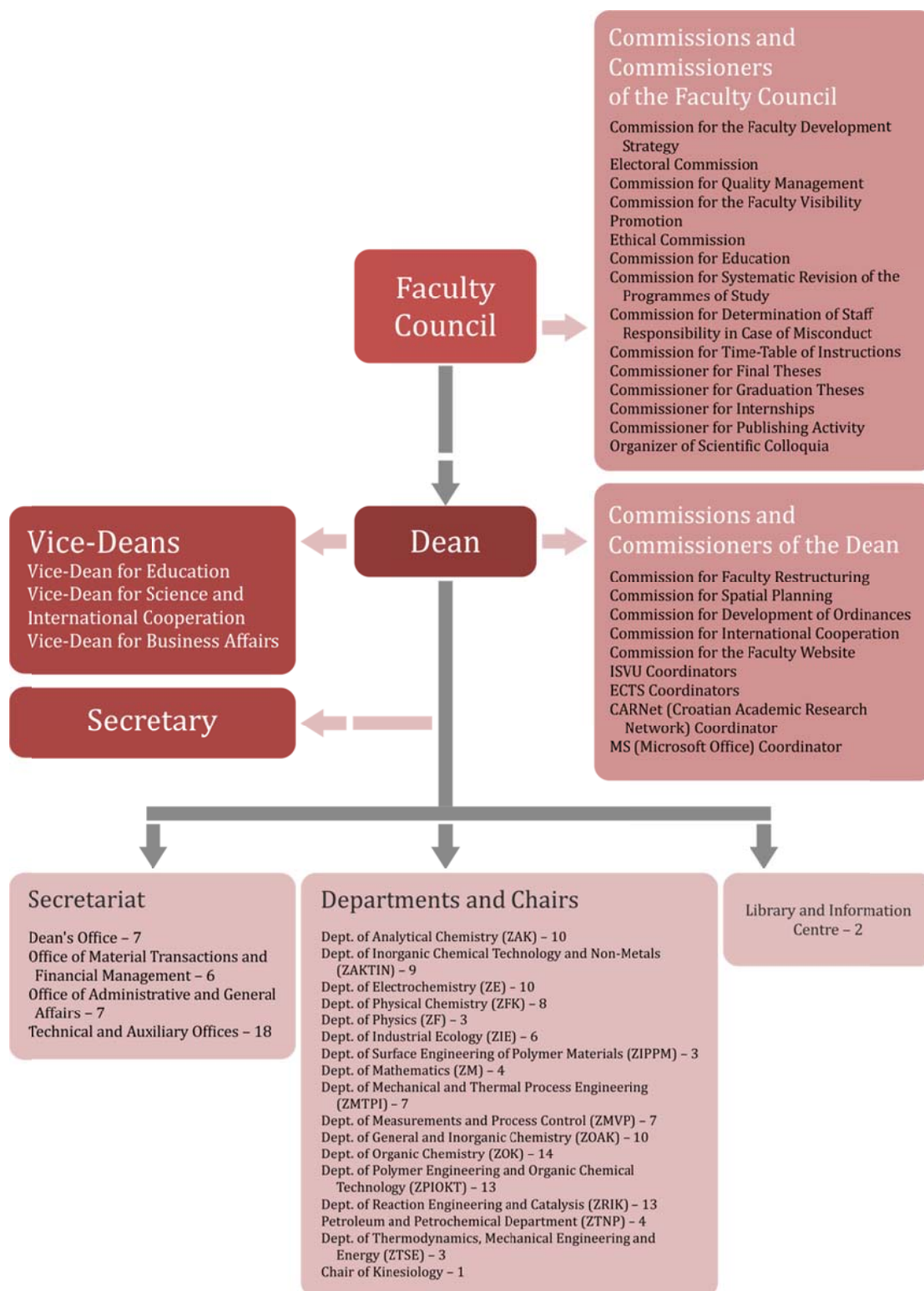
Acronyms are defined as follows:

AMACIZ	<i>Društvo diplomiranih inženjera i prijatelja kemijsko-tehnološkog studija</i>	Association of Graduate Engineers and Friends of Chemical and Technological Studies
AZVO	<i>Agencija za znanost i visoko obrazovanje</i>	Croatian Agency for Science and Higher Education
D	<i>Dekan</i>	Dean
FV	<i>Fakultetsko vijeće</i>	Faculty Council
GS	<i>Godišnja samoanaliza</i>	Annual self-evaluation report
GV	<i>Gospodarsko vijeće</i>	Business Council
KorE	<i>Erasmus koordinator</i>	Erasmus Coordinator
MZOS	<i>Ministarstvo znanosti, obrazovanja i sporta</i>	Ministry of Science, Education and Sports of the Republic of Croatia
N	<i>Nastavnici</i>	Teachers
PD	<i>Prodekani</i>	Vice-Deans
PN	<i>Prodekan za nastavu</i>	Vice-Dean for Education
PovI	<i>Izorno povjerenstvo</i>	Electoral Commission
PovID	<i>Povjerenik za izdavačku djelatnost</i>	Commissioner for Publishing Activity
PovMS	<i>Povjerenstvo za međunarodnu suradnju</i>	Commission for International Cooperation
PovN	<i>Povjerenstvo za nastavu</i>	Commission for Education
PovOK	<i>Povjerenstvo za osiguravanje kvalitete</i>	Commission for Quality Assurance
PovPIM	<i>Povjerenstvo za promicanje imena Fakulteta</i>	Commission for the Faculty Visibility
PovSR	<i>Povjerenstvo za strategiju razvoja</i>	Commission for the Faculty Development Strategy
PP	<i>Prodekan za poslovanje</i>	Vice-Dean for Business Affairs
PZMS	<i>Prodekan za znanost i međunarodnu suradnju</i>	Vice-Dean for Science and International Cooperation
R	<i>Računovodstvo</i>	Office of Material Transactions and Financial Management
SPB	<i>Studentski pravobranitelj</i>	Students' Ombudsperson
SS	<i>Senat Sveučilišta u Zagrebu</i>	Senate of the University of Zagreb
SUMS	<i>Ured za međunarodnu suradnju Sveučilišta u Zagrebu</i>	International Office of the University of Zagreb
SZ	<i>Studentski zbor</i>	Student's Union
T	<i>Tajnik</i>	Secretary
VDS	<i>Vijeća doktorskih studija</i>	Councils of the Doctoral Programmes of Study
VodBIC	<i>Voditelj bibliotečno-informacijskog centra</i>	Head of the Library and Information Centre
VodDS	<i>Voditelji doktorskih studija</i>	Counsellors of the Doctoral Programmes of Study
VodSS	<i>Voditelji specijalističkih studija</i>	Counsellors of the Specialist Programmes of Study
VSS	<i>Vijeća specijalističkih studija</i>	Councils of the Specialist Programmes of Study
Z	<i>Znanstvenici</i>	Scientists

## 6. Organisational Structure of the Faculty

Persons and bodies that are responsible for execution of this strategic document include most of the Faculty employees within the range of their competence. Where it is particularly important, persons and bodies are additionally pointed out in Section 5.

Their mutual relations are best explained by a graphical overview of the organisational structure of the Faculty. The current state is given. The adopted restructuring implies major changes of the departmental structure of the Faculty.



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