Strategic Program of Scientific Research

University of Zagreb

The Faculty of Pharmacy and Biochemistry

2014-2019
STRATEGIC PROGRAM OF SCIENTIFIC RESEARCH

OF THE FACULTY OF PHARMACY AND BIOCHEMISTRY, UNIVERSITY OF ZAGREB, FOR THE PERIOD 2014-2019
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### 1. INTRODUCTION

#### 1.1. HISTORY

The first postgraduate programmes at the Faculty of Pharmacy and Biochemistry (FBF) were established in 1961 (*Physical Methods in Chemistry* and *Desalination of Sea Water*). Later, other postgraduate programmes were also initiated, accompanied with several reforms. At present, FBF provides a postgraduate / doctoral programme "Pharmaceutical-Biochemical Sciences", organised in two modules: pharmaceutical sciences and medical-biochemical sciences, and eight postgraduate specialist programmes: *Drug Development, Dermatopharmacy and Cosmetology, Phitopharmacy with Dietotherapy, Clinical Pharmacy, Medical Biochemistry and Laboratory Medicine, Molecular Diagnostics, Pharmacogenomics: a New Approach to Optimizing Therapy and Toxicology* (two modules).

Today, FBF, with tradition of 132 years (pharmacy) and 50 years (medical biochemistry), with 53 employees (61 of whom hold scientific-teaching title) and 204 currently enrolled postgraduate students, is an important institution within the University of Zagreb. FBF, i.e. its staff, cooperates in various ways with 31 foreign institutions and is part of the *Central European Exchange Program for University Studies* (CEEPUS) and ERASMUS programmes.

The intensity of FBF's scientific activities has been demonstrated through twenty four research projects organised by the Ministry of Science, Education and Sports, three international projects, four bilateral and eight professional projects and collaborations. The number of around 10,000 graduates, who produced more than 300 master's and more than 200 doctoral theses to date, shows that FBF has made a significant contribution to the improvement of the scientific potential of the Republic of Croatia and that it has become a lasting source of research and teaching activities at the national and international level (records of graduates have been maintained since the academic year 1949/1950 and of completed postgraduate students since the academic year 1962/1963).

FBF, as a constituent part of the University of Zagreb, is adopting the Strategic Program of Scientific Research in accordance with the following: the national priorities, requirements for EU accession or harmonisation with EU guidelines (the Lisbon Strategy from 2009, the Bologna Process etc.), integration into the European Research Area (ERA) and the European Higher Education Area (EHEA), the needs to develop programs of lifelong learning, achieve harmonization with the European Qualifications Framework, establish unique doctoral studies, continuously create national scientific-research and higher education policy, increase funding of science (especially from business sector sources) etc.

Through this document the Faculty of Pharmacy and Biochemistry aligns its strategy of scientific research with the existing specific strategies of the University of Zagreb. In doing so, it takes into account all the faculties’ specificities and particularities and outlines specific objectives and measures to be taken in the next medium term period. The Strategic Program of Scientific Research of FBF defines: the mission and vision of FBF within the research, technology and knowledge transfer and innovation areas; strategic objectives and tasks for FBF, along with appropriate measurable performance indicators; persons and bodies required for the implementation of the Strategic Program (bearers of appropriate activities i.e. persons responsible for the monitoring of performance indicators in accordance with the defined objectives and implementation deadlines); documents to be adopted by the FBF with the aim to implement the strategic programme; and the timetable of activities.
1.2. OVERVIEW OF BASIC INFORMATION CONCERNING SCIENTIFIC RESEARCH AT THE FACULTY OF PHARMACY AND BIOCHEMISTRY

Today FBF, with tradition of 132 years (pharmacy) and 50 years (medical biochemistry), with 53 employees (61 of whom hold scientific-teaching title) and 956 currently enrolled graduate and 204 postgraduate students, is an important institution within the University of Zagreb. In the period from 2007 until today, the research activities at FBF have been carried out through 24 research projects organised by the Ministry of Science, Education and Sports, 3 international projects, 4 bilateral and 8 professional projects and collaborations.

In the period from 2009 to 2013, FBF’s staff published 425 publications in total. Prevalent among them were original papers (81.4%) and review articles (12%). They were mainly in the fields of chemistry (144), biochemistry, genetics and molecular biology (139), pharmacology, toxicology and pharmacy (132), and medicine (97). According to Scopus database, the papers were cited 2,232 times in total (h-index=24), which undoubtedly demonstrates the scientific excellence and the high research potential of FBF. In the course of its scientific activities, FBF, i.e. its staff, cooperates in various ways with 34 foreign institutions and participates in the Central European Exchange Program for University Studies (CEEPUS) and ERASMUS programmes. In addition to this, 917 graduate theses, 24 postgraduate specialist study final papers, 15 master’s theses and 62 doctoral theses were produced at the faculty over the last 5 years. All of this shows that FBF has made a significant contribution to the improvement of the scientific potential of the Republic of Croatia and that it has become a lasting source of research and teaching activities at the national and international level.

(tekst u desnom stupcu):

MZOS (Ministry of Science, Education and Sports)

HRZZ (Croatian Science Foundation)

Bilateral Projects

International Projects
Scientific Publications at FBF for the Period 2009–2013 (Source: Scopus)

- Original scientific papers (346)
- Review articles (51)
- Conference Papers (9)
- Book Chapters (2)
- Other works (17)

Scientific Publications at FBF for the Period 2009–2013, per Scientific Field (Source: Scopus)

- Chemistry
- Biokemija, genetika i molekularna biologija
- Farmakologija, toksikologija i farmacija
- Medicina
- Agronomija i biologija
- Kemijsko inžinjerstvo

Original scientific papers (346)
Review articles (51)
Conference Papers (9)
Book Chapters (2)
Other works (17)
Biochemistry, Genetics and Molecular Biology
Pharmacology, Toxicology and Pharmacy
Medicine
Agronomy and Biology
Chemical Engineering

1.3. ABOUT THE STRATEGIC PROGRAM OF SCIENTIFIC RESEARCH

"The Strategic Program of Scientific Research of the FBF for the Period 2014–2019" draws on all the positive aspects of the Faculty's 132-year legacy. It is based on the Faculty's self-analysis of the current situation (SWOT analysis), general conditions in which it operates, applicable legislation, identification of global trends in the fields of biomedicine, health and natural sciences, Dean's Work Plan and the strategic decisions of the University of Zagreb.

FBF carries out important scientific work in the area of biomedicine and health, the field of pharmacy, the branch of pharmacy and of medical biochemistry, and in the area of natural sciences. Its current scientific potential needs to be further enhanced and directed towards achieving the highest possible visibility in the Republic of Croatia and abroad. The Faculty should continue providing institutional support for the improvement of research careers, continually work towards reforming doctoral studies as the basis for the development of the individuals who are the pillars of general development, encourage mobility and participation in post-doctoral trainings in various national and international projects, educate junior researchers through doctoral studies and create institutional framework for collaborative research activities and programmes.

One of the principal objectives for the Faculty is participation in the development of economy and society, with the aim to align achievements in those areas with the advancement of technology. Given the large number of its highly educated professionals in natural sciences, pharmacy and medical biochemistry, FBF should be involved in economic life, both in the region and beyond, through joint research projects and other forms of cooperation.

One of its priority objectives is therefore to strengthen the capacities for research and development in order to ensure FBF's competitiveness during its integration into national and international research programmes. Additional FBF's objectives are to use and manage intellectual property arising from the Faculty's research, and to encourage the creation of start-up companies based on the research results and the use of technology.

FBF is striving to be the key factor that enables the so called knowledge triangle (education, research, innovation) by bringing the Faculty's technologies to the market and promoting economic development.

FBF cooperates with the pharmaceutical industry and other relevant businesses. The cooperation is carried out through joint projects, provision of analytical services, implementation of new technologies, creation of expert reports etc. Worth mentioning is the long tradition of cooperation with PLIVA Croatia Ltd. within the projects of "Preparation of liposomes suitable for modification with membrane proteins", (2001-2002), "Synthesis and Evaluation of Thiomers as Potential Excipients for the Development of New Bioadhesive Therapeutic Systems", (2002-2004) and "Microparticles for Controlled Release of the Active Substance" (2008-2011). The cooperation gave rise to the publication of two master's theses and one doctoral thesis and a total of 5 CC articles, with the results having had direct industrial application. One of the most important projects is "The Development of In Vitro / Ex Vivo Models to Test the Permeability of
New Ophthalmic Topical Medications” in Partnership with the Research programme, financed by the Croatian Science Foundation and PLIVA Croatia Ltd. as an industrial partner, now in the second year of implementation. The evaluation report for the first year of implementation received the highest rating, especially in the category of financial management. The aforesaid project is an example of the implementation of research activities in the industrial application of newly gained knowledge. In addition, it should be noted that FBF is one of the partners in the project BISTEC - Building Innovation Support Through Efficient Cooperation Network - worth 794,000 EUR and of two years duration (April 2013-March 2015). The project is funded by the European IPA programme, with the aim of improving capacities of higher education and research institutions for technology and innovation transfer. At the same time, the FBF, in cooperation with other partners (14 constituent parts of the University of Zagreb plus the University of Rijeka) and the University of Zagreb as the project coordinator, builds extensive cooperation with industry, investors, public institutions and other stakeholders in the commercialization of research potentials of the University of Zagreb.

FBF has appropriate equipment for teaching and research activities. Its priorities, in addition to the proper maintenance and rational use of the existing equipment, are the acquisition of modern equipment for teaching and research purposes, along with the strengthening of capacities for conducting high quality scientific research. Technology Mapping of FBF, carried out in the second half of 2013 in order to determine the Faculty's technological potential and strengthen cooperation between University, industrial sector and SMEs, singled out 4 major areas within the FBF’s scientific research activities.

**The First Area:** encompasses the synthesis of new drugs, estimation of their therapeutic potential, and evaluation of the safety of their application. To this purpose, modern in silico methods are applied to define potentially active structures, starting from the information on biological systems. Also, the synthetic routes for the preparation of such compounds are studied, their synthesis is carried out, stability evaluated, and the therapeutic potential and safety of application assessed using various cell and tissue models and laboratory animals. Finally, the synthesized products are fully analytically characterized through the development of methods and procedures for their quantification, determination of polluting impact etc.

**The Second Area:** encompasses the development of innovative pharmaceutical forms with targeted effects and/or controlled release, in order to improve drug bioavailability, stability, safety and acceptability to patients. In addition to the creation of new technological processes for the development of such innovative pharmaceutical forms of drugs, a detailed pharmaceutical-technological characterization is carried out and the effectiveness and safety of application is assessed using adequate in vitro cell models and tissue cultures.

**The Third Area:** encompasses isolation of new, biologically active molecules from plant material, the evaluation of their therapeutic potential and the development of new herbal medicines and functional foods.

**The Fourth Area:** encompasses development of new and highly selective diagnostic tests for various diseases, metabolic disorders etc. and the provision of specific diagnostic services for the healthcare sector, in the field of laboratory diagnostics and haematology.

In addition to the above mentioned research activities, FBF organizes courses and trainings, the development, testing and optimization of different methods, procedures and protocols, and offers various specific services related to the scope of the work of individual departments of the faculty.

### 1.4. SWOT ANALYSIS
From the perspective of future development, we have to single out those features that present the basic strengths, weaknesses, opportunities and threats involved in the further development of scientific research at the Faculty of Pharmacy and Biochemistry of the University of Zagreb.

SWOT analysis has identified the following:

- **Strengths**, that we have to be aware of and use them in the best possible way,
- **Weaknesses**, that need to be taken into account and overcome whenever possible,
- **Opportunities**, that need to be seized in order to enhance the existing strengths and reduce the identified weaknesses,
- **Threats**, that we also need to take into account and try to reduce whenever and wherever possible, so that they do not jeopardize existing strengths or further aggravate current weaknesses.

**STRENGTHS (S)**
- FBF’s long-standing tradition and visibility in the scientific community during the 130 years of its successful scientific activity;
- Status of the central institution for the development of the disciplines of pharmacy and medical biochemistry that other related institutions in Croatia and beyond can rely on;
- Visibility of some of its research groups and their activities through participation in a number of scientific-research projects and publications;
- Influence on the work and development of professional associations and journals within the profession;
- Potential for interdisciplinary research in the fields of biomedicine and natural sciences;
- Doctoral postgraduate study;
- Specialist postgraduate studies;
- Various forms of international cooperation.

**WEAKNESSES (W)**
- Premises and equipment at scattered locations, which hinders optimal teaching and scientific-research cooperation and contributes to the fragmentation of the system;
- Inadequate conditions of the premises – obsolete teaching, research and supporting facilities, especially in relation to administrative support to project applications;
- Insufficient cooperation with business sector;
- Insufficient number of development and technology projects;
- Insufficient engagement in securing independent funding;
- Low interest of young graduated experts to work at the Faculty due to better financial conditions at other institutions;
- Lack of a strategic framework that would set scientific and professional priority areas for the Faculty;
- Insufficient public visibility of FBF in the Republic of Croatia;

**OPPORTUNITIES (O)**
- Research cooperation, nationally and internationally;
- Creating conditions for better cooperation with business sector;
- FBF’s interdisciplinary approach, which offers the possibility to expand the cooperation of the faculty with other constituent parts of the University of Zagreb, within the Republic of Croatia, and beyond;
- More intensive encouragement and stimulation of the mobility of teachers, students and non-teaching staff, and liaising with other universities and similar faculties;
- Starting commercially interesting specialist studies and encouraging lifelong education for
professionals in the pharmaceutical and medical-biochemistry profession;
- Active involvement in international projects (such as H2020 etc.);
- Finding ways to co-finance the staff's training abroad (by applying to projects financed by the EU and using pre-accession and structural funding opportunities);
- Sharing of human and material resources, liaising with other professions and scientific areas.

### THREATS (T)

- Limited investment in education and science, poor economic situation, reduced state budget funding due to recession in the Republic of Croatia;
- Inertia of social systems – especially in the funding of higher education teaching and research projects considering the current trends and rapid changes in FBF's areas of work;
- Inability to solve FBF's space issues (construction of a new building);
- Inability to conduct better personnel policy, which will prevent development of specialised courses (limited ability to employ doctoral studies graduates);
- Insufficient liaising with other professions and scientific areas and the fragmentation of resources (insufficient use of the existing research equipment) hindering the introduction of common standards, criteria and quality indicators;
- Unstable legislative framework with frequently changing regulations;
- Closing of pharmaceutical companies;
- Insufficient stimulation of junior researchers through funding of their initial projects;
- The growing teaching duties due to Bologna educational reform jeopardizing stronger development of science.

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**2. THE FACULTY OF PHARMACY AND BIOSCHEMISTRY: MISSION AND VISION**

#### 2.1. MISSION STATEMENT

The Faculty of Pharmacy and Biochemistry of the University of Zagreb is dedicated to conducting scientific-research, professional and teaching activities, on graduate and postgraduate level, in the field of biomedicine and health. These activities promote overall progress of the community and knowledge-based economic development. To this end, FBF enables a rational use of available human and material resources, development of multi-disciplinary research and educational programs, international competitiveness of teaching, research and professional work, an increased level of innovation in society, faster knowledge transfer and a strengthening of links between education, research and entrepreneurship.

#### 2.2. VISION STATEMENT

The Faculty of Pharmacy and Biochemistry of the University of Zagreb, in accordance with its mission / concept, its clear research profile, its teaching process which is grounded on new scientific achievements, learning outcomes and principles of lifelong learning, as well as its involvement in the European Research and Higher Education Area, will be one of dynamic centres in the field of biomedical and health sciences that will contribute to the transition of Croatia to a knowledge-based society. It will be a reference point and a hub of cooperation with other faculties, universities and institutions at the international, national and local levels and the leading higher educational institution for scientific research in the region. The faculty will continue its work as a socially responsible institution in the educational, scientific and
professional field, and professionals trained at FBF will be interdisciplinary educated and competent in solving problems in their areas, to the benefit of the entire community.

One of the principal objectives for the Faculty is participation in the development of economy and society, with the aim to align achievements in those areas with the advancement of technology. Given the large number of its highly educated professionals in natural sciences, pharmacy and medical biochemistry, FBF should be involved in economic life, both in the region and beyond, through joint research projects and other kinds of cooperation. One of its priorities as objective is therefore to strengthen the capacities for research and development in order to ensure FBF's competitiveness during its integration into national and international research programs. Additional FBF's objectives are to use and manage intellectual property arising from the Faculty's research and encourage the creation of start-up companies based on research results and the use of technology.

FBF is striving to be the key factor that enables the so called knowledge triangle (education, research, innovation) by bringing the Faculty's technologies to market and promoting economic development.


The Faculty of Pharmacy and Biochemistry carries out important scientific work in the area of biomedicine and health, the field of pharmacy, the branch of pharmacy and of medical biochemistry, and in the area of natural sciences. Its existing scientific potential needs to be further enhanced and directed towards achieving the highest possible visibility in the Republic of Croatia and abroad. The Faculty should continue providing institutional support for the improvement of research careers, continually work towards reforming doctoral studies as the basis for the development of the individuals who are the pillars of general development, encourage mobility and participation in post-doctoral trainings in various national and international projects, educate junior researchers through doctoral studies and create an institutional framework for collaborative research activities and programs.

FBF's activities include teaching, research and professional work and the objectives of the Strategic Programme of Scientific Research are therefore consistent with those activities. Each of them has many specificities and all involve human, material and financial resources. International activity lies at the core of the Bologna process and participation in joint projects, study and scientific-research programs promote the mobility of teachers and students. The strategic objectives of scientific research at FBF will therefore also affect development in this area. Moreover, we have developed Strategy of the Quality Assurance System, which will ensure a more effective production and evaluation of scientific, educational and professional achievements. Depending on the achievement of the Strategic Programme's objectives, a systematic harmonisation and revision of the faculty's basic documents and its organisational structure will take place.

Based on the SWOT analysis and FBF's scope of work, we have identified the following strategic areas of scientific research at the FBF:

- **Synthesis of new drugs**, estimation of their therapeutic potential and evaluation of the safety of their application.
- **Development of innovative pharmaceutical forms** with targeted effects and/or controlled release, in order to improve the drug's bioavailability, stability, safety and acceptability to patients.
- **Isolation of biologically active molecules** from plant material, evaluation of their therapeutic potential and the development of new herbal medicines and functional foods.
- Development of new and highly selective diagnostic tests for various diseases, metabolic disorders etc. and the provision of specific diagnostic services for the healthcare sector, in the field of laboratory diagnostics and haematology.

We have therefore defined the strategic objective for scientific research at FBF, including SMART* features (Specific, Measurable, Achievable, Relevant, Timely):

**Strategic objective** – Continually develop research profiles in the field of pharmaceutical and medical-biochemical, and natural sciences, establish collaborative research projects and enhance institutional care for the improvement of research careers.

The strategic objective will be achieved through the following tasks:

**TASK 1**

Determine FBF’s research profile and its priorities in specific areas and organizational units, and connect scientific-research activities with the improvement of teaching at graduate and postgraduate levels.

**INDICATOR 1**

Determined research profile and defined scientific-research priorities in specific areas and organizational units.

**TASK 2**

Intensify teaching activities through national and international scientific and technological projects.

**INDICATOR 2**

Number of national and international scientific and technological projects and the total contracted amount per each year, until the end of the strategic period.

*S (specific – related to concrete problems); M (measurable – in order to be successfully achieved); A (attainable – realistically achievable); R (relevant – in relation to the strategic direction); T (time-based – dynamic (continuous) or static (achievable within the strategic period)

**TASK 3**

Increase number of teachers involved in international scientific-research projects, in comparison to the previous period.

**INDICATOR 3**

Number of teachers involved in international research projects until the end of the strategic period.

**TASK 4**

Increase scientific productivity.
INDICATOR 4.A.

Number of papers produced at FBF that were published in international publications (CC and SCI/SCI-E, WOS) per each year, until the end of the strategic period.

INDICATOR 4.B.

Number of papers published in journals with a better than average impact factor relative to specific subject areas.

INDICATOR 4.C.

Ratio between the number of papers indexed in CC/SCI/SCI-E databases and the number of employees holding scientific-teaching title.

INDICATOR 4.D.

Ratio between the number of published papers and the number of researchers.

INDICATOR 4.E.

Ratio between the number of published papers and the number of research assistants.

TASK 5

Encourage research cooperation within FBF in order to establish larger projects, i.e. consolidate research capacities at FBF, and foster interdisciplinarity and multidisciplinarity.

INDICATOR 5

Number of published papers, co-authored by teachers from various FBF's departments, in the previous period.

TASK 6

Increase the number of junior researchers / doctorands per each year of the strategic period.

INDICATOR 6

Number of junior researchers / doctorands employed at FBF per each year of strategic period.

TASK 7

Define priorities and criteria for the allocation of the posts of young researches / doctorands according to specific projects and areas.

INDICATOR 7.A.

Document with priorities and criteria for the allocation of the posts of junior researchers / doctorands.
INDICATOR 7.B.

A list of priorities for the allocation of the posts of junior researchers / doctorands per a tender / period / year.

TASK 8

Create the Regulations on the Procedure and Criteria for the Selection of Candidates to Assistant Positions.

INDICATOR 8

Adopted Regulations on the Procedure and Criteria for the Selection of Candidates to Assistant Positions.

TASK 9

Monitor work of junior researchers / doctorands.

INDICATOR 9.A.

Mentors' annual reports on the work of junior researchers / doctorands and on their success in doctoral studies (number of published papers, teaching and professional activities, international cooperation, time spent in doctoral studies).

INDICATOR 9.B.

Introduction of the Faculty Council's thematic session devoted to junior researchers / doctorands in order to continuously monitor the faculty's scientific "offspring".

TASK 10.

Intensify cooperation with business sector and encourage scientists' involvement in the work of scientific committees, commissions and associations.

INDICATOR 10.A.

Number of scientific papers resulting from cooperation with business sector, in comparison with the previous period.

INDICATOR 10.B.

Number of doctoral theses created as a result of cooperation with business sector.

TASK 11.

Establish a system for the development of the careers of postdoctoral fellows through their use of various forms of support.

INDICATOR 11.

Number of post-doctoral fellows who have used some form of support.
TASK 12.

Encourage post-doctoral fellowships (staying abroad for at least 6 months).

INDICATOR 12.

Number of postdoctoral fellowships abroad in the strategic period.

INDICATOR 12. A.

Number of researchers at longer or shorter stays in foreign institutions.

TASK 13.

Increase interest of experts graduated from FBF in continued education at the doctoral study.

INDICATOR 13.A.

Minutes of meetings held with senior graduate students in order to encourage popularisation of the doctoral programme and their continued study at the doctoral level.

INDICATOR 13.B.

Number of students enrolled in doctoral study at FBF.

TASK 14.

Improve the system of quality assurance monitoring for scientific-research work.

INDICATOR 14.

Published annual productivity reports, including all relevant scientometric data.

TASK 15.

Motivate graduate students for scientific work.

INDICATOR 15.

Number of published papers co-authored by students and number of Chancellor's and Dean's Awards.

TASK 16.

Encourage popularisation of science and identify human and material resources needed for the task.

INDICATOR 16.

Number of published papers aimed at the popularisation of science, number of organized discussions and workshops, as well as lecturers' and assistants' participation in the organisation of summer schools and courses.
TASK 17.

Increase the engagement with international institutions and editorial boards of international and national scientific journals.

INDICATOR 17.

Number of teachers active in the work of international institutions and editorial boards of scientific journals.

TASK 18.

Establish FBF’s support fund (*matching fund*) for the encouragement of priority research activities (own funds).

INDICATOR 18.A.

Action plan to establish the support fund.

INDICATOR 18.B.

Number of projects co-financed from FBF’s support fund.


Implementation of FBF Strategic Programme of Scientific Research requires a precise identification of the bearers of the planned activities. In order to inform FBF employees in the best possible way about the objectives of the Strategic Programme, the Dean of the Faculty will delegate the parts of the programme implementation activities to as many employees as possible. In this regard, the following persons and FBF bodies will have important responsibilities:

Dean’s Board (dean, associate deans for teaching / research), Scientific Committee, Committee for International Cooperation, international projects coordinators, dean’s assistants for specific strategic objectives, heads of departments, heads of centres, heads of post-graduate studies (doctoral, specialist) Quality Assurance Committee, Committee for General and Personnel Affairs, FBF Website Editorial Board, Publishing Affairs Committee, Ethics Committee, Ethics Committee for Experimental Research, secretary, Committee for Textbooks and Course Materials, Diploma Thesis Commission, Committee for Student Papers and Awards, Dean’s Offices, Library.

5. PERSONS AND BODIES RESPONSIBLE FOR THE MONITORING OF THE PERFORMANCE INDICATORS

FBF will systematically monitor the defined performance indicators for each task. We have listed bodies / persons responsible for the implementation of tasks and performance monitoring during or at the end of the strategic period.
<table>
<thead>
<tr>
<th>Performance indicator</th>
<th>Task Description</th>
<th>Responsible Bodies</th>
<th>Implementation Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESEARCH PROFILE DEVELOPMENT</td>
<td>1. Determined research profile and defined scientific-research priorities in specific areas and organizational units.</td>
<td>1. Determine FBF’s research profile and its priorities in specific areas and organizational units, and connect scientific-research activities with the improvement of teaching at graduate and postgraduate level.</td>
<td>Scientific Committee, Teaching and Learning Committee, Quality Assurance Committee</td>
</tr>
<tr>
<td></td>
<td>2. Number of national and international scientific and technological projects, and the total contracted amount per each year, until the end of the strategic period.</td>
<td>2. Intensify teaching activities through national and international scientific and technological projects.</td>
<td>Scientific Committee, heads of research projects, international cooperation coordinator</td>
</tr>
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<td></td>
<td>3. Number of teachers involved in international research projects until the end of the strategic period.</td>
<td>3. Increase the number of teachers involved in international scientific-research projects, in comparison to the previous period.</td>
<td>International cooperation coordinator, heads of international projects</td>
</tr>
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<td></td>
<td>4.A. Number of papers produced at FBF that were published in international publications (CC and SCI/SCI-E, WOS) per each year, until the end of the five-year period.</td>
<td>4. Increase scientific productivity.</td>
<td>Scientific Committee, project leaders</td>
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<td></td>
<td>4.B. Number of papers published in journals with a better than average impact factor relative to specific subject areas.</td>
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<td>4.C. Ratio between the number of papers indexed in CC/SCI/SCI-E databases and the number of employees holding scientific-teaching title.</td>
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<td></td>
<td>4.D. Ratio between the number of published papers and the number of researchers.</td>
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<td></td>
<td>4.E. Ratio between the number of published papers and the number of research assistants.</td>
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<td></td>
<td>5. Number of published papers, co-authored by teachers from various FBF’s departments, in the previous period.</td>
<td>5. Encourage research cooperation within FBF in order to establish larger projects, i.e. consolidate research capacities at FBF, and foster interdisciplinarity and multidisciplinarity.</td>
<td>Scientific Committee, Dean’s Board, project leaders, Committee for General and Personnel Affairs</td>
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<td>6. Number of junior researchers / doctorands employed at FBF per each year of the strategic period.</td>
<td>6. Increase the number of junior researchers / doctorands per each year of the strategic period.</td>
<td>Dean's Board, Quality Assurance Committee</td>
<td>30 November 2014</td>
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<td>7.A. Document with priorities and criteria for the allocation of the posts of junior researchers / doctorands. 7.B. List of priorities for the allocation of the posts of junior researchers / doctorands per a tender / period / year.</td>
<td>7. Define priorities and criteria for the allocation of the posts of junior researchers / doctorands according to specific projects and areas.</td>
<td>Scientific Committee, Dean's Board, Quality Assurance Committee</td>
<td>30 November 2014</td>
</tr>
<tr>
<td>9.A. Mentors’ annual reports on the work of junior researchers / doctorands and their success in doctoral studies (number of published works, teaching and professional activities, international cooperation, time spent in doctoral studies). 9.B. Introduction of the Faculty Council’s thematic session devoted to junior researchers / doctorands in order to continuously monitor the faculty’s scientific &quot;offspring&quot;.</td>
<td>9. Monitor work of junior researchers / doctorands.</td>
<td>Scientific Committee, project leaders and mentors</td>
<td>Each Academic Year</td>
</tr>
<tr>
<td>10.A. Number of scientific papers resulting from cooperation with business sector, in comparison with the previous period. 10.B. Number of doctoral theses created as a result of cooperation with business sector.</td>
<td>10. Intensify cooperation with business sector and encourage scientists 'involvement in the work of scientific committees, commissions and associations.</td>
<td>Dean's Board, Scientific Committee, project leaders in cooperation with business sector</td>
<td>Each Academic Year</td>
</tr>
<tr>
<td>11. Number of post-doctoral fellows who have used some form of support.</td>
<td>11. Establish a system for the development of the careers of postdoctoral fellows through their use of various forms of support.</td>
<td>Scientific Committee, Quality Assurance Committee, Dean's Offices</td>
<td>Each Academic Year</td>
</tr>
<tr>
<td>12. Number of postdoctoral fellowships abroad in the strategic period 12.A. Number of researchers at longer or shorter stays in foreign institutions.</td>
<td>12. Encourage post-doctoral fellowships (staying abroad for at least 6 months).</td>
<td>Scientific Committee, project leaders and mentors, international cooperation coordinator, Dean’s Board</td>
<td>Each Academic Year</td>
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<tr>
<td>Performance indicator</td>
<td>Task Description</td>
<td>Responsible Bodies</td>
<td>Implementation Deadline</td>
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<td>13.A. Minutes of meetings held with senior graduate students in order to encourage popularisation of the doctoral programme and their continued study at the doctoral level.</td>
<td>13. Increase the interest of experts graduated from FBF in continued education at the doctoral study.</td>
<td>Dean’s Offices, Scientific Committee, Quality Assurance Committee, heads of doctoral studies</td>
<td>Each Academic Year</td>
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<td>13.B. Number of students enrolled in doctoral study at FBF.</td>
<td>14. Improve the system of quality assurance monitoring for scientific-research work.</td>
<td>Scientific Committee, head of library, Quality Assurance Committee, project leaders and mentors, Doctoral and Specialist Studies Council, heads of doctoral studies</td>
<td>Each Academic Year</td>
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<tr>
<td>14. Published annual productivity reports, including all relevant scientometric data.</td>
<td>14. Improve the system of quality assurance monitoring for scientific-research work.</td>
<td>Scientific Committee, head of library, Quality Assurance Committee, project leaders and mentors, Doctoral and Specialist Studies Council, heads of doctoral studies</td>
<td>Each Academic Year</td>
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<td>15. Number of published papers co-authored by students and Chancellor and Dean Awards.</td>
<td>15. To motivate graduate students for scientific work.</td>
<td>Teaching and Learning Committee, Committee for Student Papers, Scientific Committee</td>
<td>Each Academic Year</td>
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<td>16. Number of published papers aimed at the popularisation of science, organised discussions, workshops.</td>
<td>16. Encourage popularisation of science and identify human and material resources needed for the task</td>
<td>Scientific Committee, project leaders and mentors, Centres for Applied Pharmacy and Medical Biochemistry</td>
<td>Each Academic Year</td>
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<td>17. Number of teachers active in the work of international institutions and editorial boards of scientific journals.</td>
<td>17. Increase engagement with international institutions and editorial boards of international and national scientific journals.</td>
<td>International cooperation coordinator, Scientific Committee</td>
<td>Each Academic Year</td>
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<td>18.A. Action plan to establish support fund. 18.B. Number of projects co-financed from FBF’s support fund.</td>
<td>18. Establish FBF’s support fund (matching fund) for the encouragement of priority research activities (own funds).</td>
<td>Dean’s Board</td>
<td>End of the Strategic Period</td>
</tr>
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</table>
In line with all the above, FBF shall, during the strategic period 2014-2019, adopt documents needed to implement the Strategic Programme of Scientific Research. These are:

- A document setting criteria for mentoring and co-mentoring;
- A document setting criteria and procedures for approving and evaluating materials for e-learning;
- A document setting priorities and criteria for the allocation of junior researchers/doctorands;
- Regulations on Employment of Junior Researchers/Doctorands and Mentoring;
- Regulations on rewarding FBF Employees;
- Regulations on the Distribution of Own Revenues;
FBF’S RESEARCH INFRASTRUCTURE

An important part of the research infrastructure at the Department of Biophysics (ZBF) is EPR spectrometer, used to detect paramagnetic species and to detect and identify free radicals in biologically interesting systems. In addition to this, they use EPR to study the structure of molecules, the charge/hole transport, antioxidant behaviour in biological systems and the process of particle transport through a living cellular membrane. The Department of General and Inorganic Chemistry (ZOAK) carries out research in the field of bioinorganic chemistry, particularly in the kinetics of complexity of metal ions in biological systems through the application of various spectroscopic techniques, for which the Department is equipped with appropriate devices (Rapid Scan/Stopped-flow UV-VIS/Fluorescence Spectrophotometer, UV-VIS spectrophotometers). The Department of Analytical Chemistry (ZAK) deals with the analysis of natural antioxidants, metal complexes and with phitochemistry, for which it applies different spectroscopic, optothermal and chromatographic methods. It is equipped with the following important equipment: EG&G Princeton Applied Research Model 273 A potentiostat and Analyst 800, Perkin Elmer Atomic Absorption Spectrometer. Research activities of the Department of Organic Chemistry (ZOK) are focused on the study of the reactivity of organic substrates under solvolytic conditions and on the reaction mechanisms. It is equipped with the relevant equipment such as: NMR spectrometer Varian Gemini 3000, automatic pH-stat RADIMETER TITRALAB 856 device, conductometers (WTW LF530 and RADIMETER CDM 230), a high vacuum line, cryostat JULABO FP 40 and a gas chromatograph (VARIAN 3300). The activities of Department of Physical Chemistry (ZFK) focus on basic research in kinetics and mechanisms of chemical reaction using methods of chemical kinetics (determination of reaction rate constants, kinetic isotope effects etc.), spectroscopy (UV-VIS, IR, NMR, EPR, etc.) and other, e.g. HPLC, GC. The important parts of its instrumental technique are 8880 Spectra Physics HPLC and Pm-K 2000 Applied Photophysics system for rapid kinetics measurements. The Department of Analytics and Control of Medicines (ZAOK) houses a well equipped Pharmacopeia Laboratory and deals with the development of new analytical methods for quality control of medicines and dietary supplements. In identification of active and toxic compounds of pharmaceutical formulations, dietary supplements and dermatological preparations, they use high-performance liquid chromatography (UV, fluorescence and mass detection), gas chromatography (flame ionization detector and mass detector) and capillary electrophoresis. In addition to this, they develop new electroanalytical methods to identify and quantify drug substances in pharmaceutical formulations and biological fluids at the therapeutic level of concentrations. The Department of Pharmaceutical Botany (ZFB) carries out taxonomic characterisation of angiosperms of the Croatian flora and assesses the potential for their application in modern phytotherapy. Part of the research is focused on the taxonomic and phylogenetic study of some pharmacologically important taxa of the Croatian and world flora on molecular level, through the application of various chromatographic techniques, methods of DNA isolation, electrophoresis and microscopy. The activities of the Department of Pharmacognosy (ZFG) encompass the isolation and structural characterisation of secondary metabolites from higher plants with untapped therapeutic potential, pharmacobotanical and chemotaxonomic research, and identification and quality control of herbal drugs and phitopharmaceuticals. The focus of the teaching and research work of the Department of Pharmaceutical Chemistry (ZFMK) is on the synthesis of drugs and identification of their structure. Additionally, they carry out significant research in the fields of drug design (QSAR and QSAR), drugs’ biological properties and the development of metabolic databases. The department houses significant research equipment (UV/VIS spectrophotometer, IR-spectrophotometer, HPLC, densimeter for a quantitative evaluation of TLC chromatogram). The Department of Pharmacology (ZFL) studies the pathophysiological mechanisms of the development of different types of chronic pain, such as inflammatory, neuropathic and reflex pain, using experimental models. To this purpose they use relevant biochemical methods to identify various neuronal (c-fos, p-CREB, p38) and other cell markers involved in...
nociception (identification of neurotransmitters, neuropeptides and their receptors) in animal tissues (peripheral tissue, spinal cord, brain regions). Department of Medical Biochemistry and Haematology (ZMBH) carries out research in the fields of general and medical biochemistry, molecular biology and cytology. They examine changes associated with the development of complications in chronic diseases and tumor progression, study cell’s oxidative stress and its acute response to the stress, and the possibility to regulate and improve the antioxidant potential of the cells. They also study gene polymorphism for various PON-1 proteins and matrix metalloproteinases in chronic diseases and tumors. The department is equipped with optical and fluorescent microscopes, UV-VIS spectrophotometers, a real-time PCR device, microrotter plate readers, equipment for DNA, RNA and protein electrophoresis and western blot, ultracentrifuges and a high speed cooling centrifuge, a sterile work chamber, a cell culture incubator and an autoclave. The Department of Biochemistry and Molecular Biology (ZMB) conducts basic and applied research in the fields of biochemistry and molecular biology, with a particular interest in glycobiology, the analysis of glycan structures in health and diseases and the development of specific and sensitive methods for the identification of glycan structures of glycoconjugates and their lectin receptors through the research of the mechanisms and signal pathways involved in the regulation of expression and activity of lectins and glycosyltransferases. Furthermore, they examine the presence and frequency of mutations / polymorphisms in glycosyltransferases genes in general population and in certain diseases, and indentify and validate biochemical and molecular biological markers to diagnose various diseases. They also study mechanisms of bacterial resistance to ribosomal antibiotics, mechanisms of action of rRNA methyltransferases and of bacterial cell-to-cell communication. ZMB has significant equipment, including a genetic analyser AbiPrism 310 (Applied Biosystems), a system for work with cell cultures, a real-time polymerase chain reaction device, a specialised microrotter plate reader, a system for protein electrophoresis and transfer to a membrane, a system for preparative electrophoresis, a system for DNA electrophoresis – trays and transilluminator, cooling centrifuges (up to 36700g and 18000g), thermostatic shaker for growing bacterial cultures, autoclave, spectrophotometer, a HPLC with fluorescent detector and a HPAEC-HPLC with fraction collectors. The Department of Food Chemistry (ZKP) develops new types of functional foods and semi-finished products with targeted characteristics to create new (functional) food. In addition to this, they routinely provide complete nutritional analyses (macro and micronutrients) and phytochemical composition analysis (polyphenols) of a variety of plant-based foods. They also assess biological activity of plant extracts in different food and biological model systems. For this purpose, ZKP is equipped with ICP-AES and AAS systems (trace metal determination), Microwave MLS-1200 MEGA Digestion System, BÜCHI Kjeldahl System + METROHM equipment for protein determination, a UV/VIS spectrophotometer, fluorometer and HPLC system. The Department of Microbiology (ZMB) has a broad collection of microbial cultures isolated from clinical and environmental sources. Its research activities are focused on the study of the secondary metabolites of fungi and their impact on human health. They test the viability of different cell lines (MTT assay) and also use single gel electrophoresis (comet assay) and micronucleus assay for the determination of genotoxic effects. Furthermore, they apply in vitro methods, such as microdilution assay, „time-kil“ test and experiments on the inhibition of germination of fungal cells, to study antimicrobial effect of various molecules and preparations. ZMB also performs microbiological analyses in accordance with the requirements of European Pharmacopoeia (microbial limit tests, tests for certain microbial species and preservative efficacy), and other microbiological analyses (microbiological purity, efficacy of disinfectants, antiseptics and other antimicrobial agents or mixtures of natural or synthetic origin). ZMB has all the equipment needed for the cultivation of microorganisms (bacterial incubator, CO2 incubators for cell culture (Heraeus 6000), a laminar-flow cabinet (bh800), optical binocular magnifier (Olympus SZH), optical binocular microscope (Olympus BX40), invert microscope (Olympus TH4-200), dry sterilizer, Koch steamer (INKO, Zagreb, autoclave) and a HPLC device (Shimadzu).
FBF has years-long experience in the management and administration of various projects and procedures for procurement of capital, medium and small size research equipment and chemicals. In addition to this, the faculty has a senior project adviser. Since 2006 until today, the majority of FBF departments carried out at least one national project (total of 24), and 6 departments took part in international projects. Most of the departments are funded from the state budget. However, 4 departments have reported funding through EU funds, with the Department of Biochemistry and Molecular Biology, which draws almost half of its funding (an amount larger than 300,000 KN) from EU funds, standing out. Six departments obtain funding from commercial contracts, where the Department of Microbiology draws around 50% of its total revenues from this source. Typically, the majority of national projects amount from 20,000 to 99,999 KN, and the international projects are in the range of up to 200,000 KN.

During the projects audit performed by the Ministry of Education, Science and Sports for the previous project period (2007-2013), only one project out of 24 was denied further funding in 2010. The funding was reduced for 4 projects, while the rest of the projects were continued with the same amount of funding. Three (3) projects received the highest grade (A).

The success of the projects' implementation at FBF is reflected in the number of published papers, too. In the 2010-2012 period, for instance, 151 original scientific papers were published in journals indexed in the Current Contents database and 55 scientific and professional papers in other journals.