



# DEPARTMENT OF BIOLOGY

JOSIP JURAJ STROSSMAYER UNIVERSITY OF OSIJEK

## SELF-EVALUATION 2015

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### **Name of higher education institution**

Department of biology

### **Name of university of which the institution is a constituent**

Josip Juraj Strossmayer of Osijek

### **Year of establishment**

2004

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JOSIPJURAJSTROSSMAYERUNIVERSITYOFOSIJEK  
DEPARTMENTOFBIOLOGY  
SELF-EVALUATION

2015





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## 1. Higher education institution management and quality assurance

### 1.A. DEVELOPMENT OF HE INSTITUTION

State a short description of the development of your *HE* institution and important events in the past 10 years (organisational changes, relocations, significant problems in operation).

The higher education of biologists in Osijek dates back to 1977, the year of the establishment of the Chair of Biology at the Faculty of Education of the Josip Juraj Strossmayer University of Osijek. In 1984, the Chair grew into the Sub-department of Biology. On 1 April 2005, the University Department of Biology (hereinafter referred to as the Department of Biology) was established as a constituent of the University of Osijek. Until February 2012, the Department was located at 6 Ljudevit Gaj Square. The Department of Mathematics, the Department of Physics and the Technology Development Centre were located, and still are, at the same address. The Department of Biology used to have a total of 1,100 m<sup>2</sup> of space at disposal which included one lecture hall, a seminar classroom with computers, 4 specialized teaching laboratories (for Zoology, Botany, Biochemistry and Physiology, and Microbiology), 7 laboratories (Plant Molecular and Cellular Biology Laboratory, Plant Ecophysiology Laboratory, Water Ecology Laboratory, Algal Ecology Laboratory, Laboratory of Animal Physiology and Toxicology, Microbiology Laboratory, and Laboratory of Entomology), 12 teachers' and associates' offices, the offices of the Secretariat and the Accounting Office, toilet facilities and a suite for visiting lecturers. These areas were connected to one large and four smaller halls suitable for the exhibition of biological collections and the gathering of students. In addition, the Department had a Library and a Student Administration Office. For the purpose of field courses, the Department has a long-term lease agreement concluded with the municipality of Mrkopalj. The agreement covers the lease of the former primary school building in the village of Sunger that was remodelled and adapted for the purpose of student accommodation and work.

In June 2005, based on the accreditation license issued by the Ministry of Science, Education and Sports, the Department started delivering the Undergraduate university study programme in Biology (PSB) and two graduate programmes: the Graduate university study programme in Biology (DZSB) and the Graduate university study programme in Biology and Chemistry Education (DNSBK). The teaching according to the Bologna education system began in the academic year 2005/2006.

With the help of the teaching/research assistants, the students of the Department of Biology have been organizing workshops for primary and secondary school students, as well as for the students of other faculties, as part of the Science Festival since 2005. The Science Festival has been organized in Croatia since 2003. The main objective of this event is to bring sciences

closer to the public, to improve the general perception of researchers and to motivate young people to conduct research and acquire new knowledge.

Since 2005, the Josip Juraj Strossmayer University of Osijek has been offering the Postgraduate university interdisciplinary doctoral study programme in Nature and Environmental Protection, in cooperation with the Ruđer Bošković Institute in Zagreb.

The Postgraduate university interdisciplinary doctoral study programme in Molecular Biosciences was established in the academic year 2005/2006. The doctoral study programme was jointly developed by the University of Dubrovnik, the Ruđer Bošković Institute in Zagreb and the University of Osijek. Part of the lectures and experimental work in the mentioned postgraduate studies is carried out in the classrooms, specialized teaching laboratories and the research laboratories of the Department.

As part of the global Brain Awareness Week campaign, coordinated by the Dana Alliance for Brain Initiatives, the Brain Awareness Week event is organised in Croatia every year in March. The students of the Department of Biology have been participating in the event since 2007, with the help of the teaching/research assistants.

In the academic year 2009/2010, the students of the Department went to foreign universities within the framework of the Erasmus programme for the first time (<http://biologija.unios.hr/webbio/studenti/erasmus>).

The organizational units of the Department are the following Sub-departments: the Sub-department of Zoology and the Sub-department of Water Ecology, since establishment, and the Chair of Biochemistry and Ecophysiology of Plants, which grew into a Sub-department in 2010.

The Quality Assurance Committee was appointed in 2011, with the aim of improving the quality of higher education at the Department.

In February 2012, the Department was relocated to the University Campus, located in 8/A Cara Hadrijana Street, Building No. 3. The Department of Biology is located on the second and third floor and in the attic, while the Department of Chemistry and the Faculty of Law occupy the rest of the building. Overall, the Department has an area of 2,003 m<sup>2</sup> space at disposal: 4 lecture halls, 4 teaching laboratories and 9 laboratories (for ecophysiology of plants, biochemistry, ecology of plants, cellular and molecular biology, aquatic invertebrates, algal ecology, entomology, ecology of animals and for the analysis of biological systems), 29 offices, 8 toilet facilities, two changing rooms, a kitchenette, a student room, the archives, a workshop for the custodians, a storage and three suites. In the same year, the 2012-2017 Strategic Plan of the Department was adopted with a defined mission, vision, organizational structure and the development plan of teaching and research activities. In terms of organizational structure, as of end 2012, the Department has been operating within 4 Sub-departments (the Sub-department of Quantitative Ecology was founded in 2012) and 11 laboratories (Figure 1).

Since February 2013, the Department has been organizing scientific colloquia (<http://biologija.unios.hr/webbio/nastava/znanstveni-kolokvij>) with the aim of presenting staff activities and strengthening cooperation among the staff members. In April 2013, the Alumni Club was established, a voluntary association of former students who have completed undergraduate or graduate studies at the Department of Biology of the University of Osijek (<http://biologija.unios.hr/webbio/alumni-klub>).

In May 2014, the Department launched a project titled 'Biologist-and-Me' ('*Biolog-i-ja*') with the objective to emphasize the importance of preserving the valuable natural resources in the city of Osijek and its surroundings through an interdisciplinary approach, and to establish cooperation with the broader local community (<http://biologija.unios.hr/webbio/biolog-i-ja>). In the same year, the Association of Biology Students - ZOA (<http://www.zoa.hr/>) was founded, and the delivery of the new Graduate university study programme in Nature and Environmental Protection (DSZPO) began. At the end of the year, the 2014-2019 Strategic Research Programme was adopted (<http://biologija.unios.hr/webbio/wp-content/uploads/2014/kvaliteta/strategija-znanstveno-istrzivackog-rada-ozb.pdf>). The Laboratory of Entomology was declared the official laboratory of the Postgraduate university interdisciplinary doctoral study programme in Nature and Environmental Protection, and the Cellular and Molecular Biology Laboratory was declared the official laboratory of the Postgraduate university interdisciplinary doctoral study programme in Molecular Biosciences.

Based on the SWOT analysis conducted for the purpose of developing the 2012 - 2017 Strategic Plan of the Department of Biology, the following issues have been highlighted by Department staff:

- Lack of funding from the State Budget for the Department development programmes;
- Insufficient supply of laboratory equipment and lack of space for research and for teachers' offices;
- Lack of employment of young research personnel by the parent Ministry of Science, Education and Sports;
- Insufficient mobility of academic staff;
- Insufficient promotion and recognition on the international scientific level;
- Insufficient involvement in international projects.

## 1.B. INTERNAL ORGANISATIONAL STRUCTURE

### 1.B.1. DIAGRAM OF INTERNAL ORGANISATIONAL STRUCTURE

Make a diagram of the internal organisational structure of your *HE* institution (council, Sub-departments, chairs and other). State the number of full-time employees per each organisational unit. Describe as an addendum the composition and function of individual elements of the structure. Specify which elements of the management structure involve other stakeholders (students, employers and other) and comment on their role and contribution

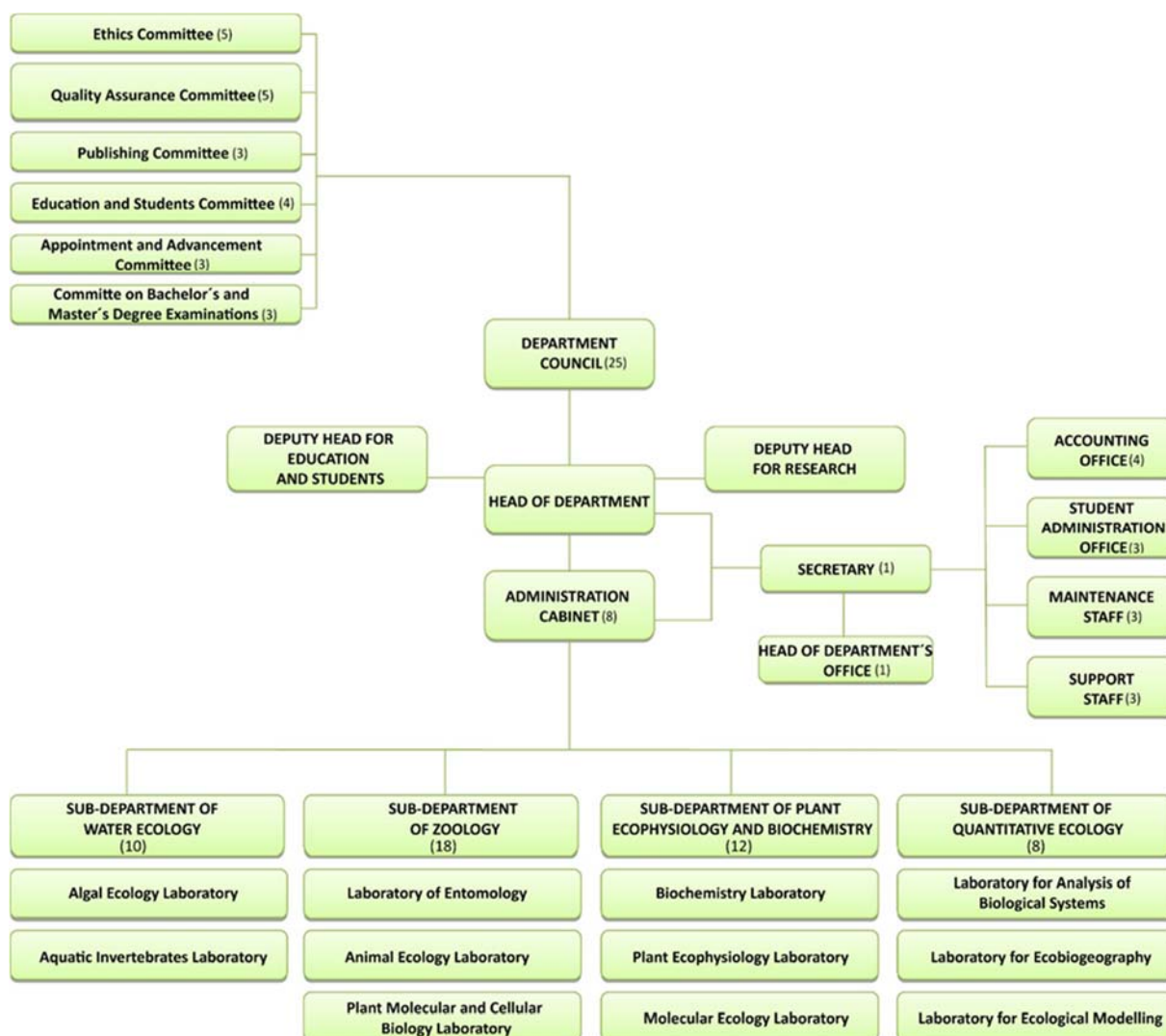


Figure 1.1 Diagram of the internal organizational structure of the Department of Biology, with the number of full-time employees per each organizational unit

The organizational structure of the Department of Biology is in compliance with the Ordinance of the Department of Biology (<http://biologija.unios.hr/webbio/opci-podaci-2>) which is in accordance with the Act on Scientific Activity and Higher Education, and the Statute of Josip

Juraj Strossmayer University of Osijek. The Department is represented by the **Head of Department** who manages its activities in accordance with the University Statute and the Ordinance of the Department of Biology.

According to the Ordinance, the duties of the Head of Department are to:

- organize the work and operation of the Department in accordance with the University Statute and the Ordinance of the Department;
- propose to the Department Council the classification of employment positions at the Department;
- organize and manage the research, educational and professional work of the Department;
- make operating decisions in accordance with the regulations and within the framework of his/her powers in accordance with the University Statute;
- prepare, convene, propose the agenda and preside over the meetings of the Department Council;
- propose to the Department Council the appointment of Deputy Heads of Department;
- propose to the Department Council the appointment of Heads of Sub-departments;
- appoint the Acting Head of Sub-department;
- propose to the Rector the appointment of the selected Secretary of the Department;
- propose to the Rector the selected employees and the conclusion of employment contracts in the Secretariat of the Department;
- take care of the research and professional training of Department staff;
- propose to the Department Council measures to improve the work of the Department;
- propose the budget of the Department to the University;
- implement the decisions of the Department Council, the Senate and other University bodies relating to the Department;
- appoint standing and ad hoc committees to conduct activities within his/her scope of work;
- appoint examination committees and determine the date of examination upon students' appeal;
- co-signs diplomas and other public documents issued by the Department;
- decide on investments and supply of valuable equipment for the Department in accordance with the University Statute and the Ordinance of the Department;
- sign contracts concluded by the Department within his/her powers in accordance with the University Statute and Ordinance of the Department;
- submit an annual report on the activities and operations of the Department;
- make decisions about working hours and redistribution of working hours;
- make decision on overtime work;
- make decisions about rewards and recognition of Department staff;
- determine the annual leave schedule of staff;

- make decisions on compensation for damages;
- decide on the cooperation of the Department at home and abroad;
- issue Head of Department awards to students;
- approve paid and unpaid leave in accordance with the University Statute, the Ordinance of the Department, the Labour Act and other regulations;
- Perform other tasks as stipulated by the Act, the University Statute and the Ordinance of the Department.

In his/her work, the Head of Department is assisted by the Deputy Head of Department for Education and Students, the Deputy Head of Department for Research and the Secretary of the Department.

#### **Deputy Head of Department for Education and Students:**

- coordinates the teaching at the Department in collaboration with the heads of organizational units of the Department;
- in cooperation with the heads of organizational units, drafts the Study Programme Implementation Plan and the examination schedule and monitors their implementation in the university study programmes;
- proposes to the Head, in cooperation with the heads of organizational units, the annual teaching assignments (workload) for teachers and associates and external associates (part-time teachers);
- proposes measures to improve the quality of teaching in university study programmes;
- coordinates and establishes cooperation with other comparable departments at home and abroad, as part of the teaching activities of the Department;
- participates in the work of the Vice-Deans' Cabinet for Education of the University of Osijek.

#### **Deputy Head of Department for Research:**

- coordinates the development of the research activity plan of the Department in cooperation with the heads of organizational units;
- coordinates the international cooperation of the Department;
- proposes to the Head of Department the participation of Department scientists and researchers at national and international conferences;
- supervises the research work of junior researchers and research associates, as well as their advancement;
- suggests to the Head of Department the procurement of research and computer equipment;
- participates in the work of the Vice-Deans' Cabinet for Research of the University of Osijek;
- supervises the drafting of funded research projects of the Department.

The **Department Council** is a professional body of the Department. The Department Council consists of all the full professors, associate professors and assistant professors, one representative of associates appointed to associate titles, one representative of other employees who have an employment contract with the Department, and two student representatives.

Pursuant to the Act, the University Statute and the Ordinance of the Department, the Department Council:

- adopts decisions on academic, research and professional issues;
- elects and dismisses the Head of Department and Deputy Heads of Department;
- proposes to the Senate the Ordinance of the Department;
- adopts the Statute of the Students' Union Subsidiary at the proposal of the Students' Union Subsidiary of the Department;
- upon proposal by the Head of Department, determines the organisational structure of the Department;
- establishes new organizational units of the Department in accordance with the Decision on the organizational structure of the Department;
- appoints and dismisses heads of organizational units;
- elects the representative of teachers appointed to academic rank as member of the University Council for Natural Sciences;
- initiates and conducts part of the procedure of appointment to research ranks;
- initiates and conducts the procedure of appointment to academic ranks, associate and professional titles and corresponding employment positions;
- proposes study programmes in the research field of Biology or amendments to study programmes in the research field of Biology to the University Senate and professional councils of academic University units;
- proposes the Study Programme Implementation Plan to the University Council for Natural Sciences;
- cares for and proposes measures for the quality assurance of studies and academic work;
- adopts the plan of funding student activities at the proposal of the Department Students' Union Subsidiary;
- appoints the heads of undergraduate and graduate university study programmes at the proposal of heads of organizational units;
- reviews the annual report of the Head of Department;
- adopts the reports on the reappointment of teachers appointed to academic and teaching positions;
- adopts the annual assessment of teaching/research assistants at the mentor's proposal;

- at least once every two years the postdoctoral researchers submit to the Council their work reports which form the basis for the assessment of their academic performance;
- at least once every two years, the Council assesses the work of mentors on the basis of work reports, and the reports and performance evaluations submitted by the teaching/research assistants on the mentor's performance;
- a mentor who has been assessed negatively twice, can no longer be appointed as a mentor;
- adopts the Rules of Procedure of the Department;
- performs other duties as determined by the University Statute and the Ordinance of the Department.

The Council may appoint standing and ad hoc committees to address certain issues within its competence, as determined in the Ordinance of the Department of Biology. The Department Council has appointed the following standing bodies: the Ethics Committee, the Quality Assurance Committee, the Publishing Committee, the Education and Students Committee, the Committee on Bachelor's and Master's Degree Examinations, and the Appointment and Advancement Committee. The students are involved in the work of the Ethics Committee and the Quality Assurance Committee.

The **Secretariat** is the organizational unit for legal, professional and administrative, financial and accounting affairs, quality assurance affairs, student-related affairs, technical and support services at the Department and other tasks related to the successful operation of the Department. The work of the Secretariat is managed by the Secretary of the Department.

The **Administration Cabinet** is an advisory and professional body consisting of: the Head of Department, the Secretary, the Deputy Head of Department for Education and Students, and the Deputy Head of Department for Research. The Head of Department convenes the meetings of the Administration Cabinet, as required, for the purpose of:

- coordinating and monitoring the overall activities of the Department,
- improving the work of professional services of the Department,
- coordination of all business activities of the Department.

The Administration Cabinet performs other duties as stipulated by the Ordinance, the regulations and the decisions of the Head of Department. The Head of Department may extend the composition of the Administration Cabinet by including heads of particular organizational units of the Department, external experts or experts on specific issues.

A **Sub-department** is the basic organizational unit of the Department for the delivery of teaching, research and professional work, and is managed by the Head of Sub-department.



The scope of work of the Sub-department is as follows:

- organizes and delivers teaching, conducts research and professional activities;
- proposes to the Department Council new study programmes in the research field of Biology the Department delivers teaching in;
- proposes amendments to the study programmes in the content of the courses (obligatory and elective) fully or partly delivered by Sub-department members - teachers and associates;
- proposes the Study Programme Implementation Plan for the courses in undergraduate and graduate study programmes fully or partly delivered by Sub-department members;
- manages, monitors and analyses the implementation of the work plan;
- analyses the work results and takes measures to improve the quality of work within the Sub-department;
- proposes the plan of new employment positions within the Sub-department;
- proposes the plan of advancement of Sub-department teachers and associates;
- is responsible for the professional training of Sub-department staff members, particularly the teaching/research assistants and junior researchers;
- proposes the professional development of its members in country and abroad;
- drafts the proposal for the procurement of research and teaching equipment;
- proposes to the Department Council the appointment of mentors for undergraduate and graduate students;
- proposes research programmes and projects, and developmental and professional projects;
- ensures the coverage of teaching with textbooks and manuals;
- performs other duties within the scope of its work.

The members of a Sub-department are the teachers, associates and junior researchers who deliver or participate in the delivery of part of teaching in accordance with the study programme and the Study Programme Implementation Plan of the Department. The teachers, associates and other professionals who have an employment contract outside of the Department, and who participate in the delivery of teaching in accordance with the study programme and the Study Programme Implementation Plan of the Faculty, may participate in the work of the Sub-department, without the voting right.

The involvement of external stakeholders in the work of the Department is reflected through the Alumni Club, which brings together former students of the Department who, by their engagement in the Alumni Club, contribute to greater cohesion between the Department and the industry and the local community.

## 1.B.2. STRUCTURE OF INSTITUTION'S MANAGEMENT

Specify the structure of your institution's management (heads of department and other) and briefly describe their roles and the election procedure.

The Department Management comprises the Head of Department, the Deputy Head for Education and Students, the Deputy Head for Research and the Secretary. From time to time, and at the invitation of the Head of Department, the Heads of Sub-departments participate in the work of the Administration Cabinet for the purpose of coordinating, monitoring and improving the overall activities of the Department.

The Head of Department of Biology represents the Department and has all the rights and obligations under the University Statute and the Ordinance of the Department. The Head of Department is responsible for the legality of operations, the implementation of the Statute of the University, the Department Ordinance and the decisions of University authorities at the Department, and is accountable to the Rector, the Senate and the Department Council. The Head of Department is an *ex-officio* member of the Senate, the University Council for Natural Sciences and presides over the meetings of the Department Council.

The Head of Department is elected for a term of four years, and the Head of Department may be elected from among the Department teaching staff appointed to the academic rank of assistant, associate or full professor provided they have an employment contract with the University or the Department. The same person may be elected Head of Department for a maximum of two consecutive terms. The decision to initiate the Head of Department election procedure is adopted by the Department Council, and the Head of Department election procedure must begin no later than six months before the expiry of the mandate of the incumbent Head of Department, i.e. 1 April, and end no later than 1 June. The members of the Department Council elect the Head of Department by secret ballot at the Election Session. The election of the Head of Department is confirmed by the Senate of Josip Juraj Strossmayer University of Osijek, and the Head of Department takes office on the first day of the next academic year.

The Department has two Deputy Heads of Department: the Deputy Head of Department for Education and Students, and the Deputy Head of Department for Research. The Deputy Heads of Department are accountable to the Head of Department, who proposes them, and the Department Council which elects them. The Deputy Heads of Department may be elected from among the Department teaching staff appointed to the academic rank of assistant, associate or full professor, provided they have an employment contract with the Department. The term of office of the Deputy Heads of Department is equal to the term of office of the Head of Department. In addition to these functions, the Deputy Heads of Department perform other tasks as requested by the Head of Department.

The Secretary is the head of the Secretariat of the Department, and is responsible for organizational, professional and administrative, legal, technical and other affairs at the Department. Furthermore, the Secretary of the Department is responsible for legal and administrative affairs, interprets the law and other regulations, and performs other tasks as stipulated by the Act, the University Statute and the Ordinance of the Department. The Secretary is selected by the Head of Department on the basis of a public vacancy announcement with the consent of the Rector. The Secretary must be a person holding a law degree (LLM) and having five years of professional experience. The Secretary of the Department is accountable to the Head of Department.

The Head of Sub-department represents the Sub-department and manages its operation. The Head of Sub-department is appointed by the Department Council, upon proposal by the Head of Department, by a majority vote of all members of the Council by show of hands, to a two-year term. The Head of Sub-department may be elected from among the Department teaching staff appointed to the academic rank of assistant, associate or full professor, and provided they have an employment contract with the Department.

### 1.C. ELEMENTS OF INTEGRATION OF THE DEPARTMENT OF BIOLOGY AT THE UNIVERSITY OF JOSIP JURAJ STROSSMAYER

If your institution is a constituent of a university, list the integrated elements.

The Department of Biology has been an academic component of the Josip Juraj Strossmayer University of Osijek since 2005. The elements of integration of the Department within the University of Osijek are reflected in the structural organisation and the activities of the Department. The Department, as a University unit, has neither legal personality nor financial autonomy. The Head of Department may use the funds up to the amount of 300,000.00 HRK with the consent of the Rector, and any legal actions above the mentioned amount require the approval of the Senate. The Department has a sub-account of the University giro bank account.

The Department may independently plan and deliver study programmes and develop research and professional work, nevertheless, all the activities are conducted in accordance with the acts and regulations adopted at the University level.

The most important acts of the University of Osijek are the following:

- a) Statute of the Josip Juraj Strossmayer University of Osijek (<http://www.unios.hr/uploads/50Statut%20ENG.pdf>);
- b) Strategic Plan of the Josip Juraj Strossmayer University of Osijek (<http://www.unios.hr/uploads/50STRATEGIJA%20SVEU%20C4%8CILIC5%A0TA%20ENG.pdf>);

- c) Code of Ethics of the Josip Juraj Strossmayer University of Osijek (<http://www.unios.hr/uploads/50EtickiKodeks.pdf>);
- d) Ordinance on study programmes and studying at the Josip Juraj Strossmayer University of Osijek (<http://www.unios.hr/uploads/50Pravilnik%20o%20studiranju%20ENG.pdf>);
- e) Ordinance on advancement into academic rank, artistic-teaching rank, teaching, assistant and professional titles, and corresponding employment positions (<http://www.unios.hr/uploads/50PRAVILNIK%20o%20izboru%20u%20zvanja%20ENG.pdf>);
- f) Ordinance on the organisation and operation of the Quality Assurance System at the Josip Juraj Strossmayer University of Osijek (<http://www.unios.hr/uploads/50Pravilnik%20o%20kvaliteti%20ENG.pdf>);
- g) Ordinance on student conduct and disciplinary responsibility of the Josip Juraj Strossmayer University of Osijek ([http://www.unios.hr/uploads/50pravilnik\\_2013-03-29.pdf](http://www.unios.hr/uploads/50pravilnik_2013-03-29.pdf));
- h) Ordinance on the financial operation ([http://www.unios.hr/uploads/50pravilnik\\_2013-03-29.pdf](http://www.unios.hr/uploads/50pravilnik_2013-03-29.pdf));
- i) Ordinance on junior researcher performance evaluation (<http://www.unios.hr/uploads/50prozn.pdf>).

The Senate confirms the election of the Head of Department, and takes the decision on the classification of employment positions at the Department. The integration is reflected in the direct participation of representatives of the Department in decision-making at the University level. The Head of Department participates in the work of the Senate when deciding on the organization of research, professional and educational activities, on the appointment of teachers, on development and business matters, and other issues stipulated by the Act on Scientific Activity and Higher Education and the University Statute. The Head of Department and the Deputy Head for Education and Students are members of the University Council for Natural Sciences. The Deputy Head for Education and Students is a member of the University Committee for Education and Human Resources, and, together with the Deputy Head for Research, participates in the work of the University Vice Dean's Cabinet for Education. The Deputy Head for Research is also working in cooperation with the University Service for International and University Cooperation, and coordinates the international cooperation of the Department. On the basis of the Erasmus Mobility Charter, the Department exchanges students with foreign universities. In addition to the Deputy Head for Research, a staff member has been appointed to coordinate the international mobility of students within the framework of the Erasmus, i.e. Erasmus+ Programme.

The Department has representatives in the postgraduate University Councils: three members in the University Council for Postgraduate Interdisciplinary University (Doctoral) Studies, and two members in the University Council for Postgraduate Interdisciplinary Specialist Studies, two members in the Council of the Postgraduate university interdisciplinary studies Nature and Environmental Protection, one member in the Council of the Postgraduate interdisciplinary university doctoral studies in *Molecular Biosciences*. The staff members of the

Department of Biology are lecturers and mentors at the two postgraduate interdisciplinary university doctoral studies in Molecular Biosciences and Nature and Environmental Protection.

The Publishing Committee of the Department collaborates with the University Publishing Committee which proposes all the approvals required for the publishing of university textbooks. The Head of Department is a member of the University Publishing Committee.

The Department of Biology has a Quality Assurance Committee that cooperates with the University Centre for Quality Assurance in Higher Education (hereinafter referred to as the Quality Assurance Centre).

The Secretary of the Department participates in the work of the Secretaries' Cabinet of the University of Osijek.

The Biology Students' Association – ZOA is active within the Department. The Association has been established in accordance with the relevant regulations of the University, has legal personality and takes part in legal affairs under the University name and its own name. The University keeps a register of student associations.

#### **1.D. INSURANCE OF ETHICS CONDUCT IN ACTIVITES RELATED TO RESEARCH, TEACHING AND STUDENT RELATIONS**

Specify the core values and methods of monitoring ethical behaviour in your activities related to research, teaching and student relations.

The core values and the methods of monitoring ethical behaviour have been laid down in the Code of Ethics of the University of Osijek. The Ethics Committee of the Department, established in accordance with the University Statute and the Code of Ethics, monitors the implementation of provisions of the Code of Ethics and the upholding of a high level of ethical principles and values in research, teaching and student relations.

In the professional evaluation, any discrimination based on race, colour, gender, sexual orientation, marital status, religion, age differences, political affiliation, national, social or regional origin, property, birth, social status, and physical or social difficulties is forbidden. The only criteria for evaluation and assessment are professional expertise, competencies, knowledge, professional merit, skills and the results achieved in the performance of certain tasks. The principles of scientific integrity are particularly promoted. Research has been regulated in accordance with ethical standards. It is unacceptable to fabricate data or results, same as plagiarism, forgery and the violation of intellectual property rights. The researchers are required to plan and carry out their research by taking into account its ethical acceptability. If the research involves working with animals, the researchers are obliged to comply with the Animal Protection Act (Official Gazette 135/06, 37/13, 125/13) and the Act

on the implementation of European Union regulations on animal protection which lay down all the rules, responsibilities, obligations and duties of natural and legal entities for the protection of animals. Persons performing work with animals, be it in research or teaching and working with students, are professionally trained in such a way as to have educational background in the field of natural sciences. In addition, people who work with animals should have passed a basic course in laboratory animal science (C category in accordance with FELASA - Federation for European Laboratory Animal Science Associations) which at the same time means compliance with European standards laid down by the Federation for European Laboratory Animal Science Associations. So far, only one employee of the Department has passed the basic course, and two are currently undergoing training. Nevertheless, it has been envisaged to provide all Department staff working with animals with the possibility of taking the course.

The relationship between teachers and students must be based on fairness, respect, impartiality, openness, trust and respect for privacy and dignity. The teachers must assess students only on the basis of the demonstrated knowledge. The mentoring relationship is based on mutual respect without exploitation of superiority.

The University Quality Assurance Centre, in cooperation with the Department Quality Assurance Committee, conducts the common University Student Survey in which the students evaluate the courses and the performance of teachers. The anonymous Survey is conducted once a year, at the end of the summer semester, as a rule. The Survey results are available on the website of the Department; however, the assessment of each teacher is not communicated publicly, but personally to each individual teacher. Past performance assessments of teachers have been generally quite high. On completion of classes in individual courses, the teachers conduct their own surveys in order to analyze the success of the teaching process. The Department Quality Assurance Committee started conducting additional student surveys for the purpose of internal audit.

### 1.E. MISSION AND VISION IN LINE WITH THE STRATEGY OF *HE* INSTITUTION

Briefly describe the mission and vision in line with the strategy of your *HE* institution and evaluate its implementation in activities carried out by your institution (study programmes, employment policy, international dimension, research activity, students, quality assurance, business activities, etc).

The Strategic Plan of the Department of Biology defines the mission and vision, and lists the strategic objectives for the five-year period 2012-2017 (<http://biologija.unios.hr/webbio/kvaliteta>).

The mission of the Department of Biology is to provide university education at the undergraduate, graduate and postgraduate level in different fields of Biology, to continuously

conduct and develop research and professional work in biology and to apply the acquired knowledge.

The vision of the Department is to strengthen the position of the Department as a university and research stakeholder in the country and the broader region by the continuous improvement of quality in higher education and research. To strengthen the cooperation with industry by introducing new educational programmes and research projects in the field of Biology, biotechnical sciences and nature and environmental protection, as recognized priorities in the coming period, both at national and European level.

The mission and the vision of the Department have been realized gradually. The Department has been systematically developing and modernizing the study programmes, defining and adapting the learning outcomes with respect to the requirements of science and profession, and thus fulfilling its mission of education of students in the undergraduate and graduate studies. In the academic year 2014/2015, the first generation of students enrolled in the Graduate study programme in Nature and Environmental Protection (DSZPO) which marked the achievement of one of the specific objectives related to the educational activities of the Department. The Department also regularly monitors and analyzes the performance of students and encourages students to join mobility programmes. So far, international exchange has been mostly organised at the level of IAESTE internships; therefore, it is certainly necessary to increase the number of incoming students through the Erasmus+ or similar programmes. For this purpose, information sessions have been organised with students and the current competitions are regularly published on the website of the Department.

The Department publishes university textbooks and manuals, and the library holdings have been growing gradually. However, in the future, the Library, which is currently located off-site at the Department of Mathematics, should be established at the Department location, and the Department should get engaged in the creation of a unified software infrastructure of the University Library system.

Research activity is being successfully implemented as reflected primarily in a number of published articles cited in the reference databases, with a high impact factor. Systematic efforts have been invested in the promotion of research and increased visibility of the Department through participation in various events such as the Brain Awareness Week, the University Fair, as well as through the organization of the 'Biologist-and-Me' project. However, the Department should increase cooperation with the industry and broader community, increase the number of research projects at home and abroad, increase the mobility of staff members and continue to work systematically on the promotion of the Department.

### 1.E. IMPORTANCE AND UNIQUENESS OF THE DEPARTMENT IN RELATION TO RELATED INSTITUTIONS IN CROATIA IN OUR RESEARCH FIELD

Explain why your institution is important and unique when compared to other institutions in Croatia working in your research field.

The Department of Biology is best comparable to the Department of Biology of the Faculty of Science in Zagreb, and the Faculty of Science in Split (undergraduate and graduate studies in Biology and Chemistry). Compared to the Department, which is a relatively new University unit, the Department of Biology of the Faculty of Science in Zagreb has a long tradition of education of engineers and teachers in a number of studies and specializations. The Department of Biology of the Faculty of Science in Split offers only a double major study programme in Biology and Chemistry, whereas the Department of Biology in Osijek offers one undergraduate and three graduate study programmes. The Department is located in the eastern part of Croatia, and the studies are mostly enrolled by students from the five counties of Eastern Croatia (Osijek-Baranja, Vukovar-Srijem, Virovitica-Podravina, Slavonski Brod-Posavina and Požega-Slavonia counties).

The teachers of the Department participate in the teaching in two doctoral studies at the University of Osijek (Postgraduate university interdisciplinary doctoral study programme in Molecular Biosciences, and the Postgraduate university interdisciplinary doctoral study programme in Nature and Environmental Protection), which contributes to an interdisciplinary approach to teaching and research as well as to better integration with other University constituents.

The Department is located near the Kopački Rit Nature Park, which allows the students to understand the importance of protected areas through field courses in the undergraduate and graduate programmes, as well as within the study of different types of habitats and biodiversity.

### 1.G. POTENTIAL OVERLAPS OF DEPARTMENTS WORK WITH THE WORK OF SIMILAR INSTITUTIONS WITHIN THE SAME UNIVERSITY

Comment on potential overlaps of your work with the work of similar institutions within the same university.

The Department of Biology participates in the delivery of study programmes in the research field of Biology and develops research and professional work in the field of Biology and the interdisciplinary area of sciences. The curricula that are implemented in the undergraduate and graduate study programmes of the Department do not overlap with the curricula of the study programmes of other constituents of the University of Osijek. The research activities of



the Department, based on the study of fundamental biological processes, provides a solid basis for further research conducted at other University constituents such as the Faculty of Agriculture, the Faculty of Food Technology and the Faculty of Medicine, which is primarily evident in joint research projects and the scientific publications.

At the time of the establishment of the Department, the initial idea was for the Department to continue with the delivery of the existing studies, and to deliver teaching at other constituents of the University of Osijek, which has been incorporated in the Strategic Plan of the Department. Although this idea has not been implemented yet, the Management of the Department seeks to encourage the planning and implementation of teaching Biology at other constituents of the University of Osijek, delivered by Department staff.

## 1.H. STRATEGY AND PROCEDURES FOR QUALITY ASSURANCE OF RESEARCH AND TEACHING ACTIVITIES AT *HE* INSTITUTION

Attach the document on strategy and procedures for quality assurance of research and teaching activities at your *HE* institution, assess the level of its implementation and comment on the annual reporting procedures

The quality assurance of teaching and research at the Department of Biology (<http://biologija.unios.hr/webbio/kvaliteta>) is based on the Strategic Plan of the University of Osijek

(<http://www.unios.hr/uploads/50STRATEGIJA%20SVEU%C4%8CIL%20A0TA%20HR.pdf>), the 2012 - 2017 Strategic Plan of the Department of Biology and the 2014-2019 Strategic Research Programme of the Department of Biology. The Quality Assurance policy of the Department has defined the continuous improvement of the quality of teaching and research. The objectives, purpose, evaluation areas, and the structure and functioning of the Quality Assurance System at the Department are governed by the Ordinance on the organization and operation of the Quality Assurance System at the Department of Biology which was adopted in October 2014.

The activities and the quality assurance procedures have been gradually introduced and implemented. The Department of Biology staff members have been continuously discussing the effectiveness of the existing Quality Assurance System, and any ambiguities are resolved in cooperation with the University Quality Assurance Centre. In cooperation with the University Quality Assurance Centre, the Department has organised a workshop on learning outcomes. Student Surveys in which students evaluate the teaching process and teacher performance are conducted on a regular basis.

### 1.I. BODIES WHICH CONTINUOUSLY WORK IN THE FIELD OF QUALITY ASSURANCE ASSESS THEIR WORK IN THE PAST 5 YEARS

List the bodies which continuously work in the field of quality assurance. Assess their work in the past 5 years.

The Quality Assurance Committee was established at the Department of Biology in 2011. The Quality Assurance Committee comprises five (5) members: two representatives of the employees appointed to academic rank, one representative of the employees appointed to associate titles, one representative from among other employees, and one student representative. The Quality Assurance Committee monitors the quality of undergraduate and graduate study programmes of the Department, and continuously consults and submits activity reports to the University Quality Assurance Centre.

The Committee meets as required. The focus of the Committee has been to define learning outcomes. The main activity of the Committee so far has been the education of teachers to properly define the learning outcomes to ensure quality monitoring of student performance and student assessment in individual courses. For the purpose of educating teachers on the defining of learning outcomes, a workshop was organized and templates were designed with clearly defined objectives and outcomes. The Committee thereby provided the teachers with quality planning and implementation of the entire cycle of the teaching process.

The implemented activities and the activity plan for the academic year 2014/2015 can be found on the website of the Department (<http://biologija.unios.hr/webbio/kvaliteta>).

We assess the work of the Quality Assurance Committee as positive with the emphasis on the importance of further implementation of activities to ensure continuous improvement and quality assurance of teaching and the quality of the teaching staff. In the future, we should coordinate and conduct the internal evaluation procedure, develop institutional mechanisms to ensure, improve and promote quality assurance at the Department as laid down in the Ordinance on the Quality Assurance System at the Department of Biology.

### 1.J. SPECIFY AND BRIEFLY EXPLAIN THE MAIN STRATEGIC OBJECTIVES WHICH THE MANAGEMENT PLANS TO ACHIEVE IN ITS CURRENT MANDATE

Specify and briefly explain the main strategic objectives which the management plans to achieve in its current mandate and any difficulties it has encountered in their realisation (in relation to study programmes, employment policy, international dimension, research activity, students, quality assurance, business activities, etc).

In its current mandate, the Management of the Department has tried to achieve several strategic objectives in different areas of Department activities. For this purpose, the 2012 –

2017 Strategic Plan of the Department of Biology was adopted, based on a conducted SWOT analysis, which clearly defined the main strategic objectives of the Department.

The overall objective related to educational activities is continuous improvement of the existing study programmes based on modern knowledge and achievements of European and world science and profession, the alignment of learning outcomes with the requirements of the profession and the market, the alignment of course contents, forms of teaching and student workload with the intended learning outcomes, and continuous modernization of the teaching process by developing all procedures and forms of transferring the existing knowledge to ensure and improve the quality of teaching.

The specific objectives of the Department of Biology related to educational activities are the following:

- Elaboration of the learning outcomes of study programmes and individual courses in cooperation with employers and graduate students taking into account the development of the profession;
- Amendments to the existing study programmes based on the learning outcomes that reflect the development of science and profession;
- Monitoring and analysis of student success;
- Fostering the publication of university textbooks and manuals;
- Establishment of a Department Library and the increase of library holdings, and participation in the development of a unique software infrastructure of the university library system;
- Increase in the number of students who will participate in various programmes of international mobility for the purpose of studies and traineeships;
- Increase in the participation of academic staff in mobility programmes for the purpose of teaching and professional development;
- Increase in international incoming student mobility at the Department of Biology (by increasing the number of courses delivered in English, increasing information about study opportunities at the Department of Biology and intensifying the promotion of the Department).

The overall objective related to research activities is to maintain the position of a research-oriented constituent of the University of Osijek, and to increase the quality of research work through the establishment of cooperation with other home and foreign universities and research institutions, in particular. The specific objectives and tasks related to research activities are the following:

- Participation in joint research projects with partners from Croatia, the region and EU member states;
- Networking with the industry and the development of cooperation through research, professional and applied projects;

- Networking with the broader community and the industry for the purpose of application of research results;
- Promotion of research activities and raising the visibility and recognition of the Department of Biology.

The Management of the Department has been working systematically to achieve the set objectives. In terms of teaching activities, the study programmes have been developed and modernized; the learning outcomes have been defined and adapted with respect to the requirements of science and the profession, and, in order to meet the needs of the industry and the local community, the Department introduced the new DSZPO study programme in October 2014. In order to increase the employment of students after graduation, the Management plans to organise discussions with potential employers on the existing study programmes offered at the Department of Biology. The number of employees appointed to academic rank is satisfactory, and provides for high-quality teaching. The Department employs five full professors, four associate professors, 11 assistant professors, and 14 senior teaching/research assistants. The Management seeks to provide suitable conditions for the professional development and advancement of its academic staff.

One of the objectives of the Management is to raise the level of international cooperation and to achieve the visibility and recognition of the Department at the international level. The Management coordinates the international cooperation of the Department and encourages student mobility by means of informative meetings with students, and timely provision of information on current competitions on the website of the Department. In addition, the Department seeks to encourage the mobility of teaching and administrative staff by timely notification.

Research activities are successfully implemented as reflected primarily in a number of published articles cited in the reference databases, with a high impact factor. Systematic effort has been invested in the promotion of research and raising the visibility of the Department of Biology through participation at various events.

By relocation to the new facilities, the Department received more space for teaching and research. The Management strives to provide additional facilities to increase the quality of studying and conducting research at the Department. In addition, the Management strives to provide the necessary own funds because the funds that the Department receives from the Ministry of Science, Education and Sports are not sufficient for all the required purposes (e.g. scholarships for low-income students).

The Quality Assurance System has been partly implemented through student surveys, the processing and analysis of the results of the surveys and the recommendation of actions to improve the teaching process. Furthermore, the Quality Assurance System has been implemented through a systematic analysis of student success, the cumulative GPA and the pass rate at examinations. However, there has been an open request sent to the University of

Osijek and the Ministry of Science, Education and Sports to endorse the employment position of the Head of the Quality Assurance Office. The main tasks of the Office would be the adoption of basic regulations on quality assurance, systematic monitoring, analysis and proposal of measures to improve the quality in every area of Department activities. To provide a better quality of scientific research, the Management has initiated the adoption of the 2014-2019 Strategic Research Programme with the aim of developing research excellence, increasing productivity and scientific recognition of the Department.

The Management of the Department seeks to ensure maximum transparency of operation and information sharing regarding individual decisions and the management policy of the institution.

### 1.K. MAIN ADVANTAGES AND DISADVANTAGES OF THE PROGRAMME, STAFF AND MATERIAL RESOURCES

State your opinion on the main advantages and disadvantages of the programme, staff and material resources of your *HE* institution.

#### Programme Resources

The Department of Biology delivers undergraduate (PSB) and graduate studies (DZSB, DNSBK and DSZPO). The Department staff members participate in the delivery of university doctoral studies as well. The study programmes provide students with the opportunity to acquire the latest knowledge in various fields of biology. The student/teacher ratio is satisfactory and allows for high quality teaching and working with students. The enrolment quota for full-time students is generally filled in the first enrolment period. However, some students are not sufficiently motivated to learn and actively participate in class. Increased student motivation could be achieved through the active involvement of students in teaching (e.g. teacher's aides in exercises), more active participation in research activities, participation in various projects, and networking with the business sector and the broader community.

The programme potential of scientific research has been realized through the participation of Department staff members in a variety of research projects, in the publication of research results, their participation in numerous national and international scientific and professional conferences, and the launching of a project aimed at the popularization of sciences titled 'Biologist-and-Me'.

The Department has established cooperation with different universities and experts at home and abroad. The cooperation is especially manifested through student mobility within the Erasmus programme, and teacher mobility for the purpose of scientific training or research in various projects. The inclusion of a larger number of staff members in research projects would

improve the research potential which would result in the publication of a number of scientific papers in journals with a high impact factor.

Some of the Sub-departments have established cooperation with the local authorities with a view to making decisions of public interest such as the mosquito control in the city of Osijek, within the Monitoring and Research of Mosquitoes project. Nevertheless, there is still need for further networking with the industry and the broader local community.

#### Human resources

Human resources of the Department are in accordance with the employment policy of the University of Osijek. The Department has 20 employees appointed to academic rank, and a total of 21 employees appointed to associate titles, which provides for successful implementation of teaching and quality work with the students. Most of the teachers and associates meet the prescribed teaching workload. Due to the increased enrolment quota in the first year of the PBS, and the introduction of the new DSZPO study programme, there is a need for additional teaching/research assistants, junior researchers, professional associates and laboratory assistants at the Department who would contribute to the enhanced quality of teaching and research.

#### Material Resources

Given the number of classrooms, teaching laboratories and research laboratories, the Department has currently enough space at disposal to meet the requirements of the teaching process and the work with students. The teaching laboratories, most of the laboratories, the classrooms and computer lab are equipped with the necessary teaching and learning equipment. The Department strives to achieve good visibility at the regional and national level, and strives for a systematic increase in the quality of teaching and research through the training of teachers, and by equipping the Department with enhanced and modernized equipment.

In addition to the library holdings, the students may use the literature available at individual Sub-departments, and browse and search the literature using a PC in the computer lab. In the future, it has been envisaged to construct a library within the University Campus.

### **1.1. EXPERIENCES OF PRIOR EVALUATION CONDUCTED**

If your institution has already been subject to some form of external evaluation, comment on the recommendations given and the improvements implemented so far.

The Department of Biology has not been subject to any form of external evaluation so far.

## 1.M. COMPARISON WITH FOREIGN HIGHER EDUCATION INSTITUTES

If there is one, please mention the foreign higher education institution you would compare to and explain the criteria for comparison.

The criteria on which we have based the comparison of the Department of Biology with foreign institutions of higher education are the age of the institution and the structure of study programmes.

In each of the neighbouring countries, there are higher education institutions operating in the field of natural sciences, and the Departments are, in general, Faculty constituents. The Department of Biology is a unit of the University of Osijek and does not operate as an independent constituent. Being a relatively new constituent, it is difficult to compare it in terms of structure of study programmes with individual foreign universities that have had several decades of experience in research and educational work. In terms of structure of the studies, we have established similarities with the Faculty of Biology and Environmental Protection in Lodz (<http://www.biol.uni.lodz.pl/en/content/biology>) in Poland, and the Faculty of Education in Ljubljana (<http://www.pef.uni-lj.si/378.html#c1607>).

At the University of Lodz in Poland, there is the Faculty of Biology and Environmental Protection. The Department of Biology at the Faculty of Lodz offers undergraduate and graduate studies of the same duration (3 + 2), and the students at both universities can opt for individual studies or modules in the second year of undergraduate studies. Unlike the Faculty of Lodz, which offers five study programmes, the students of the Department of Biology may choose between three study programmes: the DZSB, the DNSBK and the DSZPO, which exist in Lodz as well. The Department offers only full-time studies, whereas in Lodz the students have the option of part-time studies. On completion of the PSB programme, the students of the Department of Biology acquire similar competencies as the students of the University of Lodz.

In Ljubljana, there is the Faculty of Education which offers double-major study programmes within which students can opt for the Biology and Chemistry studies. The study programme lasts for four years covering courses related to the study of biology-, chemistry- and pedagogy-related contents. At the Department of Biology, the students first have to complete the PSB programme which lasts for three years, after which they have the opportunity to enrol the DNSBK programme for a period of two years. The pedagogy-related courses are taught only at the graduate level. The students in Ljubljana are awarded the degree of Biology and Chemistry Teacher (*professor*), and on completion of the DNSBK programme, the Department students are awarded the degree of Master of Education in Biology and Chemistry.

**1.N. PARTICIPATION IN MAKING DECISIONS OF PUBLIC INTEREST**

Specify when and how you reacted and/or participated in making decisions of public interest!

The Department staff members are involved in making decision of public interest at the local, regional and national level. The Department staff members are active and participate in the work of various committees, councils, professional teams and are members of various societies.

The Department contributes to the fulfilment of the mission of the Department by participating in making decisions of public interest. The table below shows the membership and activities of staff related to public interest.

MEMBERSHIP IN THE DEVELOPMENT OF STRATEGIES AND ENVIRONMENTAL IMPACT STUDIES		
	TITLE	
	Number of staff members	
1	Committee for the drafting of the Environmental Protection Action Plan at the Josip Juraj Strossmayer University of Osijek Committee Chairperson: Dr. Enrih Merdić, Associate Professor	2
2	Mosquito Control Strategy in Osijek	1
3	Revitalisation study of the Old Drava river at Nemetin, Sarvaš, Bijelo Brdo – Aljmaš area	2

MEMBERSHIP IN SOCIETIES		
	TITLE	
	Number of staff members	
1	Croatian Society for Biochemistry and Molecular Biology member of the Society Council from 2006 to 2014 Dr. Elizabeta Has-Schön, Full Professor	4
2	Croatian Botanical Society	4
3	Croatian Society of Medical Biochemistry	1
4	Croatian Microbiological Society	2
5	Croatian Society for Neuroscience	3
6	Croatian Biological Society 1885	7
7	Croatian Chemical Society	2



8	Croatian Biometric Society	1
9	Croatian Society of Plant Biology	10
10	HNE-Club	1
11	Croatian Entomological Society President of Society since June 2014 – Dr. Enrih Merdić, Associate Professor	7
12	Croatian Herpetological Society-Hyla	1
13	Croatian Agrometeorological Society	1
14	Croatian Mycological Society	1
15	Croatian Ecological Society	1
16	Croatian Forestry Society	1
17	CROATIAN SOCIETY for Simulation Modelling (CROSSIM)	1
18	International Association for Danube Research IAD	7
19	International Union of Forestry Research Organisations	1
20	The Federation of European Biochemical Societies (FEBS)	4
21	International Association of Vegetation Science	1
22	International Society for Ecological Modelling Secretary General: Dr. Tarzan Legović, Full Professor with Tenure	2
23	European Mosquito Control Association Board of Directors: Dr. Enrih Merdić, Associate Professor	4
24	Societas Europaea Herpetologica	1
25	Society for Vector Ecology	1

**MEMBERSHIP IN SUPERVISORY BOARDS, ADMINISTRATIVE AND SCIENTIFIC COUNCILS**

	TITLE	Number of staff members
1	University Council for postgraduate interdisciplinary doctoral studies	3

	President of Council: Dr. Vera Cesar, Full Professor	
2	University Council for postgraduate interdisciplinary specialist studies President of Council: Dr. Melita Mihaljević, Assistant Professor	2
3	Council of the Postgraduate interdisciplinary university doctoral study programme in Nature and Environmental Protection President of Council: Dr. Tarzan Legović, Full Professor with Tenure	3
4	Council of the Postgraduate interdisciplinary university doctoral study programme in Molecular Biosciences President of Council: Dr. Vera Cesar, Full Professor	1
5	Scientific Council of the Oikon Ltd. Institute for Applied Ecology President of Council: Dr. Oleg AntoniĆ, Full Professor	1
6	Appointments Review Committee for Interdisciplinary Sciences	1
7	Maritime Scientific Council	1
8	Stakeholder Council for the establishment of the University of Šibenik President of Council: Dr. Tarzan Legović, Full Professor with Tenure	1
9	Scientific Council of the Oceanology Doctoral Studies of the University of Zagreb	1
10	University Council for Natural Sciences	2
11	Committee on the review of fulfilment of the conditions of the Rector's Conference as a part of the University Council for Natural Sciences	1

#### MEMBERSHIP IN PROFESSIONAL TEAMS

	TITLE	Number of staff members
1	Evaluation of the state of collected rain water at the outlet from the 'Švajcerova ada' landfill in Darda - biological indicators	6
2	Professional team: Ecological study of the Javorica accumulation lake	3
3	Professional team: Ecological study of the Javorica accumulation lake _ Phase II	2
4	Regional expert advisory group for water management and forestry in South East Europe	1

5	Committee for the implementation of sanitary measures after the floods in the Sava River Basin in 2014	1
6	Editorial Board of Acta Botanica Croatica	1

#### OTHER MEMBERSHIPS AND PARTICIPATION OF PUBLIC INTEREST

	TITLE	Number of staff members
1	Participation in the training 'Monitoring and reporting commitments under Article 17 of the Habitats Directive'	2
2	Participation in the development of the Management Plan and Action Plan for the protection of the snake-eyed skink ( <i>Ablepharus kitaibelii</i> )	1
3	Participation in the workshop 'Exotic species - risk assessment of invasiveness' organized by the State Institute for Nature Protection (SINT)	1

### 1.0. SATISFACTION WITH THE CURRENT SITUATION AND POSSIBLE IMPROVEMENTS

Specify to what extent you are satisfied with the current situation and propose possible improvements.

A self-critical assessment of the current situation at the Department of Biology has highlighted the existence of grounds for satisfaction, but also of certain elements that require continuous efforts and improvement.

#### The reasons for satisfaction are the following:

- Increased number of study programmes: in the academic year 2014/2015, the Department started delivering the new DSZPO study programme.
- Increased enrolment quota: as of the academic year 2014/2015, upon proposal by the University of Osijek, the Department increased the student enrolment quota from 50 + 10 to 70 in the first year of the PSB programme.
- Favourable teaching structure: the teaching process at the Department of Biology takes place without major difficulties. The Department relies heavily on its own human resources. Due to the favourable age structure, we are able to strengthen and develop the human resources in order for them to be competent, and sufficient for the delivery of all teaching assignments in all study programmes at the Department.

- Research excellence: in relation to other constituents of the University of Osijek, the Department of Biology is at the top by the number and quality of scientific publications. In the past three years the Department teachers and associates published 43 scientific papers, 19 of which in prestigious world journals (Q1 rank according to the ISI Web of Knowledge database). The quality of research of Department staff has been recognized in the scientific circles, and the staff and students of the Department have been invited to present the results of their work at other universities in Croatia, at the Ruđer Bošković Institute in Zagreb, the Agricultural Institute of Osijek, and conferences organized by the Croatian Academy of Sciences and Arts. The Department staff members regularly participate in the organization of various conferences and symposia, and are involved in the work of organizational, scientific and technical conference committees.
- Visibility of the Department of Biology: the Department has had a long tradition in the popularization of sciences. The Department staff and students are involved in the organization of workshops, exhibitions and lectures as part of the Science Festival and the Brain Awareness Week events. In 2014, the work of the teaching/research assistants and students of the Department was particularly noted in the organization of the workshop titled *Mozgajte s biologima - NEznanje boli* (Brainstorm with Biologists – Ignorance hurts) which was awarded the title of the best workshop in Osijek. The Department students are active in the FameLab competition as well. Since the academic year 2014/2015, the Department has been organising its own event titled 'Biologist-and-Me' with the aim of popularization of sciences.
- Good Department cooperation with schools: some Department employees regularly teach classes in schools as part of the courses in the DNSBK programme. The research for the purposes of masters' theses is conducted in schools, and there are professional gatherings organised for Biology teachers. The aim of the gatherings is to present the latest research findings in Biology Teaching Methodology as an interdisciplinary science as well as other biological disciplines. The organization of these gatherings strengthens the communication between active school teachers and Department staff and thus contributes to further education and lifelong learning on both sides.

**Activities for the improvement of the current situation are the following:**

- To provide more working space: the relocation of the Department to the building on the University Campus resulted in more space for teaching in the undergraduate and graduate studies. Most of the existing laboratories are used both for teaching and for research; therefore, additional facilities (laboratories intended only for scientific research, ancillary facilities for the storing of field equipment, growth chambers, etc.) would provide the staff members with a possibility of higher quality research work.
- To continue to enhance the study programmes in order for them to become as attractive as possible to prospective students, and for the students to be more

competitive in the labour market upon graduation, not only in Croatia, but also in the EU.

- To improve the material resources for the purpose of even better and higher quality teaching activities and research.
- To increase the number of students of the Department of Biology in the existing graduate programmes.
- To include a larger number of staff members in various forms of international cooperation - visits to other faculties, working on joint international projects, joint scientific research and publishing of papers, receiving students from abroad for practical work.
- To increase the number of research projects at national and international level, managed by the Department staff.
- To improve the website of the Department.
- To promote quality in all segments of Department activities.
- To establish the Quality Assurance Office.

Table 1.1 Internal quality assurance

Type of activity	Responsible for the activity (name of the body or persons)	Frequency of the activity (number of annual meetings or activities)	Number of reports made in the course of specific activity in the last 5 years	Practical results of activities (description in the text)
Thematic sessions on teaching quality	Head of Department Deputy Head for Education and Students Quality Assurance Committee	as required		Amendments to study programmes Drafted Self-evaluation
Activity of the board (committee) for teaching quality monitoring	Quality Assurance Committee	as required		Learning outcomes defined
Student survey (implementation, processing, informing students, teachers' responses)	Deputy Head for Education and Students Quality Assurance Committee	1	4	Results of the student survey on the delivery of teaching and the performance of teachers

SWOT analysis at the level of the institution	Sub-departments Management		1	SWOT analysis
Monitoring quality indicators at HEI*	Student Administration Office	continuous	5	Student success (GPA) at completion of studies, number of students enrolled in the next year of studies
Other forms of evaluation	-	-	-	-

*\*Ordinance on the content of license and conditions for issuing license for carrying out activities of higher education, carrying out study programmes and re-accreditation of higher education institutions (Official Gazette, no. 24/10) and the Ordinance on the conditions for issuing license for carrying out scientific research, the conditions for reaccreditation of scientific organisations and the content of license (Official Gazette, no. 83/2010)*

## 2. Study programmes

### 2.A. CONFIGURATION OF STUDY PROGRAMMES

Provide a diagram with the configuration of all study programmes along the vertical line (undergraduate, graduate, integrated and postgraduate) with their possible branching into specialisations. If you also carry out professional study programmes, show their configuration as well. Explain the functional reasons for such configuration, especially from the standpoint of achieving optimal educational results (employability, study continuation, mobility) in relation to the projected enrolment quota. Specify which study programmes are off-campus and comment on their justification.

The Department of Biology of the Josip Juraj Strossmayer University of Osijek is currently delivering one undergraduate and three graduate study programmes:

1. Undergraduate university study programme in Biology (**PSB**): 6 semesters, 180 ECTS credits
2. Graduate university study programme in Biology (**DZSB**), 4 semesters, 120 ECTS credits
3. Graduate university study programme in Biology and Chemistry Education (**DNSBK**), 4 semesters, 120 ECTS credits
4. Graduate university study programme in Nature and Environmental Protection (**DSZPO**): 4 semesters, 120 ECTS credits

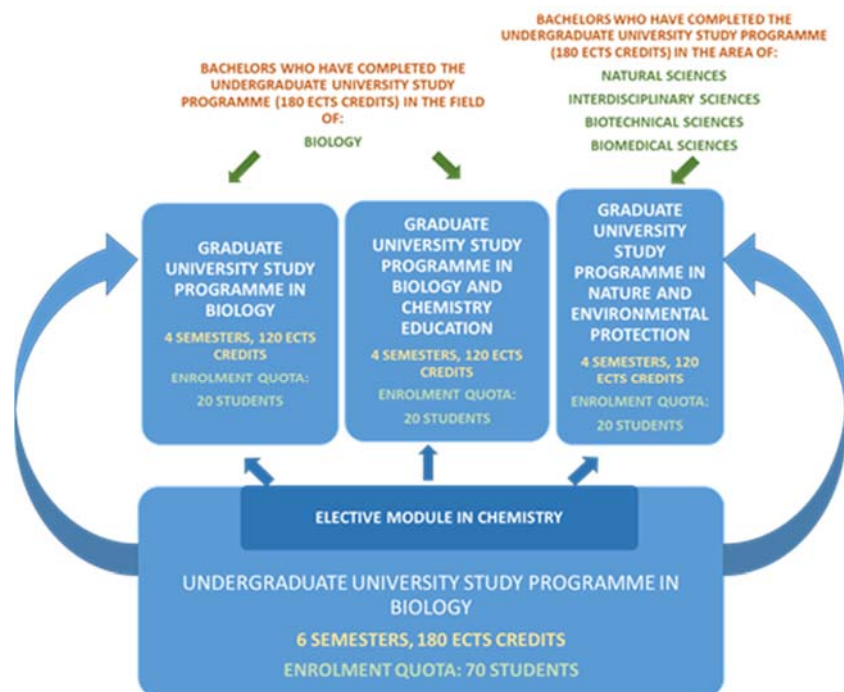


Figure 2.1 Diagram with the configuration of study programmes, delivered by the Department of Biology of the Josip Juraj Strossmayer University of Osijek, along the vertical line

The study programmes are available on the following web pages:

- The PSB programme with amendments in accordance with the Senate Decision of 1 October 2012 <http://biologija.unios.hr/webbio/wp-content/uploads/2012/programi/preddiplomski.pdf>
- The DZSB programme with amendments dated 11 April 2011. Decision of the Senate of the Josip Juraj Strossmayer University of Osijek on amendments to the programme of the Graduate university studies in Biology, delivered by the Department of Biology (accreditation license of the Ministry of Science, Education and Sports dated 16 June 2005) <http://biologija.unios.hr/webbio/wp-content/uploads/2012/programi/znanstveni.pdf>
- The DNSBK programme with amendments dated 11 April 2011. Decision of the Senate of the Josip Juraj Strossmayer University of Osijek on amendments to the programme of Graduate university studies in Biology and Chemistry Education delivered by the Department of Biology (accreditation license of the Ministry of Science, Education and Sports dated 16 June 2005) <http://biologija.unios.hr/webbio/wp-content/uploads/2012/programi/nastavnicki.pdf>
- The DSZPO programme [http://biologija.unios.hr/webbio/wp-content/uploads/2014/programi/nastavni\\_plan\\_i\\_program\\_ZPIO.pdf](http://biologija.unios.hr/webbio/wp-content/uploads/2014/programi/nastavni_plan_i_program_ZPIO.pdf)
- The Study Programme Implementation Plans of the Department of Biology are available on the following web page: <http://biologija.unios.hr/webbio/studiji>

## UNDERGRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY

The Undergraduate university study programme in Biology lasts for three years, i.e. six semesters. Upon completion of the programme, students earn 180 ECTS credits and a Bachelor degree (*Baccalaureus/Baccalaurea*) in Biology. The PBS programme is structured based on a 70 to 30 percent ratio between obligatory and elective courses following the European studies “major + minor” model, and is coordinated with similar programmes in the Republic of Croatia. The study programme is completed by passing all the required exams and writing the final bachelor’s thesis which is graded. The rules for writing the final bachelor’s thesis, the rights and obligations of students, mentors and the committee are regulated by the Ordinance on the final bachelor’s thesis which can be downloaded from the following web page of the Department:

<http://biologija.unios.hr/webbio/wp-content/uploads/2012/programi/preddiplomski.pdf>.

This study programme offers a number of elective courses supplementing the core programme and enabling specialization in terms of enrolment into one of the graduate study



programmes of the Josip Juraj Strossmayer University of Osijek, other universities in Croatia or the EU. Second year students may also opt to take an elective module in Chemistry, which means that until the completion of their studies, Chemistry courses will be their electives. Upon completion of the undergraduate study programme, a Bachelor of Biology will have acquired the knowledge and skills, i.e. will be qualified to work in a laboratory as a professional associate and laboratory technicians, or at nature parks or similar institutions as a ranger. Students who took elective courses in Biology can enrol in the Graduate university study programme in Biology and the Graduate university study programme in Nature and Environmental Protection, while those who have taken an elective module in Chemistry can also enrol into the Graduate university study programme in Biology and Chemistry Education.

### **GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY**

The Graduate university study programme in Biology lasts for two years, i.e. four semesters. Upon completion of the programme, students earn 120 ECTS credits and a Master's degree in Biology. This programme is also structured based on a 70 to 30 percent ratio between obligatory and elective courses and is coordinated with similar programmes in the Republic of Croatia. The DZSB programme is open to students who have completed the Undergraduate university study programme in Biology at the Department of Biology, as well as bachelors from other universities in the Republic of Croatia who have completed an Undergraduate university study programme in the field of Biology and have earned 180 ECTS credits. In exceptional cases, bachelors who have completed study programmes in the area of Biotechnical, Medical and Natural Sciences can also enrol in this programme, provided they have passed the differential exams.

The DZSB programme is completed by passing all the required exams, and by writing and defending the master's thesis. The rules for writing the master's thesis, the rights and obligations of students, mentors and committee are regulated by the Ordinance on master's degree examination (the Ordinance on master's degree examination can be downloaded from the following web page of the Department of Biology: <http://biologija.unios.hr/webbio/studenti/dokumenti>).

Upon completion of this graduate study programme, Masters of Biology will be qualified to work in various research and professional institutions involved in research in the area of Natural, Biotechnical and Biomedical Sciences. During their studies, future Masters of Biology also acquire the knowledge and skills required for quality and competent management of national and nature parks, fishponds, botanical and zoological gardens, parks in general, as well as bioanalytical laboratories. Masters of Biology can continue their education by enrolling in postgraduate study programmes at our University or any other university in the Republic of Croatia or the EU.

## **GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY AND CHEMISTRY EDUCATION**

The Graduate university study programme in Biology and Chemistry Education lasts for two years, i.e. four semesters. This study programme is open to students who have completed the PSB programme with a Chemistry module, as well as bachelors who have completed the Undergraduate university study programme in the area of Natural Sciences. Upon completion of the study programme, students earn 120 ECTS credits and a Master of Education in Biology and Chemistry title. This programme is also coordinated with similar programmes at other universities in the Republic of Croatia and structured based on a 70 to 30 percent ratio between obligatory and elective courses. It is open to students from comparable faculties that offer study programmes in the area of Natural Sciences. In exceptional cases, bachelors who have completed undergraduate study programmes in the area of Biotechnical and Medical Sciences can also enrol in the programme, provided they have passed the differential exams.

The Graduate university study programme in Biology and Chemistry Education is completed by passing all the required exams, and by writing and defending the master's thesis. The rules for writing the master's thesis, the rights and obligations of students, mentors and committee are regulated by the Ordinance on master's degree examination (the Ordinance on master's degree examination can be downloaded from the following web page of the Department of Biology: <http://biologija.unios.hr/webbio/studenti/dokumenti>).

Master's of Education in Biology and Chemistry acquire the knowledge in the area of Biology and Chemistry, as well as the knowledge of teaching methods required for successful education of primary and secondary school students.

## **GRADUATE UNIVERSITY STUDY PROGRAMME IN NATURE AND ENVIRONMENTAL PROTECTION**

The Graduate university study programme in Nature and Environmental Protection is a new study programme, launched in the academic year 2014/2015. This study programme is open to bachelors who have completed an undergraduate university study programme (180 ECTS credits) in the area of Natural Sciences, Interdisciplinary Sciences, Biotechnical Sciences, and Biomedical Sciences. It lasts for two years, i.e. four semesters. Upon completion of the study programme, students earn 120 ECTS credits and a Master's degree in Environmental Protection. The DSZPO programme is completed by passing all the required exams, and by writing and defending the master's thesis. The rules for writing the master's thesis, the rights and obligations of students, mentors and committee are regulated by the Ordinance on master's degree examination (the Ordinance on master's degree examination can be downloaded from the following web page of the Department of Biology: <http://biologija.unios.hr/webbio/studenti/dokumenti>).

With the applied and interdisciplinary knowledge of biological, geological and geographical aspects of the protection of biological and landscape diversity they have acquired during their studies, future Masters of Environmental Protection, as modern professionals, can seek

employment in institutions for the protection of nature and spatial planning, national parks, water industry etc. In addition to providing the basic knowledge in the area of Biology and Ecology, the study programme prepares students for responsible management of natural resources and links the concepts and knowledge acquired with other professions and scientific areas such as climatology, urban planning, economics, civil engineering, and agriculture. Students who complete this study programme are qualified to perform the most complex activities in all types of organizations engaged in the protection of environmental assets; national, county and city governments, including advisory services and inspections; in horticultural and utility companies; in research institutions in the area of environmental and nature protection as professional associates or heads, in institutions involved in the protection of nature and environment as heads or supervisors. They will also be able to carry out journalism-related activities and environmental and nature protection-related media activities and participate in the development and implementation of Ecological Network Impact Assessment, Environmental and Nature Impact Assessment, Strategic Environmental Impact Assessment and Environment and Nature Risk Assessments.

### **CONFIGURATION OF STUDY PROGRAMMES**

The organisation of study programmes at the Department of Biology (Figure 2.1) allows both vertical and horizontal mobility of students enrolled at the Department of Biology. After completing the Undergraduate study programme in Biology, students can continue their studies at graduate study programmes of the Department of Biology. They can also enrol in any graduate programme in the area of Natural, Biotechnical, Biomedical or Interdisciplinary Sciences in the Republic of Croatia or the European Union since the undergraduate programme provides comprehensive basic knowledge required for further education and specialization in any field of Biology. Such organisation of study programmes also allows enrolment of students from other universities according to clearly defined criteria. This is in line with the basic principles of the Bologna process on horizontal and vertical mobility; i.e. it ensures the mobility of students both within their institution and the higher education system in the Republic of Croatia and in the EU. The configuration of study programmes of the Department of Biology, in which there is one undergraduate study programme that provides comprehensive basic knowledge and three very different graduate study programmes, ensures the production of professionals with diverse competencies in the area of Natural Sciences. This provides students of the Department of Biology with an opportunity to choose among a wide range of future careers and employment possibilities in a number of research and professional institutions, various companies, primary and secondary schools.

Enrolment quotas have changed over the last few years. In the academic year 2012/2013, the enrolment quota for undergraduate study programme was 50 students. The quota was increased in the academic year 2013/2014 to 50 students + 10 students above the age of 25, and then again in this academic year (2014/2015) to 70 students. The latest increase in the enrolment quota is the result of the Strategy for Education, Science and Technology of the

Republic of Croatia adopted in 2014 (Official Gazette 124/14) which identified the expansion of the capacity of higher education in the STEM fields (Science, Technology, Engineering, Mathematics) as a strategic priority. The expansion of the capacity in the STEM fields is also one of the objectives of the University of Josip Juraj Strossmayer programme contracts. The enrolment quotas are aligned with the capacity of the Department of Biology and the needs of labour market. The enrolment quotas are proposed by the Department of Biology and approved by the University Senate. The enrolment quotas for graduate study programmes are 20 students, and they have not changed recently.

After completing the Undergraduate study programme of the Department of Biology, students used to continue their studies in one of the graduate study programmes of the Department. However, in the last three years, students who completed the PSB programme have tended to enrol in graduate study programmes at other universities in the Republic of Croatia, which reduced the number of their enrolments in graduate study programmes of the Department of Biology (Figure 2.2). At the same time, students from other universities in the Republic of Croatia started to enrol in the study programmes delivered at the Department of Biology. The above is most definitely a result of the mobility of students promoted by the Bologna process, an opportunity which students have welcomed and started to take advantage of. However, this has reduced the number of students enrolling in graduate study programmes of the Department of Biology. In order to make sure that as many undergraduate study programme students as possible continue their studies at the Department, adequate measures will be taken in the future, while at the same time students from other study programmes and universities in the Republic of Croatia will be welcomed.

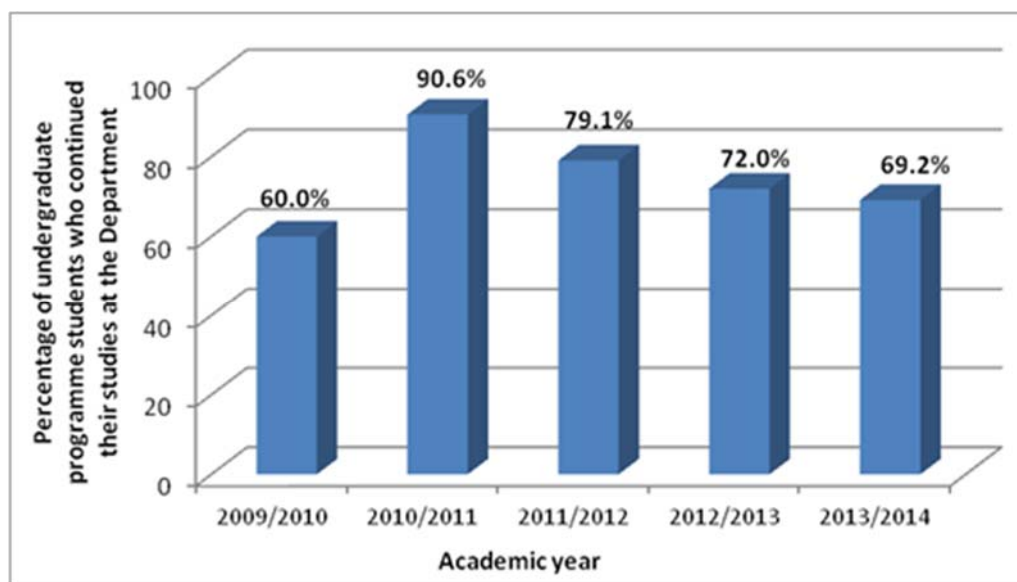


Figure 2.2 Share of PSB students (%) who enrolled in graduate study programmes of the Department of Biology from the academic year 2009/2010 to the academic year 2013/2014

**2.B. OVERLAPS OF THE STUDY PROGRAMMES OF THE DEPARTMENT WITH SIMILAR STUDY PROGRAMMES AT OTHER CONSTITUENTS OF THE UNIVERSITY OF OSIJEK**

Specify overlaps of your study programmes with similar study programmes at other constituents of your university, if such exist. Explain steps undertaken to avoid future overlaps.

The Department of Biology of the Josip Juraj Strossmayer University of Osijek delivers study programmes in the area of Biology, covering a wide range of topics that are the subject of research in Biology. Obligatory courses provide comprehensive basic education, while elective courses specialise future biologists in the area of their interest. Upon completing the Undergraduate study programme, students can choose among three graduate study programmes (DZSB, DNSBK and DSZPO) for specialisation in a particular area.

Study programmes at other constituents of the Josip Juraj Strossmayer University of Osijek (Faculty of Agriculture, Faculty of Medicine, Faculty of Food Technology and Faculty of Teacher Education) that include a course in Biology are not comparable to the programmes offered to the students of the Department of Biology. The content of Biology courses at the mentioned constituents of the University are adapted to their area of activity, i.e. they provide a specialization and are tailored to the needs of agricultural, medical and biotechnology professionals. We find that the study programmes delivered at the Department of Biology and at other constituents of the University complement each other in terms of their scope and type of Biology-related content offered to students.

**2.C. QUESTIONS RELATED TO TYPES OF STUDY PROGRAMMES (2.C.1.TO 2.C.7)**

For each of the following types of study; undergraduate, graduate, integrated and postgraduate (separately for postgraduate specialist study programmes) as well as professional study programmes (if any) answer the following.

**2.C.1. CRITERIA TAKEN INTO ACCOUNT WHEN PROPOSING ENROLMENT QUOTAS FOR STUDY PROGRAMMES OF THE DEPARTMENT AND THEIR SUITABILITY**

Specify the criteria you take into account when proposing enrolment quotas for undergraduate (or integrated undergraduate/graduate) study programmes, as well as professional study programmes (if any). Assess the suitability of the enrolment quotas with regard to the social needs and the number of unemployed, the possibility of the higher education institution to provide quality education in groups and the number of able and motivated students who are prepared for efficient studying in line with the given programme.

The enrolment quotas for study programmes are proposed by the Department Management and approved by the Senate of the University of Osijek. The criteria for determining enrolment quotas are the interest of prospective students in the study programmes of the Department, the capacity to provide quality education in terms of available space, equipment and staff, and the needs of labour market for professionals educated at the Department, as well as the possibilities for their employment and further education.

Past enrolment quotas were adequate by all criteria. Since the establishment of the Department, candidates have shown great interest in studying at the Department in each academic year. First year enrolment quota was often filled during the summer enrolment period. Since the establishment of the Department, the quota has been increased from 45 to 70 students (in this academic year). The latest increase in enrolment quota was proposed by the University, in view of the fact that Biology is one of the STEM fields. The Department accepted the proposal taking into account the current favourable staff structure (Chapter 4) and improved levels of equipment at the new location (which ensures the quality of the teaching process will remain the same), as well as the launch of a new graduate study programme (DSZPO).

**2.C.2. PASS RATE IN THE FIRST YEAR OF UNDERGRADUATE STUDY**

Analyse the pass rate in the first year of study (undergraduate, integrated and professional) and relate it to the enrolment criteria. Reflect on the types of secondary schools your candidates are coming from and their secondary school grade point

To qualify for enrolment in the Undergraduate study programme, candidates must complete four-year secondary education and pass the Secondary School Leaving Examination. Applicants for enrolment in the first year of study are ranked according to the following grading system:

		%	number of points
<b>Evaluation of secondary school grades</b>		<b>10</b>	<b>100</b>
<b>Compulsory part of Secondary School Leaving Examination</b>			
<b>Croatian language</b>	<b>B level</b>	<b>20</b>	<b>200</b>
<b>Mathematics</b>	<b>B level</b>	<b>20</b>	<b>200</b>
<b>Foreign language</b>	<b>B level</b>	<b>30</b>	<b>200</b>
<b>Biology</b>		<b>30</b>	<b>300</b>
<b>Total</b>		<b>100</b>	<b>1000</b>

A candidate can earn a maximum of 1,000 points. Until 2013, the enrolment quota was 50 students; in the academic year 2013/2014, it was 60 students (50 + 10 above the age of 25), and in the academic year 2014/2015, it was increased to 70 students (Table 2.1.). Priority enrolment is granted to secondary school students who ranked among the top three in a national or county level competition in Biology, Chemistry or Physics. Each academic year, several such students enrol in the programme of the Department.

In the academic year 2013/2014, grammar school students accounted for 94.12% of the enrolment quota for the Undergraduate study programme in Biology, while vocational school students accounted for 5.88%. The percentages are similar to those recorded in the previous and current academic year (Figure 2.3). Grade Averages of grammar and vocational school students are above 4 and approximately the same in all three years under observation (Figure 2.4). This leads to the conclusion that a major part of candidates for enrolment in the PSB of

the Department of Biology is made up of successful grammar schools students while a much smaller share is made up of equally successful vocational school students.

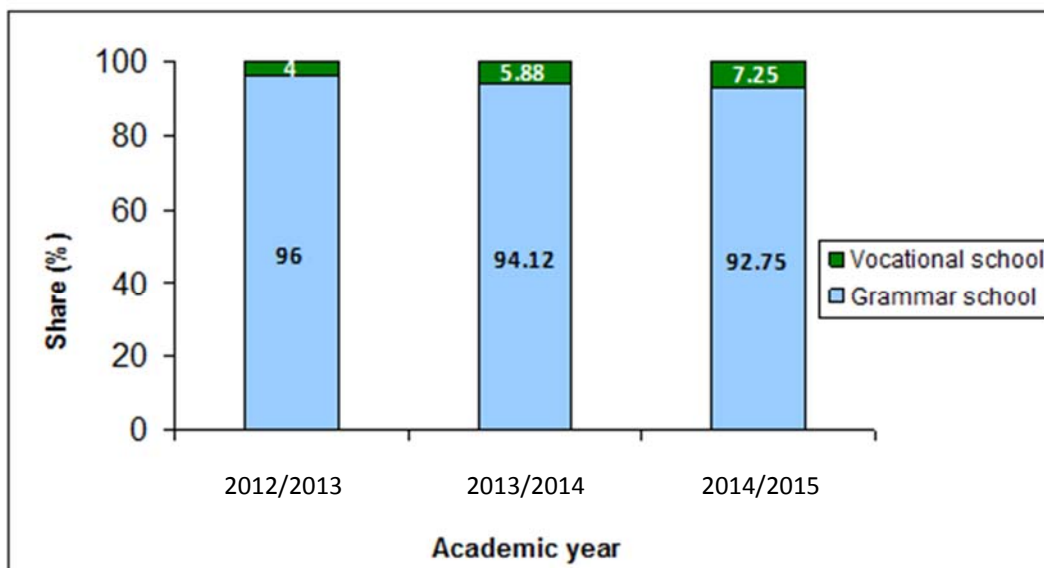


Figure 2.3 Composition of students enrolled in the first year of the Undergraduate university study programme in Biology in terms of their secondary school education (grammar school, vocational school) in the academic year 2012/2013, 2013/2014 and 2014/2015

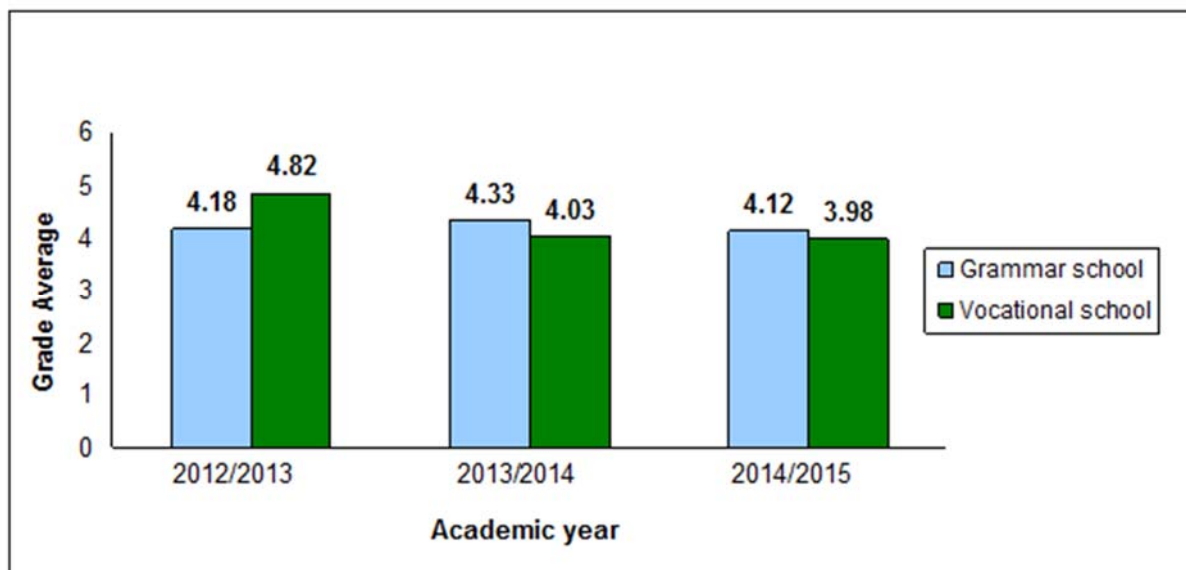


Figure 2.4 Grade Averages of secondary school students enrolled in the first year of the Undergraduate university study programme in Biology in the academic year 2012/2013, 2013/2014 and 2014/2015



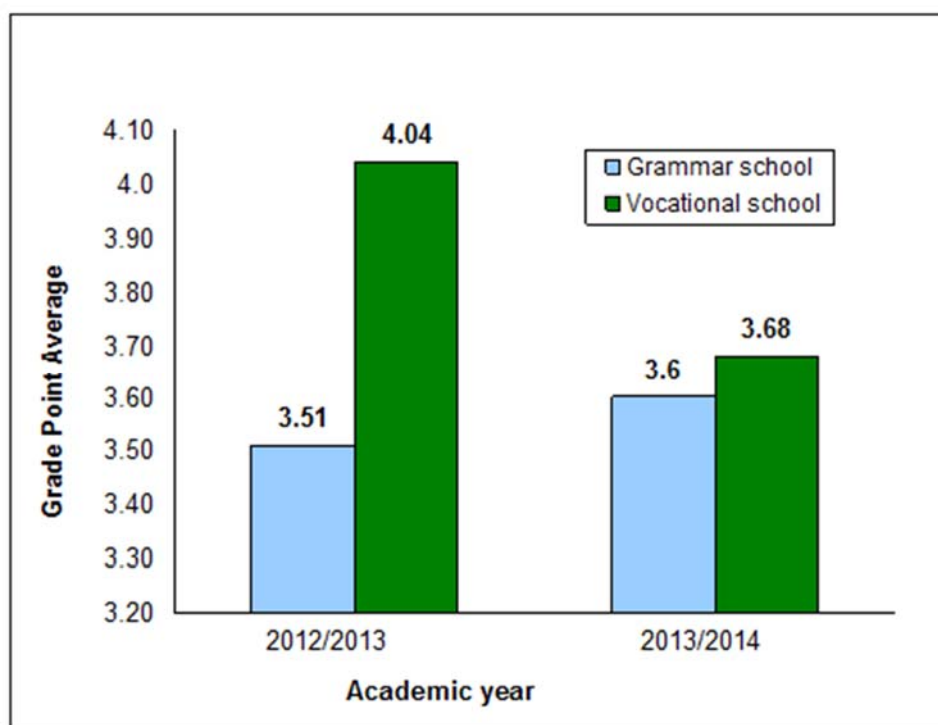


Figure 2.5 Grade Point Average of grammar school and vocational school students achieved at the Undergraduate university study programme in Biology of the Department of Biology in the academic year 2012/2013 and 2013/2014

Grade Point Averages of students pursuing the Undergraduate university study programme in Biology in the past two academic years (all exams passed until the academic year 2014/2015 were taken into account) are shown in Table 2.1 and Figure 2.5. The Grade Point Averages are in direct correlation with their secondary school Grade Averages, which was also confirmed by the statistical analysis ( $P < 0.001$ ). It was also established that the few vocational school students achieved higher Grade Point Averages during their studies. This is assumed to be a result of best vocational school students enrolling in the study programme offered by the Department. In order to further increase the number of quality candidates, it would be useful to introduce some changes to make the enrolment criteria stricter. Despite its strengths, the Secondary School Leaving Examination which involves obligatory Croatian language, Mathematics and Foreign language tests as one of the enrolment criteria, plus a test in an additional elective course (Biology), is not an optimal criterion for the selection of students who want to study at the Department of Biology. It is our opinion that in addition to Biology as an elective course, the Secondary School Leaving Examination should also take into account and evaluate students' grades in Physics and Chemistry, as well as increase the requirement for Mathematics to A level, with a view to attracting even more high-quality students. Grade Point Averages achieved by students attending graduate study programmes in the last two academic years were higher than the Grade Point Averages achieved at the undergraduate level (at both graduate study programmes, they were above 4, Table 2.1) and were also found to be directly correlated with the GPAs achieved at the undergraduate level.

Present data for undergraduate and integrated study programmes for the first year in this academic year and the past two years.

**Table 2.1 Structure of enrolled students and interest in the study programme in this academic year and the past two years**

UNDERGRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY	Full-time students					Total			
	Applied	First choice	Second choice	Enrolment quota	Enrolled into the first year	Grammar school education		Vocational school education	
						Number	Grade average/ GPA*	Number	Grade average/ GPA
2012/2013	176	83	35	50	50	48	4.18 / 3.51	2	4.82 / 4.04
2013/2014	128	74	24	50 + 10 *	51	48	4.33 / 3.6	3	4.03 / 3.68
2014/2015	179	87	19	70	69	64	4.12	5	3.98

\* Total enrolment quota for the first year in the academic 2013/2014 was 60. There were 50 enrolment positions available for full-time students and 10 enrolment positions for students above 25 years of age.

\*GPA Grade Point Average

The table lists secondary school Grade Averages of enrolled students (in black) and their current Grade Point Averages at the higher education institution (in red).

Present data for graduate and postgraduate study programmes for the first year in this academic year and the past two years.

GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY	Full-time students					Undergraduate study programme GPA / current GPA
Year	Applied	Enrolled	Enrolment quota	Number of students transferred from other HEIs	GPA*	Undergraduate study programme (Department of Biology)
2012/2013	12	13	20	0	-	4.27 / 4.32
2013/2014	12	14	20	0	-	4.12 / 4.58
2014/2015	0	0	20	0	-	-

GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY AND CHEMISTRY EDUCATION	Full-time students					Undergraduate study programme GPA / current GPA
Year	Applied	Enrolled	Enrolment quota	Number of students transferred from other HEIs	GPA	Undergraduate study programme (Department of Biology)
2012/2013	5	5	20	0	-	4.08 / 4.45
2013/2014	4	4	20	0	-	4.24 / 4.75
2014/2015	8	8	20	4	-	4.081

GRADUATE UNIVERSITY STUDY PROGRAMME IN NATURE AND ENVIRONMENTAL PROTECTION	Full-time students					Undergraduate study programme GPA / current GPA
Year	Applied	Enrolled	Enrolment quota	Number of students transferred from other HEIs	GPA	Undergraduate study programme (Department of Biology)
2014/2015	10	10	20	0	-	3.756

\* GPA Grade Point Average

Table 2.2 Pass rate at the study programme

UNDERGRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY							
Year of enrolment	Number of students enrolled	Number of students who earned up to 1/3 of the maximum ECTS credits	Number of students who earned from 1/3 up to 2/3 of the maximum ECTS credits	Number of students who earned more than 2/3 of the maximum ECTS credits	Number of graduates	Number of students who lost their right to study	Cumulative GPA
2010/2011	138	19	10	89	42	-	3.81
2011/2012	136	17	7	91	25	-	3.75
2012/2013	141	26	12	94	26	-	3.63
2013/2014	163	19	19	94	29	2	3.50
GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY							
Year of enrolment	Number of students enrolled	Number of students who earned up to 1/3 of the maximum ECTS credits	Number of students who earned from 1/3 up to 2/3 of the maximum ECTS credits	Number of students who earned more than 2/3 of the maximum ECTS credits	Number of graduates	Number of students who lost their right to study	Cumulative GPA
2010/2011	57	-	1	39	14	-	4.56
2011/2012	64	-	2	47	20	-	4.40
2012/2013	63	-	1	39	21	-	4.34
2013/2014	52	-	1	24	23	-	4.22
GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY AND CHEMISTRY EDUCATION							
Year of enrolment	Number of students enrolled	Number of students who earned up to 1/3 of the maximum ECTS credits	Number of students who earned from 1/3 up to 2/3 of the maximum ECTS credits	Number of students who earned more than 2/3 of the maximum ECTS credits	Number of graduates	Number of students who lost their right to study	Cumulative GPA
2010/2011	24	-	1	13	9	-	4.55
2011/2012	19	-	-	15	5	-	4.54
2012/2013	11	-	-	11	6	-	4.53
2013/2014	16	-	-	9	9	-	4.33

The number of students enrolled includes all students enrolled in the academic year (full-time students, students repeating the year, students who have been granted an interruption of studies, students completing their studies, senior undergraduates/senior graduates). The pass rate at the study programme refers to full-time students and students repeating the year.

Specify the structure in the method of assessment at the undergraduate, graduate (including integrated undergraduate and graduate) as well as postgraduate specialist study programmes carried out by your institution (the number of courses in relation to the total number, expressed in percentage). Comment in tables if necessary.

**Table 2.3 Assessing learning outcomes**

Study programme name	Final exam only			Practical work and final exam	Mid-term/preliminary exams/homework and final exam	Seminar paper	Seminar paper and final exam	Practical work
	Final written exam	Final oral exam	Final written and oral exam					
Undergraduate university study programme in Biology	1.75%	1.75%	28.07%	10.53%	45.61%		12.28%	
Graduate university study programme in Biology			42.86%	20%	11.43%		25.71%	
Graduate university study programme in Biology and Chemistry Education	3.7%	3.7%	29.63%	3.7%	25.92%	3.7%	18.52%	11.12%
Graduate university study programme in Nature and Environmental Protection			24.24%	15.15%	12.12%		48.49%	

### 2.C.3. METHODOLOGY FOR SETTING LEARNING OUTCOMES WHEN PLANNING STUDY PROGRAMMES

State which methodology was used to set learning outcomes when planning study programmes. Use one study programme as an example of linking obligatory courses and competencies.

When planning study programmes, the Department takes into consideration the needs of the labour market for biologists in education, research, industry (pharmaceutical, food, chemical, wood, etc.) and professional activities (e.g. environmental inspection services), which seek to tap into the latest scientific knowledge in the area of Biology. The first step was setting general learning outcomes for study programmes. This was followed by numerous internal meetings at which the Department teachers sought to match the specific learning outcomes of individual courses with the defined outcomes of study programmes. We believe that we have done this successfully as exemplified in Appendix 2.1. which shows how the learning outcomes of the Graduate university study programme in Biology are linked to the learning outcomes of obligatory courses in that study programme. The learning outcomes of the obligatory courses of the DZSB programme are aimed at achieving the general learning outcomes and competencies of graduated students.

Competencies that a future Master of Biology will have acquired upon completion of the DZSB are as follows:

- developed observation, perception, analogical reasoning and deduction skills in the area of Natural, Biotechnical, and Biomedical Sciences;
- competitiveness for positions in research institutions (universities, public research institutes, other research institutes);
- competitiveness for professional positions at nature parks, national parks, botanical and zoological gardens;
- competitiveness for professional positions in freshwater and marine aquaculture industry;
- competitiveness for professional positions in companies providing public health hygiene and sanitation services, veterinary services, plant protection (disinfection, pest control, fumigation services, etc.);
- competitiveness for professional positions in bioanalytical laboratories;
- competitiveness for professional positions in planning companies in the area of natural resource management.

#### 2.C.4. GOALS USED TO SET LEARNING OUTCOMES

Specify the most important goals you used to set learning outcomes. Assess to what extent have the goals you had in mind when creating the new study programmes (undergraduate, integrated undergraduate/graduate, and professional, if any) been achieved.

The most important goals used to set the learning outcomes were to define the knowledge and skills that will help students to attain competencies needed in the labour market and consequently increase their employment opportunities. The obligatory and elective course contents are based on the latest scientific knowledge and provide the basic knowledge, which will make students competitive in the global knowledge market. The Undergraduate study programme learning outcomes are set in a way that will allow students to enrol in as many as possible graduate study programmes in a similar area. Most undergraduate study programme students decide not to seek employment after completing their studies and enrol in one of the graduate study programmes in the Republic of Croatia. As a result, it is not possible to assess adequately whether the learning outcomes set for the PSB programme have been achieved. However, in terms of gaining competencies required to study at graduate study programmes, we find that the learning outcomes have been achieved to a satisfactory extent.

The learning outcomes for the DNSBK programme were set with a view to educating professionals for teaching Biology and Chemistry in primary and secondary schools. Most Masters of Education in Biology and Chemistry find employment relatively quickly. We therefore find that the learning outcomes set for this graduate study programme have been achieved to a large extent.

The DZSB programme graduates find employment in research institutions, industry (pharmaceutical, food, chemical, wood, etc.) as well as services that seek to tap into their knowledge of Biology, such as environmental inspection services. The learning outcomes were set taking into consideration the knowledge and skills students need to acquire for quality and competent management of national and nature parks, fishponds, botanical and zoological gardens, parks in general, bioanalytical laboratories, as well as to participate in research projects in the area of Natural, Biotechnical, and Biomedical Sciences as members of research and professional teams.

Only a portion of students who complete this study programme find employment in their field of education in Croatia. Some of them work and study at prestigious universities and research institutions in Croatia (Ruđer Bošković Institute, Laboratory for Molecular Ecotoxicology, Zagreb; Ruđer Bošković Institute, Centre for Marine Research, Rovinj; University of Zagreb, Faculty of Science; Josip Juraj Strossmayer University of Osijek: Medical faculty, Faculty of Agriculture, Department of Chemistry, Department of Biology) as well as Europe (Medical

faculty, Institute of Pharmacology, University of Marburg, Germany; Centre for Molecular Life Sciences, Universität Basel, Switzerland; Universität Zürich, Switzerland; Paracelsus Medical University Salzburg, Salzburg, Austria; Institut für Molekulare Biowissenschaften, Graz, Austria; Marie Curie ITN, Early Stage Researcher (ESR) on the project CropLife; Kiel, Germany; Goethe Universität, Frankfurt am Main, Germany; Veterinary Research Institute, Department of Immunology, Brno, Czech Republic; Norwegian Veterinary Institute, Oslo, Norway; Universitetet i Tromsø, Department of Chemistry, Tromsø, Norway) and the United States of America (University of Mississippi Medical Center, Jackson, Mississippi, USA) performing well, which supports the fact that the learning outcomes for this study programme have been achieved to a large extent. The fact that it is difficult for graduates of this study programme to gain employment in Croatia can be attributed to the current poor state of the labour market.

It is not possible to assess whether the learning outcomes set for the DSZPO programme have been achieved because the first generation of students has only enrolled in this academic year. However, while we were designing the study programme, we presented it to different companies and associations in the Republic of Croatia (OIKON Ltd. Institute for Applied Ecology, Zagreb; Croatian Association of Professionals in Nature and Environmental Protection (HUSZPO), Zagreb; Dvokut Ecro, Zagreb, etc.), which received it very well and showed a lot of interest in future professionals with this specialisation. It can therefore be assumed that the learning outcomes set for this study programme will be achieved to a large extent.

In science, in particular Biology, the requirements with regard to professionals, in terms of specific knowledge and skills, are changing rapidly. To ensure the quality of study programmes of the Department of Biology, there are plans to conduct a detailed analysis of the competencies, knowledge and skills that students acquire in our undergraduate and three graduate study programmes, as well as analyse the current and predict future trends in labour market demand for professionals with specific knowledge and skills. Moreover, the current learning outcomes will be adjusted in response to changes in the labour market and the demand for specific professions in order to facilitate employment of our students.

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#### **2.C.5. ADJUSTMENTS OF ALLOCATED ECTS CREDITS WITH REALISTIC ASSESSMENT OF STUDENT WORKLOAD**

Describe methods and comment procedures for adjustments of allocated ECTS credits with realistic assessment of student workload.

The ECTS grading scale was introduced to allow for quality comparability of study programmes, which is a requirement for student mobility within the European higher education system. The undergraduate study programme delivered by the Department of Biology lasts for six semesters in the course of which students earn a total of 180 ECTS credits, while graduate study programmes last for four semesters in the course of which students earn



120 ECTS credits in each programme. The courses are divided over the study years in such a way that student workload is evenly distributed across semesters. Standard workload is 30 ECTS credits per semester.

Before assigning ECTS credits to a course, teachers responsible for the course estimate the total student workload required to complete the course, i.e. the time required to complete all learning activities in each course. Student workload includes a range of activities, such as active participation in class activities, research, experimental and practical work, writing seminar papers or reports, developing of projects, preparation for mid-term/preliminary exams, final exams, etc. The calculation takes into account the value of ECTS credits, whereby one ECTS credit equals 25-30 hours of work (Article 47 of the Ordinance on study programmes and studying at Josip Juraj Strossmayer University of Osijek: <http://biologija.unios.hr/webbio/nastava/pravilnik-o-studiranju>).

Student feedback about their perception of individual course workload is an integral part of the evaluation of the quality of teaching process and teacher performance (University Student Survey). The evaluation should be carried out at regular intervals to compare student assessment as to the level of adjustment of allocated ECTS credits with realistic student workload.

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#### 2.C.6. COMPETENCIES OF EXPERTS WHO GRADUATE FROM THE DEPARTMENT IN COMPARISON TO SIMILAR STUDY PROGRAMME AT PROMINENT HEIS ABROAD

Assess competencies of experts who graduate from your higher education institution with a similar study programme at prominent HEIs in Europe and the world and state to what extent your programmes follow recommendations of European or international professional organisations.

The competencies that graduates will have gained upon completion of the Undergraduate university study programme in Biology are similar to the competencies acquired by students who have completed a similar program in the EU. However, this study programme differs from other similar programmes in that it is less specialised, i.e. gives preference to providing general knowledge in the area of Biology. More specifically, the Undergraduate study programme in Biology is quite extensive and includes a number of obligatory courses which, in terms of their scope, considerably exceed the programmes that are available in the EU. The knowledge that students acquire during the Undergraduate study programme in Biology enables them to enrol in a range of graduate study programmes to continue their education. For the most part, study programmes of the Department of Biology are comparable to those delivered at some European universities: the University of Stirling, Imperial College London and the Ludwig-Maximilians-Universität München.

In terms of its structure, the Graduate university study programme in Biology and Chemistry Education is comparable to some of the programmes available in the EU; however, it has a number of features specific to programmes in the Republic of Croatia. This specialisation will provide students with a solid foundation in the area of their study. Moreover, students attend a number of additional Pedagogy, Didactics and Teaching Methodology courses, which qualifies them for employment not only in primary and secondary schools, but also in various other institutions, including higher education and research institutions. This study programme is comparable to similar study programmes in Amsterdam and the above-mentioned university in Munich. Masters of Education in Biology and Chemistry have an advantage on the labour market over those holding a Master's degree in Biology because of the reduced number of science classes in schools. This is why they generally find employment more easily, especially if they are willing to work in smaller towns or villages or in the outlying areas of Croatia.

Graduate university study programme in Biology is also comparable to a number of programmes available in the EU (Wageningen University & Research Center, University of Gothenburg). The competencies that students will have gained upon completion of this study programme are to a large extent comparable to the competencies acquired by students who have completed a similar study programme in the EU. The fact that students who have completed one of the study programmes delivered by the Department find employment or enrol in graduate study programmes in the EU, or even in the US, where they perform very well, supports the above statement.

The Graduate university study programme in Nature and Environmental Protection is a unique programme in the Republic of Croatia; however, there are study programmes abroad that are comparable to the new graduate study programme of the Department of Biology. Similarly, the competencies that students will have gained upon completion of this study programme are comparable to the competencies gained by their colleagues in Europe. In the design of the Postgraduate university study programme in Nature and Environmental Protection, much attention was paid to adjusting the structure of the programme to that of similar study programmes at prominent universities in the EU and beyond (The University of Edinburgh, Yale School of Forestry & Environmental Studies).

The web addresses of foreign universities with study programmes comparable to study programmes offered by the Department of Biology are listed below:

- <http://www.stir.ac.uk/undergraduate-study/course-information/courses-a-to-z/school-of-natural-sciences/biology/>
- <https://workspace.imperial.ac.uk/lifesciences/Public/teaching/ug/biology/Programme%20Specification%20Biology%202014-15.pdf>
- [http://www.biologie.uni-muenchen.de/studium/studiengaenge/bachelor\\_bio1/index.html](http://www.biologie.uni-muenchen.de/studium/studiengaenge/bachelor_bio1/index.html)
- <http://www.vu.nl/nl/opleidingen/masteropleidingen/opleidingenoverzicht/i-1/leraar-voorbereidend-hoger-onderwijs/index.asp>

- [http://www.didaktik.bio.lmu.de/studium\\_lehre/index.html](http://www.didaktik.bio.lmu.de/studium_lehre/index.html)
- <http://www.wageningenur.nl/en/Education-Programmes/prospective-master-students/MSc-programmes/MSc-Biology/Programme.htm>
- <http://www.wageningenur.nl/en/Education-Programmes/prospective-master-students/MSc-programmes/MSc-Biology/Programme.htm>
- <http://www.science.gu.se/english/education/master/biology/>
- <http://www.ed.ac.uk/schools-departments/geosciences/postgraduate/masters-programme/taught-masters/environment-protection/degree-structure>
- <http://environment.yale.edu/academics/degrees/mem/#mem-curriculum>

### 2.C.7. MONITORING AND IMPROVEMENT OF STUDY PROGRAMMES AND THEIR ADAPTATION TO NEW RESEARCH

Describe your procedure of monitoring and improvement of study programmes, and their adaptation to new research. Specify any changes you made to the accredited Bologna study programmes, together with the decision-making process and the purpose of those changes.

The study programmes of the Department of Biology are improved through continuous monitoring and adaptation to the latest scientific knowledge and the labour market needs. It is therefore not surprising that since the establishment of the Department less than 10 years ago all three study programmes have undergone changes.

Draft Decision on amendments to the study programme is adopted by the Department Council, upon proposal by the Head of Department or the Cabinet, after an extensive public discussion involving all the teachers of the Department. Once adopted by the Department Council, the proposal is submitted to the Committee on Undergraduate, Graduate, Postgraduate and Professional Study Programmes of the Josip Juraj Strossmayer University of Osijek for review. On confirmation that it is in compliance with the laws and regulation, it is proposed to the University Senate for adoption.

The dates of the Decisions on amendments to individual study programmes of the Department of Biology approved by the University Senate are as follows:

- |                   |       |
|-------------------|-------|
| • 29 October 2007 | PSB   |
| • 11 April 2011   | DNSBK |
| • 11 April 2011   | DZSB  |
| • 1 October 2012  | PSB   |
| • 15 July 2014    | DNSBK |

All changes involved the introduction of new elective courses, change of course status (obligatory / elective), and changes to course content of up to 20%, along with necessary changes in terms of assigned ECTS credits. Both times the changes to the Undergraduate

university study programme in Biology affected the Chemistry module, and also involved assigning one ECTS credit to Physical Education and the introduction of the final bachelor's thesis in the sixth semester. The latest changes to the DNSBK programme primarily involved a group of courses with pedagogy-, psychology- and didactics-related contents. The content of these courses was standardised across all natural science study programmes with a specialisation in Education at the Josip Juraj Strossmayer University of Osijek and as the number of students is small, they are held at the same time for at least two constituents. We believe that all amendments to study programmes adopted thus far have considerably improved the quality of studying at the Department. Nevertheless, we are aware that there is room for further improvements in the future.

## 2.D. METHODS OF CHECKING CLASS ATTENNDACE

Specify methods of checking class attendance and your opinion about them.

Class attendance at the Department of Biology is regulated by the Ordinance on study programmes and studying at Josip Juraj Strossmayer University of Osijek (Article 56, paragraph 2). Students are required to actively participate in all forms of learning activities and attendance is monitored on a regular basis by having students sign the class attendance record form or by calling the roll.

During classes, the responsible teacher fills in the Course Report (<http://biologija.unios.hr/webbio/nastava/evidencije-o-odradenoi-nastavi>) which, among other data, contains the number of students in attendance at individual forms of teaching activities. At the end of each semester, teachers send an electronic record to the Deputy Head for Education and the signed printed copy is submitted to the Head of Department's Office.

## 2.E. TEACHING METHODS, IMPLEMENTATION OF PRACTICAL WORK AND FIELD CLASSES AT THE DEPARTMENT

Describe and assess the teaching methods, implementation of practical work (internship) and field classes. Particularly reflect on problems and possible improvements.

Practical work is an integral part of most courses taught in the undergraduate and graduate programmes of the Department of Biology. The Department of Biology has four teaching laboratories (two microscopy laboratories, one chemistry laboratory and one microbiological laboratory) in which practical work is carried out as laboratories. Students perform laboratory work, i.e. become familiar with laboratory instruments, equipment, as well as techniques and methods of research. The Department also has a computer room where students learn about mathematical, statistical and computer analyses, which they will use for data processing and

analysis, and become familiar with electronic databases used in research and professional work.

Field courses are an integral part of the PSB programme during all three academic years (six semesters). In the first semester, the *Field course 1 - Zoology* includes a visit to the Osijek Zoo and Kopački Rit Nature Park. Students visit Kopački Rit Nature Park in the second semester too, as part of the course *Plant Morphology with a Field Course 1*. In the fourth semester, as part of the *Field Course 2 (Zoology and Botany)*, students visit the Centre for Marine Research of the Ruđer Bošković Institute in Rovinj, Aquarium Pula, Kopački Rit Nature Park and Lisičine Arboretum in Papuk Nature Park, Donji Miholjac Fishpond and Orahovica Nature Park. In the sixth semester of the PSB programme, students visit Lonjsko Polje Nature Park, the island of Krk, the island of Košljun, Drvenik, Bjelolasica, Matic poljana, Vražji prolaz, Zeleni vir, cave Lokvarka and Sunger biological station as part of the *Field Course 3*.

Some field courses are held at Sunger biological station. A long-term lease agreement was signed with the municipality of Mrkopalj in Gorski Kotar based on which a former primary school building was remodelled and adapted for the accommodation of students and teachers during field courses. The building has two large bedrooms, a dining room, a kitchen, a bathroom, three apartments for teachers, and a large space for teaching (practical course, screenings, social activities).

During field courses, students become familiar with field work including observation and biological sampling, identification of plant and animal species and basic analytical methods (Figure 2.6). Students also build permanent sample collections and herbariums. Field courses introduce students to biodiversity for the purpose of preserving and protecting important habitats and protected areas in Croatia.

Part of the practical work (mostly laboratories) is carried out in the research laboratories of the Department, which contain the necessary equipment. In order to maintain the high quality of teaching, investments are made in new equipment each year and necessary chemicals are procured. However, due to a larger number of students enrolled in the first year of the PSB programme, as well as the launch of the new graduate study programme, the investments in laboratory equipment will need to be larger to accommodate for an increased number of students especially in next two years when the number of students enrolled in all three years of the PSB programme will significantly increase. For these reasons, the Department of Biology has already been trying to find additional space that will enable it to maintain the high quality of practical courses.



Figure 2.6 Photographs taken during field courses organised by the Department of Biology

## 2.F. TEACHING OUTSIDE THE DEPARTMENT

Describe and assess the quality of teaching in workplaces outside your institution (workshops, farms, internship and other). Explain the system of monitoring internship attendance. Particularly, reflect on problems and possible improvements.

As part of some courses delivered by the Department of Biology, students visit various professional institutions, museums, etc. in order to familiarize themselves with the scope of their work. Examples of such visits are listed in Table 2.4.

Table 2.4 Institutions visited by students of the Department as part of some courses

Course	Institution	Location
Evolution	Krapina Neanderthal Museum	Krapina
	Museum of Slavonia in Osijek	Osijek
Marine Ecology	Gloria Maris Association	Osijek
Ecology of Terrestrial Habitats	Podunavlje Fishponds	Kopački rit

For example, during their visit to the Podunavlje Fishponds, students learned about the implementation and results of the international project Wetland restoration in the Mura-Drava-Danube area (Podunavlje fishponds restoration project). One of the project partners is the Croatian Society for the Protection of Birds and Nature, whose members informed students about their work and possibilities for students (i.e. future Masters of Science) to get involved in projects in the area of nature protection at a national or international level in the framework of NGO activities.

The course *Biological Collections* is partly delivered in the Croatian Natural History Museum in Zagreb, the Department of Entomology of the City Museum of Varaždin, and the Association Gloria Maris in Osijek, where students familiarize themselves with the permanent aquatic world exhibition.

As part of the seminar in the elective course *Ornithology*, each year in January, students participate as observers in the International Waterbird Census (IWC), which is organized by Wetlands International. Students observe birds in Baranja; their results are compiled with the data collected in the rest of Croatia and sent to the IWC coordinator for the Republic of Croatia and then to the Wetlands International.

The Department of Biology cooperates with the Agricultural Institute of Osijek where, as part of *Plant Cell and Tissue Culture* and *Fundamentals of Horticulture* courses, students familiarize

themselves with the application of biological research in the industry. Students also visited the Regional Biotechnology Research and Development Centre of the Brod-Posavina County located in M.A. Reljković secondary school in Slavonski Brod.

Student practice is conducted in accordance with the Ordinance on study programmes and studying at Josip Juraj Strossmayer University of Osijek:

[http://biologija.unios.hr/webbio/wp-content/uploads/2012/dokumenti/pravilnik\\_o\\_studiranju\\_HR.pdf](http://biologija.unios.hr/webbio/wp-content/uploads/2012/dokumenti/pravilnik_o_studiranju_HR.pdf).

Practice is conducted under the supervision of laboratory heads and mentors (teachers appointed to academic rank) and students are required to keep a practice journal which needs to be signed by the laboratory head and mentor:

[http://biologija.unios.hr/webbio/wp-content/uploads/2012/studenti/dokumenti/desktop\\_strucne\\_prakse.doc](http://biologija.unios.hr/webbio/wp-content/uploads/2012/studenti/dokumenti/desktop_strucne_prakse.doc).

The purpose of teaching/scientific practice is to teach students how to independently carry out research and professional activities for the purpose of writing their master's theses and their future employment. Table 2.5 gives an overview of the type and hours of practice conducted as part of the study programmes of the Department of Biology.

**Table 2.5 Type and hours of practice conducted as part of study programmes of the Department of Biology**

Study programme	Scientific research practice	Research practice	Teaching practice
Undergraduate university study programme in Biology		90 hours	
Graduate university study programme in Biology	30 hours		
Graduate university study programme in Biology and Chemistry Education			90 hours
Graduate university study programme in Nature and Environmental Protection		30 hours	

For the purpose of conducting the teaching practice as part of the DNSBK programme, the Department of Biology has entered into an agreement with 2<sup>nd</sup> Grammar school in Osijek, as well as Antun Mihanović Osijek and Vladimir Nazor Čepin primary schools.

In view of the increase in the enrolment quota for the PSB programme and the launch of the DSZPO programme, it is necessary to increase the number of research institutions, business entities, as well as government bodies with which the Department of Biology could enter into an agreement on student practice.



## 2.G. AVAILABILITY AND QUALITY OF THE CONTENT OF THE STUDY PROGRAMMES OFFERED ONLINE

Assess availability and quality of the content of your study programmes which is offered online.

The website of the Department of Biology <http://biologija.unios.hr/webbio> provides general information about the Department (general information, management, council and structure), as well as basic information concerning the organization and operation of each Sub-department. Students, as well as others can access the website of the Department and look up study programmes and Study Programme Implementation Plans for all study programmes delivered by the Department. In addition, students have access to current information (notifications, schedule of classes and exams, activities of student associations and the Alumni Club, notifications relating to the Erasmus programme, etc.). Vacancy notices of the Department are also published on the website. Students can also download the course materials for some courses (<http://biologija.unios.hr/webbio/nastava/nastavni-materijali>). There are no separate websites for individual courses offered within the study programmes of the Department.

Although the website of the Department of Biology provides basic information that students need, there is room for significant improvement in terms of content and optimal organisation of the site. The website should therefore be improved to make all relevant information readily available to both students and the teaching staff. A website is a visual representation of an institution as well as a representation of its professional and scientific identity. With that in mind, the Department plans to invest in the design and improvement of both the organization and the content of the website. Moreover, in addition to improving the Croatian version of the site, there are plans to translate relevant content into English to enhance the visibility of the Department. This would also facilitate international cooperation, both in terms of research and in terms of international exchange of students.

## 2.H. OVERALL STUDY PROGRAMMES AT THE DEPARTMENT

Comment on the overall study programmes at your institution and specify any plans and proposals for their change in the near future, together with reasons for the changes.

The quality of study programmes delivered by the Department of Biology has been monitored continuously since its establishment and the programmes were modified five times (the Undergraduate university study programme in Biology was modified twice, as was the Graduate university study programme in Biology and Chemistry Education, while Graduate university study programme in Biology was modified once; detailed description of changes can be found in Section 2.C.7.). The Department faculty are committed to enhancing the quality of studying at the Department as evidenced by the creation of a new program, i.e. Graduate

university study programme in Nature and Environmental Protection, for which the Department has recently been granted an accreditation license. The first generation of students has enrolled in this programme in this academic year.

The management and teachers of the Department will continue with their efforts to improve the existing study programmes, taking into consideration (as they have done so far) students' opinions and suggestions. For instance, there is an initiative to increase the share of Chemistry courses and introduce teaching practice into the Chemistry Module (the Undergraduate university study programme in Biology), increase the share of Chemistry courses in the Graduate university study programme in Biology and Chemistry Education, move the course *Organic Chemistry 1* to the second year of the Undergraduate university study programme in Biology, introduce an *English language* course to the Undergraduate university study programme in Biology, and *Introduction to Research* to the Graduate university study programme in Biology and change the status of some courses, for which students show greater interest, from elective to obligatory.

The Department has also considered reorganising the Undergraduate university study programme in Biology which would involve the existing Chemistry Module (for which students opt in the second year of study). This would change and students would have a possibility to choose a specialisation in the first year, which means that the Undergraduate university study programme in Biology would offer two specialisations, in Biology and in Chemistry, from the very beginning of the study.

Since the Department delivers courses in the STEM fields, we believe that the Ministry should bear the costs of delivering study programmes even when the number of enrolled students is smaller than 10.

## 2.1. LIFELONG LEARNING

Specify lifelong learning programmes carried out at your institution, enter the number of programmes with and without ECTS credits and their duration in the table.

The Department of Biology does not carry out any formal lifelong learning programme with ECTS credits. However, in this academic year, the Department has organized its first conference for Biology teachers. The goal of the conference was to present the latest research findings in Biology Teaching Methodology as an interdisciplinary science, as well as in other biological disciplines, in a popular and interesting way through lectures and workshops. The plan is to hold the conference, which was entitled *Learning how to teach Biology*, twice every academic year. One would be held in the summer and its main topic would be teaching methods for Biology, while the second would be held in the winter and its content would be related to Biology and Chemistry courses. The second conference is planned to take place in

February 2015. By participating in conference activities related to teaching methods for Biology and other disciplines, teachers will gain insight into the latest research in the field and use that in the planning and shaping of the teaching process, as well as in their personal and professional development. As the concept of lifelong learning is based on a continuous relationship between different institutions, this kind of activity promotes the cooperation between the Department of Biology and school teachers and students, thus contributing to further education and lifelong learning on both sides.

In addition to the conference described above, the Department of Biology, i.e. the senior teaching assistant in the course *Biology Teaching Methodology* acts as a coordinator and participates in the activities of the conference organized by the Education and Teacher Training Agency Regional office Osijek for trainee teachers of Biology. The senior teaching assistant also participates actively in conferences and workshops in Biology and shares his/her experience with the teachers of the Department of Biology. As a member of the Quality Assurance Committee, our colleague is planning a workshop entitled *Constructing Written Test Questions* to be held in February 2015 for all teachers of the Department of Biology, with the goal of contributing to lifelong learning of teachers.

## 2.J. SYSTEM FOR RECOGNITION OF PRIOR LEARNING AND SYSTEM FOR ACADEMIC RECOGNITION OF FOREIGN HIGHER EDUCATION QUALIFICATIONS

Explain the system for recognition of prior learning (informal and non-formal education).  
Explain the system for academic recognition of foreign higher education qualifications.

There is no system for recognition of prior learning (informal and non-formal education) at the Department of Biology. Recognition is performed by the Agency for Science and Higher Education.

The Department of Biology is a constituent, i.e. an organisational unit of the Josip Juraj Strossmayer University of Osijek without legal personality. In case the need arises to recognize higher education qualifications in the framework of the Department, this will be done by the Office for academic recognition of foreign higher education qualifications and period of study, established at the Josip Juraj Strossmayer University of Osijek.

## 2.K. FORMAL MECHANISMS FOR APPROVAL, REVIEW AND MONITORING OF PROGRAMMES

Specify and describe formal mechanisms for approval, review and monitoring of your programmes and qualifications.

New study programmes are approved in accordance with the Rules for the evaluation of study programmes at the Josip Juraj Strossmayer University of Osijek (the decision of the University

Senate adopted on the eighth session held on 10 June 2009). The procedure is as follows: a new study programme proposal is submitted, accompanied by the necessary documents (decision of the Department Council on the proposed study programme and a report explaining the reasons for proposing a new programme), 12 months before the beginning of the academic year at the latest.

New study programme proposal is developed by integrating and aligning individual proposals by Sub-departments, which is then discussed and finalized at numerous meetings of the teachers, the Cabinet and the Department Council.

The procedure for amending approved study programmes is described in Section 2.C.7. Study programmes are reviewed through a quality assurance system, i.e. by monitoring the learning outcomes. The process of re-accreditation for the purpose of which this self-evaluation is being conducted is also an important method of reviewing study programmes and qualifications.

## 2.L. SELF-ACCREDITATION OF STUDY PROGRAMMES

If your institution can self-accredit own study programmes, explain the procedure and criteria applied.

The Department of Biology of the Josip Juraj Strossmayer University cannot self-accredit its study programmes.

## 2.M. SATISFACTION WITH THE CURRENT SITUATION AND POSSIBLE IMPROVEMENTS

Specify to what extent you are satisfied with the current situation and propose possible improvements.

We are satisfied with the programme content offered by the Department of Biology and especially with the fact that as of this academic year we have started to teach classes in the new Graduate university study programme in Nature and Environmental Protection. Currently, the Department has a sufficient number of teachers and teaching associates delivering high quality teaching in their study programmes. However, in the future, the Department will need to employ young associate staff as teaching/research assistants, as well as professional associates, and laboratory technicians. The new premises used by the Department are of high quality, but they could prove to be too small relatively soon because the number of students has increased, so there is a need to provide additional teaching and research laboratories. Despite being higher, the enrolment quota for the Undergraduate

university study programme in Biology was filled in this academic year which shows that prospective students are interested in our programmes. Student performance is very good, but there is still room for improvement. We believe that our study programme learning outcomes have been adequately set and that they are well-aligned with the learning outcomes of individual courses and competencies acquired by the Department of Biology (under)graduates. Nevertheless, we will continue with the ongoing effort to improve our study programmes in line with the changing labour market needs, latest scientific knowledge in the area of Biology, and student suggestions. We will also continue to support the professional development of the Department teachers and other staff involved in the teaching process, and in particular encourage the production of study programme textbooks. We also intend to increase the textbook holdings and improve the quality of the Department website.

Appendix 2.1. Link between learning outcomes and the outcomes of obligatory courses at the Graduate university study programme in Biology

Obligatory courses	Course outcomes	Programme outcomes
<b>Upon successful completion of the course/study programme, a student will be able to:</b>		
Biochemistry 3	<p>Understand which mechanisms allow a living organism to respond to changes in the environment in an efficient and timely manner.</p> <p>Understand how specific ionic balance between the extracellular and intracellular space is maintained, as well as the possibilities and limitations of the transfer of ions and compounds to the cellular space.</p> <p>Understand the sophisticated interaction of complex protein structures involved in the mobility/activation of living organisms (bacterial motility, muscular mobility/activation of muscular systems).</p> <p>Understand the basic mechanisms of the immune response against foreign intruders (bacteria, viruses), the concept of autoimmune reaction and hypersensitivity.</p> <p>Understand the complex process of signal transmission to the intracellular space, and the possibility to induce an adequate response in order to maintain homeostasis.</p> <p>Monitor the complex processes of the transformation of protein molecules which are the basis of all sensory processes in humans and other living organisms.</p> <p>Attempt to design artificial sensory systems which emulate the studied natural systems.</p>	<p>Participate in research and professional teams involved in the research in the area of Natural, Biotechnical and Biomedical Sciences.</p> <p>High-quality and competent management of national and nature parks, fishponds, botanical and zoological gardens, and parks in general.</p>
Animal Physiology 2	<p>Understand the physiological responses of animal organisms in different environmental conditions.</p> <p>Explain the adaptive mechanisms of animal organisms to changes in the environment.</p> <p>Define the principles of adaptation to different environmental conditions in terrestrial and aquatic environments.</p> <p>Define the principles of adaptation to extreme environmental conditions.</p>	<p>Recognize the connection between different biological areas and other related disciplines.</p> <p>Conduct research-related field work as well as independently collect biological material and build herbariums and collections.</p>
Plant Physiology 2	<p>Relate complementary metabolic processes, such as photosynthesis and respiration, in terms of accumulating energy and using it in a cell.</p> <p>Relate metabolite distribution and transport in a plant.</p> <p>Define intracellular and intercellular regulation and regulation by environmental factors.</p> <p>Describe and explain the localization of growth, cell division, level of differentiation, aging, falling off of plant organs and the role and significance of plant hormones.</p> <p>Distinguish between chemical composition, biosynthesis, transport, physiological effects and mechanism of action of plant growth regulators.</p> <p>Describe and explain the processes involved in the physiology of movement, in particular free locomotor movements, organ movements, nastic, autonomous, turgor, hygroscopic and cohesion movements.</p> <p>Demonstrate the techniques of setting up and conducting experiments in plant physiology.</p> <p>Analyse the data from these experiments and formulate conclusions.</p>	<p>Use professional literature and standard keys for identification of plant and animal species.</p> <p>Apply appropriate methods in biological research.</p>
Virology	<p>Define and describe the basic concepts of genome organization and expression of individual viruses.</p> <p>Use professional literature and research issues related to virology using computer programs.</p> <p>Distinguish between harmful and beneficial effects of viruses on living organisms.</p> <p>Plan and apply basic methods of virus research.</p> <p>Properly use laboratory devices in virology experiments.</p> <p>Identify and describe individual viruses as important ecological and evolutionary factors.</p>	<p>Use equipment and devices in bioanalytical laboratories.</p> <p>Summarise, interpret and present the research results.</p> <p>Enrol in a postgraduate study programme in the area of Natural Sciences.</p>

<p>Quantitative Biology 2</p>	<p>Understand fundamental scientific methods, including the logic of experimental design and hypothesis testing. Independently select and apply basic statistical and computer methods for solving contemporary problems in Biology. Define the advantages and limitations of different statistical methods. Independently interpret the results of statistical analyses. Use the R programming language. Critically assess and analyse literature on ecology and statistics.</p>	
<p>Marine Ecology</p>	<p>Describe sea and ocean habitats. Describe interrelationships of marine organisms. Describe relationships between marine organisms and their habitat. Compare marine ecosystems developed in different geographic areas. Identify and explain the causes of changes in marine ecosystems. Define human impact on marine ecosystems. Independently analyse the effects of population regulation (predation, key species). Independently learn the content of similar courses building up on their knowledge of the ecology of marine organisms.</p>	<p>Participate in research and professional teams involved in the research in the area of Natural, Biotechnical and Biomedical Sciences. High-quality and competent management of national and nature parks, fishponds, botanical and zoological gardens, and parks in general. Recognize the connection between different biological areas and other related disciplines.</p>
<p>Plant Nutrients</p>	<p>Explain how plants acquire, transport and absorb nutrients. Explain the impact of chemical processes in the soil on the availability of nutrients for plant growth and development. Describe the role and importance of individual mineral elements in a plant. Analyse the symptoms of deficiency and excess of some elements necessary for plant growth and development. Give the reasons for hydroponic growing of plants. Define secondary plant metabolites.</p>	<p>Conduct research-related field work as well as independently collect biological material and build herbariums and collections. Use professional literature and standard keys for identification of plant and animal species.</p>
<p>Fundamentals Of Horticulture</p>	<p>Define and describe the fundamental concepts of horticulture (floriculture, vegetable farming, park design and planning, and dendrology). Apply the knowledge of botany to plant cultivation. Classify plant species in terms of various environmental and endogenous factors. Distinguish the basic methods of plant propagation. Use <i>in vitro</i> method of plant propagation. Use a computer program in developing horticultural design plans.</p>	<p>Apply appropriate methods in biological research. Use equipment and devices in bioanalytical laboratories.</p>
<p>Embryology and Evolution Of Organ Systems</p>	<p>Explain the basic concepts of Embryology and Developmental Biology. Understand the importance of size, shape, interconnectedness, and communication of cells for the normal functioning of the organism, fertilization and embryonic development. Use knowledge from other courses to fully understand the changes and processes that lead to the development of the organism - from fertilization to birth and throughout life. Conclude why environmental protection is important for embryonic development. Identify and recognize the different stages of early embryonic development - from the first division to the gastrula stage. Identify similarities and differences in the embryonic development of vertebrates and invertebrates, with a special focus on human embryonic development. Conclude which anatomical, morphological, physiological and behavioural adaptations have enabled the survival of different organism groups and influenced the course of their evolution - specialization and the emergence of new structures. Consider and develop a position on cloning, artificial insemination and the use of stem cells.</p>	<p>Summarise, interpret and present the research results. Enrol in a postgraduate study programme in the area of Natural Sciences.</p>

<p>Inland Water Ecology</p>	<p>Define the general characteristics of freshwater ecosystems.</p> <p>Identify the specific hydrological and ecological characteristics of individual types of systems - lakes, rivers, wetlands.</p> <p>Define the ecology of biological communities in aquatic ecosystems.</p> <p>Understand the problem of water eutrophication and the need for water protection.</p> <p>Perform sampling and analysis of physical, chemical and biotic factors of aquatic ecosystems.</p> <p>Develop an assessment of the environmental status of the aquatic system in accordance with the regulations currently in force.</p> <p>Independently define pressures on individual aquatic ecosystems and revitalization measures.</p> <p>Summarize and interpret research results and present them in the form of research posters.</p> <p>Follow the contemporary literature on trends in the changes of aquatic ecosystems and the consequences of global warming.</p>	<p>Participate in research and professional teams involved in the research in the area of Natural, Biotechnical and Biomedical Sciences.</p> <p>High-quality and competent management of national and nature parks, fishponds, botanical and zoological gardens, and parks in general.</p>
<p>Molecular Ecotoxicology</p>	<p>Define and describe the fundamental concepts of ecotoxicology.</p> <p>Identify the relationship between pollutants and different environmental components.</p> <p>Explain and analyse the fate of pollutants in the environment.</p> <p>Describe and explain the mechanisms of action and the impact of pollutants on environmental components.</p> <p>Apply the basic methods for evaluating the effects of pollutants at lower levels of biological organization, and independently measure the selected biomarkers.</p>	<p>Recognize the connection between different biological areas and other related disciplines.</p>
<p>Ecology of Terrestrial Habitats</p>	<p>Recognize the boundaries of terrestrial habitats.</p> <p>Define terrestrial habitat and list organisms living in it.</p> <p>Understand the features of the global atmospheric circulation.</p> <p>Understand the importance of soil as a precondition for the existence and maintenance of terrestrial habitat.</p> <p>Explain the biotic components of terrestrial habitats.</p> <p>List the major types of terrestrial habitats (biomes), and explain their correlation with macroclimate.</p> <p>Analyse the spatial distribution of biomes on earth's surface and their dynamics in time.</p> <p>Compare and analyse the similarities and differences in fauna of different biomes on earth.</p> <p>Distinguish floristic and faunal features of terrestrial habitats in lowland, foothill and mountain regions, as well as Mediterranean terrestrial habitats in the republic of Croatia.</p> <p>Name the typical representatives of plant and animal organisms and their adaptations to habitat and interactions.</p>	<p>Conduct research-related field work as well as independently collect biological material and build herbariums and collections.</p> <p>Use professional literature and standard keys for identification of plant and animal species.</p> <p>Apply appropriate methods in biological research.</p> <p>Use equipment and devices in bioanalytical laboratories.</p>
<p>Plant Developmental Biology</p>	<p>Explain the importance of applying the knowledge of differentiation processes and mechanisms during plant development.</p> <p>Adequately use biology terms.</p> <p>Describe, relate and critically analyse basic scientific knowledge of differentiation processes and mechanisms in plants.</p> <p>Explain the dynamic relationship principle between plant structures and their functioning during development.</p> <p>Analyse the continuity of developmental processes.</p> <p>Draw conclusions on the need to link practical work with theory.</p> <p>Identify, in the analysed scientific papers, the requirements for a valid scientific conclusion.</p> <p>Select appropriate methods and techniques for examination of a specific problem and hypothesis testing, as well as organize research.</p>	<p>Summarise, interpret and present the research results.</p> <p>Enrol in a postgraduate study programme in the area of Natural Sciences.</p>



<p>Immunology</p>	<p>Understand the complexity and relationship among various immune system components in the immune response.</p> <p>Understand the selective activity of the immune system directed only against the foreign intruders.</p> <p>Understand the genetic basis of a large number of factors involved in the immune response, as well as their extreme variability, which allows for the defence reaction of an organism against pathogen invasion.</p> <p>Detect the consequences of the disturbance in the synthesis and interaction of the immune system components which cause specific diseases (immunodeficiency, hypersensitivity, autoimmune diseases).</p> <p>Assess which immunochemical tests are required for organ transplants to avoid potential donor tissue rejection.</p> <p>Immunize laboratory animals.</p> <p>Perform basic immunohistochemical analyses.</p> <p>Isolate and identify the antibodies from human blood or blood of laboratory animals.</p> <p>Isolate lymphocytes and master the basics of working with lymphocyte cultures.</p>	<p>Participate in research and professional teams involved in the research in the area of Natural, Biotechnical and Biomedical Sciences.</p> <p>High-quality and competent management of national and nature parks, fishponds, botanical and zoological gardens, and parks in general.</p>
<p>Plant Molecular Ecophysiology</p>	<p>Define the molecular mechanisms of signal perception.</p> <p>Distinguish between the effects of abiotic and biotic environmental factors on plants.</p> <p>List and explain the functions of the Halliwell-Asada-Cycle enzymes.</p> <p>Assess the importance of the impact of abiotic factors on the molecular organization of the photosynthetic apparatus.</p> <p>Describe the changes in gene expression caused by changes in temperature, light, drought and anoxia.</p> <p>Distinguish the mechanisms of heavy metal tolerance.</p> <p>Explain the impact of air pollutants on the physiological status of plants.</p>	<p>Recognize the connection between different biological areas and other related disciplines.</p> <p>Conduct research-related field work as well as independently collect biological material and build herbariums and collections.</p>
<p>Animal Behaviour</p>	<p>Define the key concepts in animal behaviour.</p> <p>Explain the adaptive value of specific behaviours and the role of natural selection in the evolution of behaviour.</p> <p>Explain how a particular behaviour evolves during the life of an individual and describe the physiological mechanisms that control and generate animal behaviour.</p> <p>Relate the relationship between the environment and an animal and describe the adaptation of an animal to environmental conditions.</p> <p>Ask questions about a specific animal behaviour and respond to them from various aspects of the biology of behaviour.</p> <p>List the similarities and differences between animal and human behaviour, as well as analyse and explain animal behaviour as seen in a video or described in scientific and professional literature.</p> <p>Develop the capacity for critical observation and thinking, as well as the capacity for synthesizing new information.</p>	<p>Use professional literature and standard keys for identification of plant and animal species.</p> <p>Apply appropriate methods in biological research.</p> <p>Use equipment and devices in bioanalytical laboratories.</p>
<p>Scientific Research Practice</p>	<p>Organise field research and conduct fieldwork (sample collection, preservation and labelling, taking measurements in the field).</p> <p>Familiarize themselves with various laboratory techniques for the analysis of sample material, as well as for research purposes.</p> <p>Independently perform laboratory analyses as part of a research group and scientific or professional projects.</p>	<p>Summarise, interpret and present the research results.</p> <p>Enrol in a postgraduate study programme in the area of Natural Sciences.</p>

### 3. Students

#### 3.A. STUDENTS WHO APPLIED AND STUDENTS WHO ENROLLED UNDERGRADUATE, GRADUATE AND INTEGRATED UNDERGRADUATE STUDY PROGRAMMES

Comment on the quality and structure of the students who applied and students who enrolled undergraduate, graduate and integrated undergraduate study programmes, as well as professional study programmes, if any (numerical data in Table 2.1). Based on your experience, comment on the consistency and adequacy of their prior learning.

According to the structure of students enrolled in the Undergraduate study programme in Biology (PSB), the grammar school students prevail (92-96%), and only few come from vocational schools (4-8%). The number of applicants and enrolled students, the enrolment quota and the number of students from grammar and vocational schools in the PSB programme are shown in Figures 3.1 and 3.2. The trend of increasing the enrolment quota for students in the PSB over the past three academic years (from 50 to 70 students) has led to an increase in the number of enrolled students. However, their structure has not changed, and grammar school students continue to prevail (Figure 3.1).

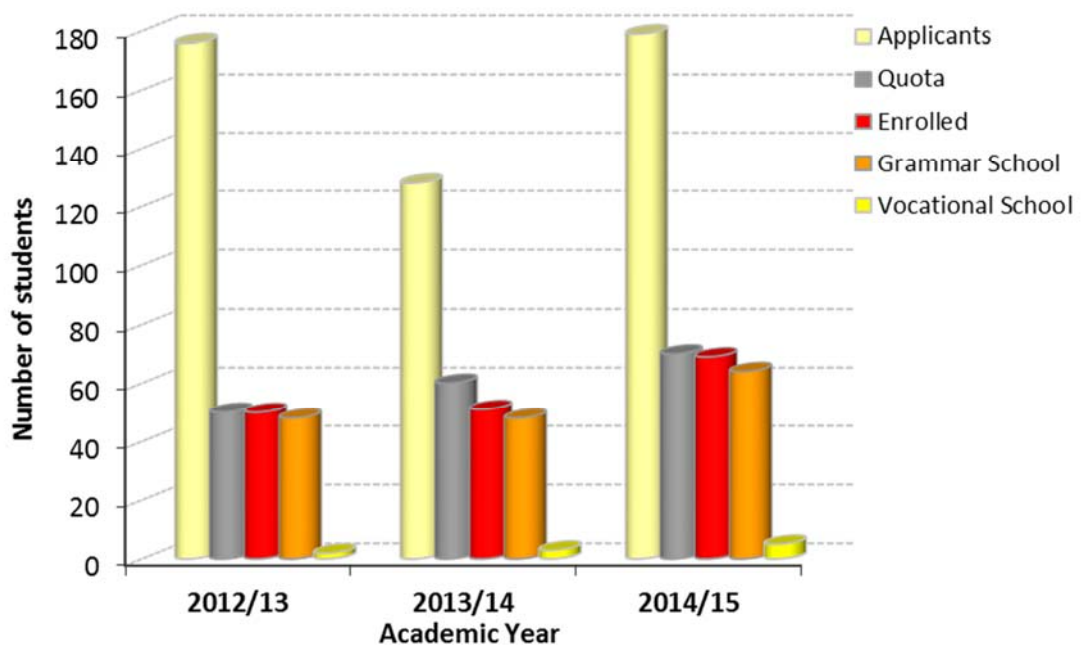


Figure 3.1 Number of applicants and enrolled students in the Undergraduate study programme in Biology (PSB)

In the reference period, the total number of applicants varies. In relation to the number of applicants, the PSB programme was the first choice for about 50% of students, which is a

relatively large number (Figure 3.2). Despite the greater variability of the total number of students who applied, the number of students for whom the PSB programme was the first choice is constant, and the number of students for whom this study programme was a second choice shows a slight downward trend. For the purpose of attracting motivated students, it is necessary to invest further efforts in promoting the Department of Biology, in order to increase the number of students whose first choice is the PSB.

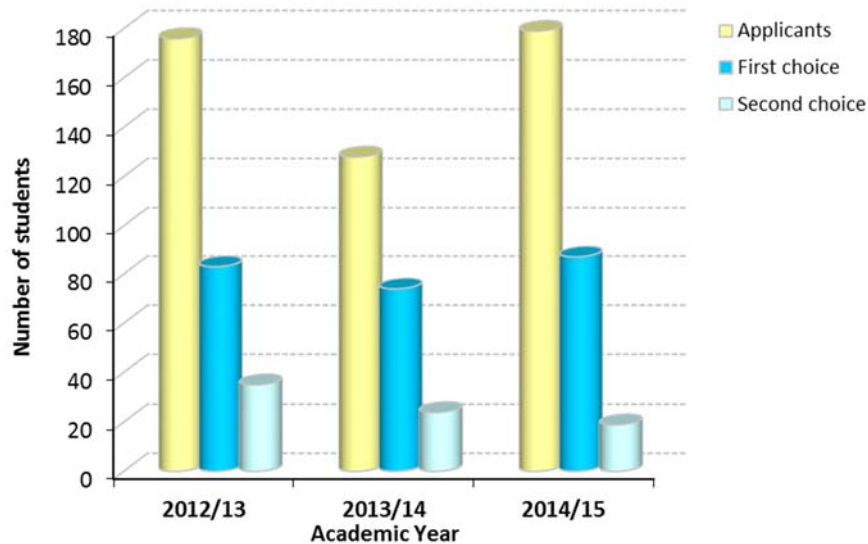


Figure 3.2 Number of students whose first and second choice was the undergraduate university study programme in Biology (PSB) compared to the number of applicants

In terms of quality, the PSB programme is enrolled by students with a very good (4) grade point average (GPA) at school (Figure 3.3) which is similar both in grammar schools (4.12 to 4.33) and in vocational schools (3.98 to 4.82).

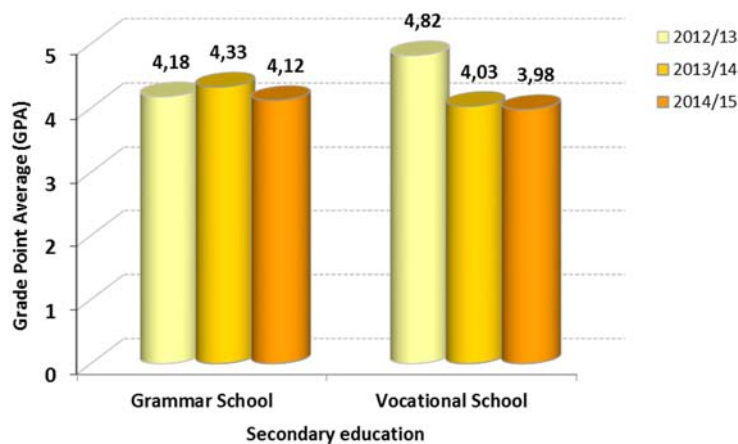


Figure 3.3 GPA of secondary school students - future students of the Undergraduate study programme in Biology (PSB)

How homogenous the students are is best seen in the comparison of the GA of enrolled students by the secondary schools from which they come and their grade point average (GPA) in the first year of the PSB programme. It is evident that there is no major difference in the GPA between the students from grammar schools and vocational schools. The GPA of all students in the first year of the PSB is notably slightly lower than the GA in secondary school (Figure 3.4), however, it is almost negligible and represents a logical process of adaptation to the academic approach to work at the Department of Biology.

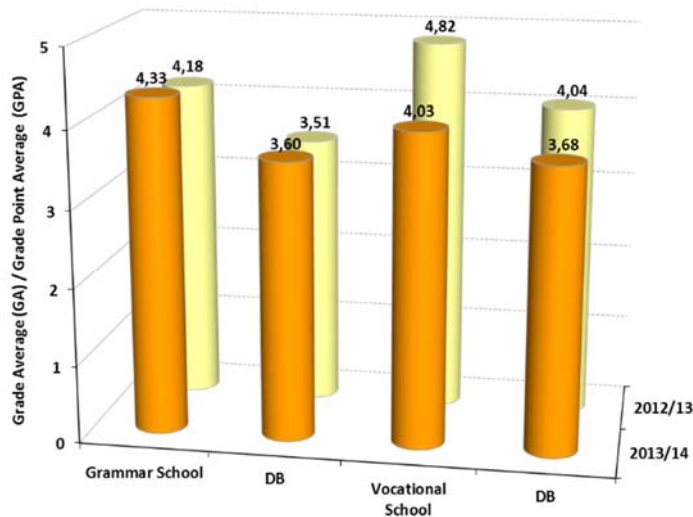


Figure 3.4 GA of enrolled students according to the secondary schools they come from, and their GPA in the first year of the Undergraduate study programme in Biology (PSB); (DB - Department of Biology)

After the completion of the undergraduate studies, there is a visibly slightly higher student interest in the Graduate study programme in Biology (DZSB) in comparison to the Graduate study programme in Biology and Chemistry Education (DNSBK) (Figure 3.5). Given that the delivery of the new Graduate study programme in Nature and Environmental Protection (DSZPO) started this academic year, the students have opted for it as well.

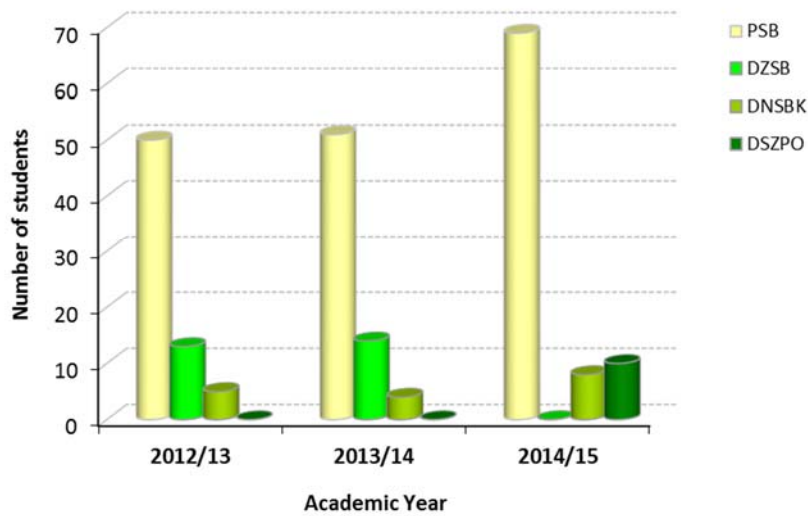


Figure 3.5 Number of students enrolled in the Undergraduate study programme in Biology (PSB) and in the graduate programs: Graduate study programme in Biology (DZSB), Graduate study programme in Biology and Chemistry Education (DNSBK) and Graduate study programme in Nature and Environmental Protection (DSZPO)

Although there has been slightly less interest for enrolment in the DNSBK, in the last two academic years the students who enrolled in this programme have had a slightly higher GPA in undergraduate studies than the students who enrolled in the DZSB and the DSZPO programmes (Figure 3.6).

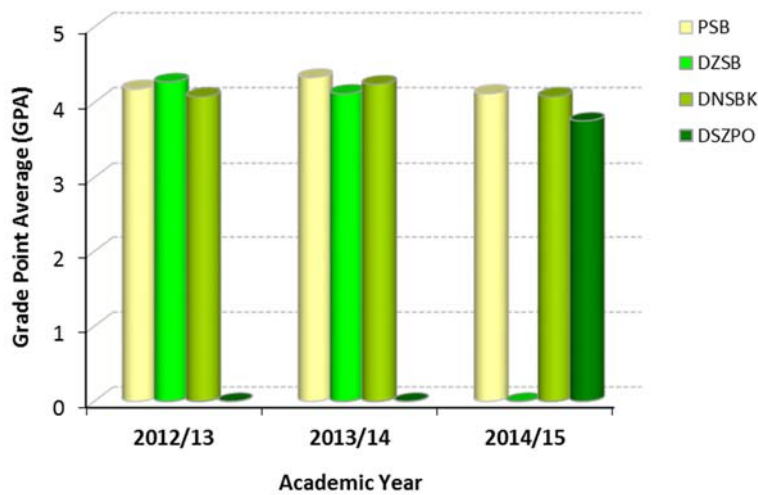


Figure 3.6 GPA of students enrolled in the Undergraduate study programme in Biology (PSB) and in the graduate programs: Graduate study programme in Biology (DZSB), Graduate study programme in Biology and Chemistry Education (DNSBK) and Graduate study programme in Nature and Environmental Protection (DSZPO) (cumulative GPA in the undergraduate studies)

It is evident from the above that the Department of Biology studies are enrolled by students with a very good (4) grade average, which most of them retain in further studies. Based on our experience, we can conclude that the structure of students and their prior learning are relatively homogeneous and sufficient for the successful continuation of studies.

### 3.B. PASS RATE ON STUDY PROGRAMMES

Comment data on the pass rate (numerical data in Table 2.2). Reflect on the enrolment quota, student motivation and organisation of teaching.

According to decision of the Senate of Josip Juraj Strossmayer University of Osijek on the conditions for enrolment in the next year of study, the conditions for enrolment in the next year of study of the Undergraduate study programme in Biology and all the three graduate study programmes are as follows:

- 1st year PBS students are entitled to enrol the second year of studies, if they have earned 48 ECTS credits;
- 2nd year PBS students are entitled to enrol the third year of studies, if they have earned 48 ECTS credits in the second year, and passed all the examinations from the first year of study;
- 1st year students of the graduate programme are entitled to enrol the second year of studies, if they have earned 48 ECTS credits.

The pass rate from a lower to a higher year of study for the period indicated in Table 2.2 is high and ranging across the generations from 65 to 90% at the undergraduate level, to 100% at the graduate level. The high pass rate can be explained by the relatively small number of students, thus providing for high quality work in smaller groups. The teaching staff members have been extremely dedicated and available to students. In addition to the time allocated for office hours, the teaching staff members are available to the students on an almost daily basis. In addition, the students in the first and second year of the DZSB carry out their scientific research practice in the area of their choice (laboratory and field research), and are thereby additionally encouraged to work. All students who show interest in research work, regardless of the study programme, have the opportunity to participate in it.

The students who enrol the PSB are in general motivated to study, and they regularly attend lectures and practical classes which helps them greatly in the preparation for and the taking of examinations. The motivation of candidates for admission to the PSB is also indicated by the data on the structure of enrolled students (Table 2.1), which shows that more than 90% of the students come from grammar schools, and it was also their first choice of a study programme. Based on this, the quality of a large number of students, with regard to the level of prior knowledge acquired in secondary schools, is satisfactory, which is a good foundation for easier learning of the tasks encountered in the studies, as well as for a good pass rate at the undergraduate and, subsequently, at graduate studies.

The proportion of students who have dropped out of the undergraduate programme is about 10%, which indicates that a very small number of students either cannot adapt to the requirements of the study programme or were subsequently redirected to some other studies. In the reference period (academic years of 2011/2012, 2012/2013 and 2013/2014) we have not had students who have

withdrawn from their graduate studies. The share of students who have lost the right to study, in the mentioned period, is much lower than the proportion of students who have withdrawn from the studies (less than 2%).

The GPA at the PSB is around 4, while the GPA in the DZSB is slightly above 4, and the average GPA in the DNSBK is excellent (5). One of the possible reasons for the high GPA is that teaching is very well organized and, in most cases, the practical classes thematically follow the lectures, which facilitates the acquisition of the required learning material for the exam. The students are also mature in their attitude and understand the seriousness of studies and studying. The practical classes are carried out in the laboratories, the teaching laboratories and in the classrooms equipped with computers and software packages suitable for individual courses. In most cases, the students have the opportunity to work independently under the supervision of teaching staff, while some of the practical classes are carried out as demonstration. In addition, it should be noted that, in the course of studies, the students also have field courses (Osijek city parks, Kopački Rit Nature Park, the Biology Station in Sunger, the Ruđer Bošković Institute, the Centre for Marine Research, Rovinj) which significantly complement the quality of teaching.

The enrolment quota for the undergraduate studies is 45 students for generation 2011/2012, 50 students for 2012/2013 and 60 students for 2013/2014, and 20 students for the graduate studies. The enrolment quota for the PSB in the reference period (academic year of 2011/2012, 2012/2013 and 2013/2014) were filled at almost 100%. The enrolment quota for the DZSB was filled at 100% in the 2011/2012 academic year, 65% in 2012/2013, and 70% in 2013/2014. The filling of the enrolment quota in the DNSBK programme is significantly lower, and has been less than 50% in the reference period, i.e. in the past three academic years. Namely, part of the students who complete their undergraduate studies in Biology at the University of Osijek, depart to comparable study programmes in Croatia, while a very small number of students who graduate from comparable undergraduate programmes in other Croatian cities enrol in the graduate studies at the Department of Biology, which is one of the reasons for the vacant enrolment quota in the graduate study programmes of the Department in the past two years. It should be noted that the Department of Biology is a relatively young institution, and, therefore, the promotion of both the existing graduate studies and the newly established DSZPO programme should be intensified.

If we look at the enrolment quota, it can be said that they match the Department capacities to organize quality education in groups of appropriate size in accordance with the statutory group size. In other words, the quality of the teaching staff, the facilities and the equipment at the Department of Biology are sufficient to work with the current number of students. However, it will not be sufficient in the future, because the workload of teachers will be increased in line with the increased enrolment quota, and, therefore, as a result, there will be a growing need of the Department for new young staff in terms of assistants, junior researchers, professional associates and laboratory technicians.

### 3.C. INFORMING POTENTIAL STUDENTS ABOUT *HE* INSTITUTE AND STUDY PROGRAMMES

Specify how you inform the potential students about your institution and study programmes that are offered (qualifications, competencies, possibilities of further education and employment) – information packages, web pages, brochures, leaflets etc.

For the purpose of informing prospective students about the Department of Biology and the study programmes offered, the Department has developed a strategy of promotion through a series of planned activities: updating web pages, printing brochures and information leaflets, recording media materials, organisation of scientific colloquia, etc.

The central promotion event of the Department of Biology and its study programmes is the University of Josip Juraj Strossmayer Fair, which is held every year in December. The information packages printed for the occasion contain the basic information about the Department and the study programmes, the admission requirements and the competencies acquired on completion of studies. In addition, the information on the possibility of further education and employment, and the contact data of the Department of Biology are available as well. The most valuable thing the University Fair offers is the direct communication of potential students with the students and teachers of the Department of Biology. The answers to the questions posed by interested students and the clarifications on the printed materials, videos and other promotional equipment (biological collections, laboratory equipment, devices used in research) leave a strong positive impression on the prospective studying at the Department of Biology. The students of the Department of Biology are crucial for the promotion of the Department at the Fair, and they prepare for the event through the Students' Union Subsidiary.

For each academic year, the Josip Juraj Strossmayer University of Osijek publishes the 'Guide for Prospective Students' in which prospective students get acquainted with the possibilities of studying at the Department of Biology, i.e. the University of Osijek.

The Department of Biology is advertised through the website of the Department ([www.biologija.unios.hr](http://www.biologija.unios.hr)) where one can find all the data on the study programmes, the study programme implementation plans, the sub-departments and the teachers. On the same page, prospective students can find information about events organised at the Department and the Josip Juraj Strossmayer University of Osijek.

It is understood that the links to the website of the Department of Biology can also be found on the website of the Josip Juraj Strossmayer University of Osijek [www.unios.hr](http://www.unios.hr), the central and most visited secondary school graduation portal [www.drzavna-matura.com](http://www.drzavna-matura.com), and the portal for university students and high school students in Croatia: [www.srednja.hr](http://www.srednja.hr). Information is also available on the website of the National Information System of Applications for Higher Education Institutions (NISpVU: [www.postani-student.hr](http://www.postani-student.hr)) and the Information System of Higher Education Institutions (ISVU: [www.isvu.hr](http://www.isvu.hr)). There are also links on the website of the Association of Biology Students - ZOA and the Croatian Biological Society.



In the near future, it has been envisaged to modernize the web pages of the Department of Biology and to adapt them to new technologies and means of content presentation.

All interested candidates can receive the necessary information about studying at the Department in person at the Student Administration Office, or by contacting the Office or the Department Management by phone or email.

The promotion of the Department takes place continuously through organized visits of the Department of Biology to primary and secondary schools. This year (2014), the Department of Biology organized for the first time the project of popularization of sciences titled 'Biologist-and-Me', which was attended by more than 100 primary and secondary school pupils who are interested in biology. This fact serves as proof that the Department of Biology is systematically working to improve the promotion and information sharing to prospective students on the study programmes, the qualifications and competencies acquired in the studies. The project has been designed to promote and popularize sciences and biologically valuable destinations in the city of Osijek and its surroundings, and was organised and implemented by the teachers and students of the Department of Biology. The promotion of the above event, i.e. the Department, continued over the following two months with the operation of three painted busses of the 'City Passenger Transport Ltd. Osijek' company, co-funded from the Osijek City budget. The busses transported pupils, students and teachers from one biological destination to another for the duration of the project. In the context of the event, at the Department, there was an exhibition of posters and wooden models 'Insects in the Culture' by Božo Kokan, senior curator at the Natural History Museum in Split, which were exhibited for the following three months. Upon completion of the project, a short promotional video material was made, now available on the website of the Department and the web pages of a non-profit student television and the radio station of the Josip Juraj Strossmayer University of Osijek (TRUE: [www.radio.etfos.hr](http://www.radio.etfos.hr)), which are intended for the development of teaching content of University constituents that are associated with this form of media activity.

In addition to printed information packages, the new graduate programme of the Department of Biology - Nature and Environmental Protection was promoted in the same way (a video).

The activities of the Department of Biology have one common goal and that is to popularize Biology. Every year the Department is promoted at the 'Brain Awareness Week' - an initiative by the *Dana Alliance for Brain Initiatives* for the dissemination of knowledge about the functions of the human brain and the preservation of its health, and the dissemination of knowledge about neuroscience. The 'Science Festival' is a festival of knowledge and innovation where the researchers and students of the Department of Biology present sciences in a popular, fun and easily understandable way through presentations, workshops, debates, etc., and thereby motivate young people to take part in research. Organized by the 'Science Festival' and the British Council, in collaboration with a number of Croatian institutions and under the auspices and financial support of the Ministry of Science, Education and Sports, the 'FameLab', an international competition of talents in the field of science communication, has been organised in Croatia since 2007. The Department is actively involved in this event as well. In the course of 2014, two events were organised at the Osijek Zoo: 'Australia in Osijek Zoo' and the 'International Bat Night' where the members of the Association of Biology Students - ZOA participated for the first time and prepared educational and entertainment contents for the visitors.

Perhaps the best promotion of the Department lies in student satisfaction which is what the Department has been constantly striving for.

### **3.D. ASSESSMENT OF LEARNING OUTCOMES AND ASSURANCE OF OBJECTIVITY AND FAIRNESS DURING EXAMS**

Describe reasons guiding you during the design of the assessment of learning outcomes (Table 2.3). Specify measures which assure objectivity and fairness during exams.

The Ordinance on studying at the Josip Juraj Strossmayer University of Osijek imposes continuous monitoring and assessment of students' performance during the semester and at the final exam. The basic model of assessment of learning outcomes is similar for most courses and is, as a rule, similar at both the undergraduate and the graduate programmes of the Department of Biology, and includes the assessment of practical classes, mid-term exams, individual work (homework assignments, seminars and scientific essays), written and oral exams. During the classes in a particular course, the acquired knowledge is checked through a number of mid-term exams which motivate students to work and encourage them to learn on a regular basis. Depending on the course, students who pass all mid-term exams have great advantages in the final examination (e.g. are exempt from the written or oral part of the examination). On completion of the course lectures, the students can take the exam which consists of the written and the oral part. The students who fail to pass the written part can take the oral exam at their own request. By cumulative assessment, which is specified in the learning outcomes for each course, the individual evaluation of a number of student activities (class attendance, practical classes, and active participation) and knowledge testing, one gets the objective picture of each student and it reduces partiality in the assessment. Impartiality and objectivity of the exams are provided by publishing the scores on the website of the Department, and by conducting oral examinations in front of other students who are taking the exam or in front of teaching/research assistants and junior researchers. The students can also review the corrected written exams. The Ordinance on studying stipulates that the exams and examination results are public. Students may complain about the assessment and ask for a re-assessment carried out by the Examination Committee and the course teacher may be part of the Committee, however, without the right to assess the student. The detailed description of the assessment of learning outcomes for each course in the current academic year is available on the website of the Department of Biology, which provides students with timely access to the verification of the fulfilment of obligations and the grading systems.

### 3.E. STATE OPINIONS OF STUDENTS ABOUT RELATIONS BETWEEN STUDENTS AND TEACHERS

State opinions of students about relations between students and teachers mentioned in student surveys and collected via other means, and comment on any problems and procedures for their resolution, as well as methods of informing the students about measures that you have undertaken.

The students express their opinion about the teachers in the common University Student Survey, the Department of Biology survey, and the internal surveys conducted by course lecturers which greatly contribute to the improvement of the teaching process.

Since 2006, the University Student Survey has been conducted almost every academic year in June, after the completion of classes. The survey contains questions that are directly related to the quality of teachers' work and their relationship with students. In the questionnaire, there is a section in which students can express their opinion on the course teachers. The response of students in filling in the survey has varied over the years. The results of the survey confirm the excellence of the student - teacher relationship at the Department of Biology.

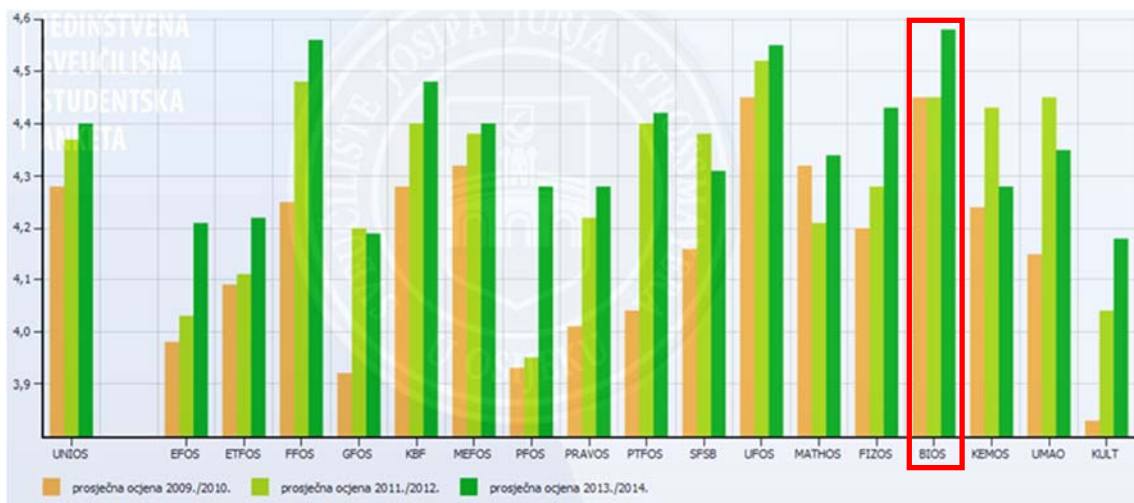


Figure 3.7 Average score of teachers of the Department of Biology (BIOS) and other constituents of the Josip Juraj Strossmayer University of Osijek

The University Student Survey shows that the teachers of the Department of Biology have been rated as very good with the average score of 4.45 for the academic years 2009/2010 and 2011/2012, and an excellent score of 4.58 for the academic year 2013/2014, which represents the best average score at the University of Osijek (Figure 3.7). The teachers of the Department have been rated the best (or among the highest ranking) teachers at the University of Osijek since the beginning of the implementation of the University Student Survey. In the analysis of the survey, the teachers are divided into teachers appointed to academic rank and teachers appointed to associate titles (teaching/research assistants). We are particularly pleased to

emphasize that the teaching assistants are by far the best-rated ones at the entire University (average score higher by 0.5 than the first following constituent of the University of Osijek). All the teachers are personally acquainted with the results of student surveys, and all subsequent surveys indicate progress in the teachers' score over the years (Figure 3.7).

Further analysis of average scores by teachers and assistants indicates a significant improvement in the average score for teachers from 4.30 in the academic year 2009/2010 to 4.57 in the academic year 2013/2014 (Figure 3.8).

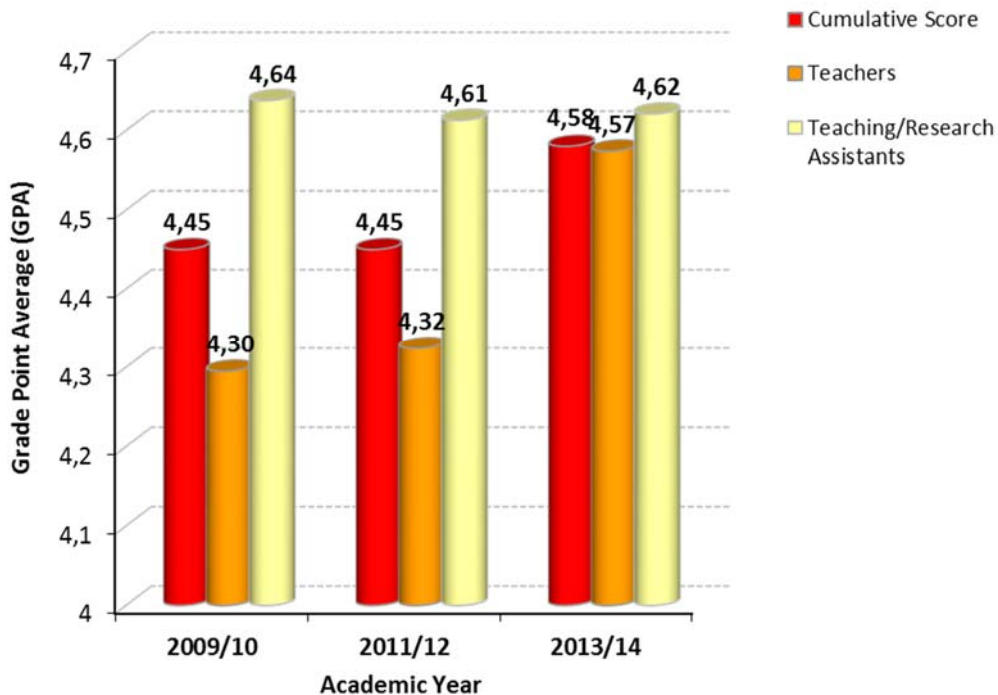


Figure 3.8 Comparison of the cumulative average score and the average score of teachers and associates

The opinions of students about the teachers can be seen in the responses to individual survey questions, as well as in their personal comments. The average ratings in response to questions that directly indicate the teacher's work were calculated and presented in Figure 3.9. The lowest score achieved in all the questions is very good (4). In the last assessment, progress was noted in the following categories: clarity of criteria of assessment, availability for consultation, encouraging students to activity and fairness in communication with students.

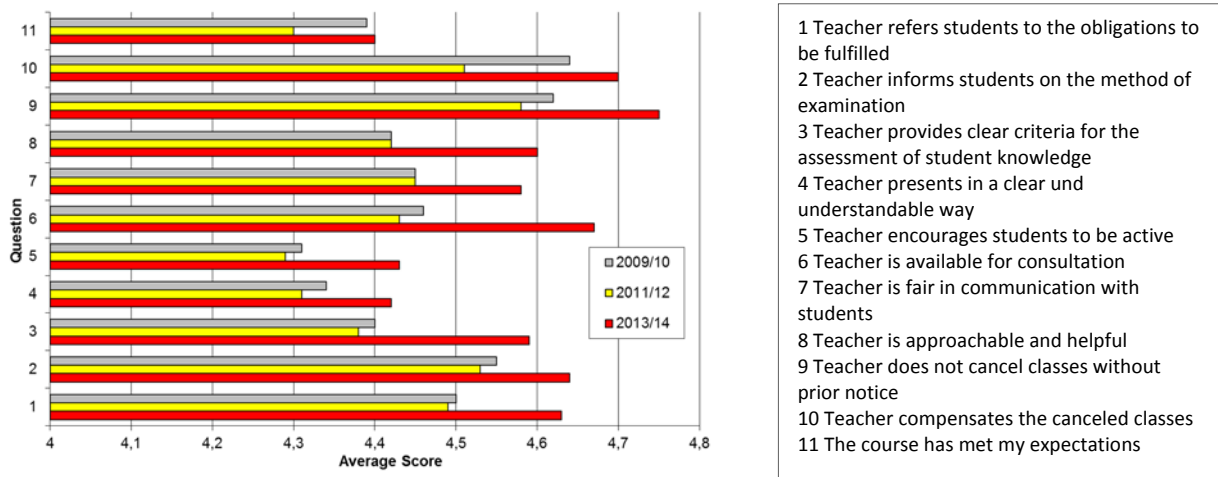


Figure 3.9 Display of survey questions and the average assessments given by the respondents indicating the relationships between the students and the teachers

### 3.F. STUDENT'S ACCOMODATION AND NUTRITION OF HE INSTITUTION AND EXTRA-CURRICULAR ACTIVITIES

Give your opinion on the problem of students' accommodation and nutrition. Specify and comment on the extra-curricular activities that you organize for students, if applicable (various courses, sport, recreation, etc). Comment on the quality and conditions of student life standard at your higher education institution (according to data in Table 3.2) and assess the degree of use. If you are not satisfied with the existing situation, identify the reasons and propose possible solutions.

The Student Centre in Osijek is an institution which is responsible, among other things, for students' accommodation and meals, as well as cultural, entertainment and sporting life of students. The students of the Department of Biology, as well as all other students of the University of Osijek have at their disposal two dormitories with a total area of 6,578 m<sup>2</sup> with a total of 713 beds, which is insufficient for all interested students. Therefore, most of the students residing outside Osijek are forced to use private accommodation which is unfavourable for the student life standard, as well as for the Student Centre, which issues about 900 subsidies for private accommodation annually.

In 2005, a new dormitory located at the University Campus in the immediate vicinity of the Department of Biology was opened; it has 457 beds in typical dorm rooms, rooms for the disabled, and apartments. The old dorm has 256 beds, and since it was fully renovated in 2009, the conditions therein have improved significantly.

Every academic year, through a public competition, according to the criteria set by the Ministry of Science, Education and Sports, the Student Centre Committee selects the beneficiaries of student dormitory accommodation and subsidized private accommodation.

Due to the fact that there are 2,500-3,000 applications processed in the competition, it is evident that the accommodation capacity of the dormitories is insufficient. The negotiations between the Josip Juraj Strossmayer University of Osijek and the Ministry of Science, Education and Sports signal a partial solution to the problem of student accommodation, as it has been envisaged to convert the currently abandoned 'Mursa' Hotel into a dormitory, which is to result in additional 250 rooms available to the students. The location of the prospective student dormitory is great, because it is located near the University Campus and the Student Centre, as well as the bus and railway station. There is a possibility of opening a student outpatient clinic in the same building, which would be an additional and important facility at the University. The lack of accommodation facilities should be resolved in the future by the construction of new dormitories and/or by increasing the number of subsidies for private accommodation of students in Osijek.

The Department of Biology has its own accommodation facilities (3 suites) primarily for the purpose of visiting lecturers, but also for the accommodation of teachers and students on international exchange.

The students of the Department of Biology have at their disposal three student restaurants with a total area of 4,000 m<sup>2</sup> and 1,100 seats: the 'Istarska' restaurant; the 'Gaudeamus' restaurant and the most frequently visited 'Campus' restaurant, because it is located in the vicinity of the Department. As well as for accommodation, students can receive a subsidy for meals (a total of 15,000 beneficiaries of the 'X-student card' (*iksica*) at the University of Osijek). The restaurants generally meet the needs of students, although the quality and quantity of meals is mediocre according to students' assessment, and there is a lack of quality menus for students with special diet (vegetarians and diabetics). Catering services are provided to students at the 'Student Club' cafe-bar and the 'Apsolvent' patisserie.

Although there is no canteen at the Department of Biology as at other faculties, there are two vending machines with hot and cold drinks, sweets and snacks and a kitchenette where the students can prepare a meal. The same area is regularly used by the newly graduated students for their reception.

All students can, through the Student Sports Federation, participate in numerous competitions representing the constituent which they are studying at, or they can play for the University team. Although there has recently been an initiative to establish one, the Department of Biology has no student sports club and the Department only participates in certain competitions. In May 2014, the students of the Department of Biology, together with the students of other Departments (Mathematics, Physics and Chemistry), took part in the academic sports event 'Primatijada' - for students of Natural Sciences and Mathematics Faculties on the topic 'Science in the service of sustainable development and environmental protection', which was held in Poreč.

In terms of extra-curricular student activities, we should mention the participation of our students in traditional events such as the 'Science Festival' and the 'Brain Awareness Week' in which our students participate with lectures, workshops and in the organization of the events. The students participate in the promotional activities of the Department aimed at popularization of Biology, 'Biologist-and-Me', and at the University of Osijek Fair.

The Department of Biology does not have sports and recreational facilities for students, but has a changing room (male and female) in case the students are using the basketball and handball courts in front of the building. Throughout the academic year, the students have at their disposal a fitness centre (200 m<sup>2</sup>) located in the Student Centre, as well as the open-air high school sports court with courts for basketball, volleyball, handball, football, jogging, exercise equipment and part of the courts adapted for people with disabilities. The construction of sports facilities (gym and sport courts) in the area of the University Campus has been envisaged, which will further improve the student life standard.

Through the Office for Sports Activities of the Josip Juraj Strossmayer University of Osijek, the students of the Department of Biology are able to engage in extra-curricular activities during certain periods of the academic year (mostly during winter and/or summer holidays): swimming, skating, rowing, volleyball, football, aerobics, zumba and classical dances. These activities are free of charge and take place at various locations in the city of Osijek. In addition, the Office organises various day trips (e.g. a trip to *Jankovac*).

The students are frequently offered various cultural events: concerts, exhibitions, book promotions, etc. Since not all of them are free of charge, full-time students should be provided with the opportunity of occasional free visits to the museums, galleries, theatres and cinemas by means of a 'cultural identity card' or they could be offered significant discounts. Students are voluntarily included in the work of NGOs, public, social, cultural and sporting life of the city of Osijek.

Some of the students of the Department of Biology are engaged in extra-curricular laboratory and field work with the teachers for the purpose of professional and scientific research, and there is an interest group that can respond to the invitation to organized lectures, seminars and scientific colloquia.

Although there is sufficient extracurricular content, the students' motivation to use it is lacking; therefore, one of the activities of the Students' Union Subsidiary and the Association of Biology Students - ZOA should be to inform students about the extracurricular activities and to encourage students to take part in them.

Within the Department building, there is the so-called student room which serves the students as space for learning and taking breaks. It is equipped with six desks, two central tables and a sitting area. The student room is used for the meetings of the Students' Union Subsidiary and the Association of Biology Students - ZOA. During working days the students have all the

classrooms at disposal, except for the computer lab, unless there are classes organised in them. The access to the computer lab is limited; nevertheless, once new computer equipment and video surveillance have been installed in it at the beginning of next year, the computer lab will be available to students without restrictions. Free internet access is provided in all areas of the Department for students who have their own computers.

The Library of the Department of Biology has an area of 168.85 m<sup>2</sup> which includes a reading room with 20 seats. In principle, the Library would be used much more if it were not off-site - located at the Department of Mathematics, i.e. in the building where the Department of Biology used to be located in the past.

Current student standard is unsatisfactory in terms of accommodation and meals and needs to be improved. The space for studying, sports facilities and recreational facilities are sufficient, although underutilized due to lack of motivation by the students and the lack of possibility of using them at any time of day or year.

### 3.G. SPECIAL MEASURES INTRODUCED TO MOTIVATE STUDENTS

Specify possible special measures you introduced in order to motivate students (awards, recognitions, etc.) and comment on the effectiveness of such measures.

Every academic year, the Rector of the University of Josip Juraj Strossmayer of Osijek gives awards to two most successful students at the academic and artistic-educational constituents of the University for the previous academic year. The students of the Department of Biology are awarded prize for excellent seminar or professional papers or for an excellent GPA (4.5 or above). Each academic year, the Head of the Department of Biology awards the most successful students for the previous academic year. The award is given to the best students per year of study (except for the first year) and specializations, and, in addition to the recognition, the students receive a monetary award. In addition, the Osijek Lions Club awards annual prizes for the best students of the University of Josip Juraj Strossmayer in such a way that one student is to be awarded at each constituent of the University. Since there are many excellent students, each student is entitled to only one prize per year.

In addition to the above awards, which motivate students to achieve a higher GPA in their studies, the Department of Biology also encourages students to participate in research. If the students participate in research and if the results of their work are accepted for a presentation at a scientific conference, the Department of Biology co-finances the participation in the conference. The Department also co-finances the travel expenses for those students who decide to take part in student exchange under the Erasmus programme.



### 3.H. MEASURES OF STUDENT SUPPORT

Specify supportive measures that you provide to students (mentorships, career counselling, study aid, aid for students with special needs and for international students, legal and financial support, etc.)

At the session of the Council of the Department of Biology (27 November 2014), the mentors for individual study years were appointed in order to provide support and assistance to students. As required, the students can contact their mentors who will familiarize them with the work of the Department of Biology, the organization of lectures and exams, resolve open issues and further familiarize the students with the basic regulations related to students and the studies, inform them about the possibilities of education, etc., and they can also contact them in case of any personal problems.

In addition, the students can contact the Secretary of the Department of Biology from whom they can learn about their student rights, obtain legal advice and seek help in resolving their problems in general.

The teachers hold regular office hours weekly and by appointment during which the students can get assistance in learning. The teaching staff members advise students and guide them to certain activities, depending on their interests. The ratio of the total number of students and the total number of full-time teachers and assistants (the average student-teacher ratio in the past five years is 14.8, and the average student-assistant ratio is 9.0) provides for interactive communication, the mentoring approach in working with students, the organization of instruction in small groups and customization of teaching methods to student needs. Good communication and cooperation between the teachers and students is evident in the active participation of students in scientific research of various laboratories of the Department of Biology during the course of their studies, the students in graduate programs in particular.

The Department of Biology participates in students' activities by providing financial or other support (financial, legal and logistic support to the Association of Biology Students - ZOA). The students of the Department of Biology participate in the international exchange of students in which the Department partially covers the travel expenses. The Department of Biology also co-finances the participation of students at scientific conferences. Given the difficult financial situation, the Department of Biology regularly meets the students' demands and approves instalment payment of tuition, and lower income students can be granted partially or completely free tuition. In exceptional cases, when students cannot secure accommodation on time, the Department of Biology, provides students with accommodation in the Department apartments.

The applications for transfer from other studies are dealt with individually, and enrolment may be granted to students from other higher education institutions whereby, if necessary,

the students are required to pass the differential exams. The Department of Biology allows senior undergraduate and graduate students and the students repeating a study year to take the exams in agreement with the teachers every month.

The Department of Biology has all the preconditions for receiving students from abroad and the implementation of studies or traineeship. Foreign students are offered a large number of courses that can be delivered in English, which are published on the website of the University (as part of the Erasmus programme). Foreign students can refer to the course lecturers for help with literature, examinations, etc. The students who come for the purpose of traineeship and work experience (IAESTE), make arrangements regarding their work with the mentor or the head of the respective laboratory.

The Management of the Department of Biology takes care of students with disabilities in order to adapt teaching to their needs (forms of delivery of teaching, the duration of lectures and practical classes, ways of examination and taking the exams, etc.). In this way the Department of Biology provides students with disabilities with quality education and successful studying. One Department staff member participated in an educational workshop on equal opportunities for disabled students in higher education in the Republic of Croatia within the framework of the project 'Tempus Joint Project- Education for Equal Opportunities at Croatian Universities - EduQuality' implemented by the University of Zagreb.

The building of the Department of Biology is adapted to meet the requirements of disabled people and has an access ramp for the disabled and an easily accessible elevator. In order to exercise their rights related to the adjustment of instruction and examinations, as well as for any other issues, assistance and information, students with disabilities may contact the Management of the Department of Biology. In addition, since the 2009/2010 academic year there is the Office for Students with Disabilities at the Josip Juraj Strossmayer University of Osijek. The Office for Students with Disabilities acts primarily as a common university office which provides students with disabilities with information and support in the Office premises, and aims to resolve the specific needs of students with disabilities.

Support to students is provided by the Students' Union as well, which is the student representative body and which protects their interests. In addition to the University Students' Union, each constituency of the University also has a Students' Union Subsidiary. The Students' Union Subsidiary helps students in studying, takes care of the quality of the life of students and the quality of the studies. In addition to the Students' Union Subsidiary, the Department of Biology has a Student Ombudsman who cares about the development and implementation of student rights and student standard, advises students about the manner of exercising their rights, and points to current and potential problems.

Student support is organized at the University level as well, by the opening of the Career Counselling Service that operates within the University Quality Assurance Office. The Career

Counselling Service prepares students for the labour market by organizing group counselling and providing individual professional advice.

### 3.I. DOCUMENTS REGARDING THE PROTECTION OF STUDENT RIGHTS

Attach documents regulating the protection of student rights (appeal procedures, student ombudsperson, etc.)

The protection of student rights is regulated by the following:

- Ordinance on studies and studying at the University of Josip Juraj Strossmayer University of Osijek;
- Ordinance on the Students' Union of the Josip Juraj Strossmayer University of Osijek;
- Ordinance on the conditions and manner of exercising the right to apply for scholarships and subsidies at the Josip Juraj Strossmayer University of Osijek;
- Ordinance on disciplinary responsibility of students of the University of Josip Juraj Strossmayer and
- Ordinance on grants and scholarships to students in need at the Josip Juraj Strossmayer University of Osijek.

It is necessary to point out that since the establishment of the Department of Biology in 2005, there have been no written complaints or objections lodged by students.

In principle, there have been some verbal complaints which have been dealt with by the services of the Department of Biology to the benefit of the student.

### 3.J. REACHING OUT TO ALUMNI

Specify methods for reaching out to alumni and how you collect data on their employment, as well as other information relevant for improvements of your study programmes.

On 13 April 2013, the Department of Biology founded the Alumni Club of the Department of Biology, of the Josip Juraj Strossmayer University of Osijek (the *Bio/Os* Alumni Club). The *Bio/Os* Alumni Club gathers students who have completed university undergraduate or graduate programmes at the University Department of Biology. One of the main objectives of the Alumni Club is to build and strengthen the relationship between the alumni and the Department of Biology, as well as the networking of students with the labour market. As part of the inaugural assembly of the Alumni Club, lectures by the Centre for Entrepreneurship were organised on EU funds, the currently available funds and the possibilities of project applications.

The record of students who have completed their studies at the Department of Biology is kept through the Alumni Club, as well as the collection of data on their employment. The *Bio/Os* Alumni Club has currently 64 members. Given that many members of the Alumni Club are biology and chemistry teachers and work in schools, visits of pupils to the laboratories of the Department of Biology have been organised on several occasions. This helps to maintain cooperation between the alumni and the Department of Biology, and also serves as promotion of the Department of Biology.

In addition to the follow-up on graduate students through the Alumni Club, the Department of Biology is in contact with the Croatian Employment Service and receives data on the current number of unemployed biologists (Table 3.3).

### 3.K. SATISFACTION WITH CURRENT SITUATION AND PURPOSE OF POSSIBLE IMPROVEMENTS

Specify to what extent you are satisfied with the current situation and propose possible improvements.

By relocation to the University Campus, the Department of Biology has received larger and more suitable premises, and, therefore, new, better opportunities for research and teaching. However, one of the problems that the Department has been facing on a daily basis is the lack of understanding by the general public regarding the name – University Department as a constituent of the University, which is why many perceive the Department as a category ‘lower’ than a Faculty. It is possible that this is one of the reasons for the decreased interest of students in the graduate studies of the Department of Biology, because they want to graduate from Faculties with a longer tradition than the one of a University Department. However, the Department has been investing continuous efforts to improve the quality of study programmes and contribute to Osijek becoming and remaining a desirable place to study.

The interest of applicants to enrol the PSB programme at the Department of Biology is very good (the enrolment quota for the first enrolment period were filled at about 100% in the reference academic years). The students are a homogeneous group of mostly grammar school students, whose prior learning is satisfactory and sufficient for the study programmes which results in a high pass rate in the undergraduate and graduate studies. However, the Department of Biology still needs to take additional measures to ensure that, in the future, the Department enrolls students with even better prior knowledge in order to educate them as high quality students highly motivated to complete their studies at one of the three offered graduate study programmes of the Department of Biology. Therefore, the Department has envisaged to set up different enrolment criteria, i.e. has considered the possibility of prescribing a higher level of obligatory subjects at graduation (Croatian language,

Mathematics, foreign language), and, in addition to the existing evaluation of the elective subject grades in biology, to evaluate the grades in Chemistry and Physics as well.

In addition, there is the need to continue working on the improvement and promotion of the study programmes in such a way that promotional materials are delivered to secondary schools (3rd and 4th year students) on the eve of the University Fair, and to establish the presentation of study programmes in high schools and vocational schools at the end of each academic year in order to attract prospective students to the studies at the Department of Biology. During the promotional activities, information should be available on the notice boards of secondary schools and in regional television and radio station programs in Osijek-Baranja County and beyond.

The student - teacher ratio at the Department of Biology is very good to excellent, which is reflected in the results of the student surveys. It is a result of quality teachers and associates who deliver instruction in properly equipped space at the Department of Biology, and who motivate the students to acquire knowledge, which is evident from the results of the learning outcomes. Although the results of the University Student Surveys are excellent, there is dissatisfaction with the implementation of the University Student Surveys primarily because:

- they are not held every year;
- they are conducted exclusively at the end of the academic year (a big time gap from the completion of individual courses; absence of students who reside outside the city of Osijek);
- many students do not respond due to the time schedule of the survey;
- there is a discrepancy in the evaluation of individual teachers (more courses they lecture - potentially higher overall average score).

One of the priorities of the Department of Biology is to learn about the basic problems faced by students, and one way would be for the Management of the Department to organize students' panel discussions in which the current issues of the teaching process and students' rights and obligations would be discussed several times a year.

Improvements should be sought in raising the living standard of students at the Department of Biology through collaboration with the University. Cheaper and sufficient accommodation is certainly a prerequisite to improve the situation, as well as increasing the quality and reducing the prices of meals. Extracurricular sports activities at the University level have no continuity, and they are offered to the students of the Department of Biology mainly in the period of winter and/or summer holidays. Therefore, there is no increased interest by Department students; therefore, the Students' Union Subsidiary, which is actively involved in all strategic issues related to studying, should make further efforts to this end.

Due to good communication between students and teachers, the readiness of the Department to assist in dealing with student problems, as well as in providing support for student activities, the Department is satisfied with the types of support provided to students. As for the

monitoring of graduates, the *Bio/Os* Alumni club gathers graduated students of the Department and collects data on their employment. It has been planned to further intensify the work of the Alumni Club in order to enhance cooperation between the alumni and the Department of Biology. The goal of the Department of Biology is for the Alumni Club to become a partner in raising the quality of the study programmes, and it is the desire of the Department to increase the employment of graduates.

The satisfaction with the current situation serves as a solid basis for further improvements.

Study programme	Full-time students	Senior undergraduate / graduate students (' <i>apsolventi</i> ')
Undergraduate university study programme in Biology (2011/2012)	128	8
Undergraduate university study programme in Biology (2012/2013)	133	8
Undergraduate university study programme in Biology (2013/2014)	156	6
<b>Undergraduate university study programme in Biology</b>	<b>417</b>	<b>22</b>
Graduate university study programme in Biology (2011/2012)	49	16
Graduate university study programme in Biology (2012/2013)	40	23
Graduate university study programme in Biology (2013/2014)	26	26
<b>Graduate university study programme in Biology</b>	<b>115</b>	<b>65</b>
Graduate university study programme in Biology and Chemistry Education (2011/2012)	15	4
Graduate university study programme in Biology and Chemistry Education (2012/2013)	11	0
Graduate university study programme in Biology and Chemistry Education (2013/2014)	13	5
<b>Graduate university study programme in Biology and Chemistry Education</b>	<b>39</b>	<b>9</b>
<b>In total</b>	<b>571</b>	<b>96</b>

**Table 3.2 Student life standard (List the data on the following elements of student life standard that exist at your HEI)**

		Area (in m <sup>2</sup> )	Number of seating or active workplaces
Study area *	4 lecture halls*	232.56	172
	4 teaching laboratories*	178.04	40
	Area used exclusively for research work* (11 rooms)	388.09	80
	Teaching base for practical courses ( <i>Sunger</i> )	400	45
	Student room*	70	20
	Library (off-site)	168.85	20 (228 active users )
Student restaurants (15000 X-card users )	'Istarska' Restaurant	-	500
	'Gaudeamus' Restaurant	-	100
	'Campus' Restaurant	-	500
Other dining facilities	'Studentski klub' Cafe	-	-
	'Apsolvent' Patisserie	-	-
	kitchenette*	34	20
Student accommodations	2 Student dormitories	6,578	713
	Private accommodation	-	-
	3 apartments* (for students in international exchange)	47	4
Sports facilities**	Fitness centre	200	20 (100 active users)
Facilities for student associations and cultural activities	Students' Union Subsidiary* of the Department of Biology (using the students' room)	70	20
	Association of Biology Students - ZOA* ( using the students' room )	70	20
Recreational facilities **	Sports courts in front of the building ***	1,000	30

\* The rooms in the building of the Department of Biology (the Department does not have space that is used solely for scientific research, but the above space (11 rooms) is at the same time space used to deliver part of the teaching process)

\*\* The students of the Department of Biology can use the sports hall of the Faculty of Education, the '*Gradski Vrt*' (City Garden) Sports Hall, the City Pools, the *Sokolski Dom* ice rink, the pool of the '*Iktus*' Rowing Club, the sports halls of the Educational and Cultural Center of Hungarians, *August Šenoa* Primary School and *Franjo Krežma* Primary School

\*\*\* Sports courts in front of the Department of Biology

Table 3.3 Graduate employment

Study programme name	Number of graduates in the past three years	Number of unemployed according to the statistics of the Croatian Employment Service
Undergraduate university study programme in Biology	80	0*
Graduate university study programme in Biology	64	10
Graduate university study programme in Biology and Chemistry Education	20	3

\* Students who complete the Undergraduate study programme in Biology at the Department of Biology mostly enrol in graduate studies (at the Department of Biology or similar institutions), and, therefore, do not register at the Employment Service with the undergraduate studies diploma.

Source: CIHI Osijek Subsidiary, unemployment data for Osijek-Baranja County as at 31 October 2014.



## 4. Teachers

### 4.A. THE STRUCTURE OF TEACHERS AND ASSOCIATES

The structure of teachers and associates at the Department of Biology as at 30 September 2014 is presented in Table 4.1 and in Figure 4.1 and 4.2. The Department has 63 full-time employees, including 20 teachers appointed to academic ranks (5 full professors, 4 associate professors, and 11 assistant professors). There are 21 teaching/research assistants of which 14 are postdoctoral researchers and senior teaching/research assistants (two are junior researchers), two professional advisors, two senior professional associates, one professional associate and two laboratory technicians. The staff members involved in teaching account for a total of 76% of employees (Figure 4.1).

**Table 4.1 Structure of teachers and associates at the Department of Biology**

Staff	Full-time staff		Cumulative employment		External associates	
	Number	Average age	Number	Average age	Number	Average age
Full Professors	5	58.6	1	63		
Associate Professors	4	51			3	49
Assistant Professors	11	38.1			9	44.9
Postdoctoral Researchers, Senior Teaching/Research Assistants	12	35.3			1	39
Teaching/Research Assistants	7	31.6			7	31
Junior Researchers - Postdoctoral Researchers	2	30				
Senior Lecturers	0	0			1	36
Lecturers	0	0			1	45
Professional Advisors	2	42.5				
Senior Professional Associates	2	46				
Professional Associates	1	31				
Laboratory Technicians	2	47				
Maintenance staff	3	40				
Administrative staff	9	44				
Support staff	3	47				

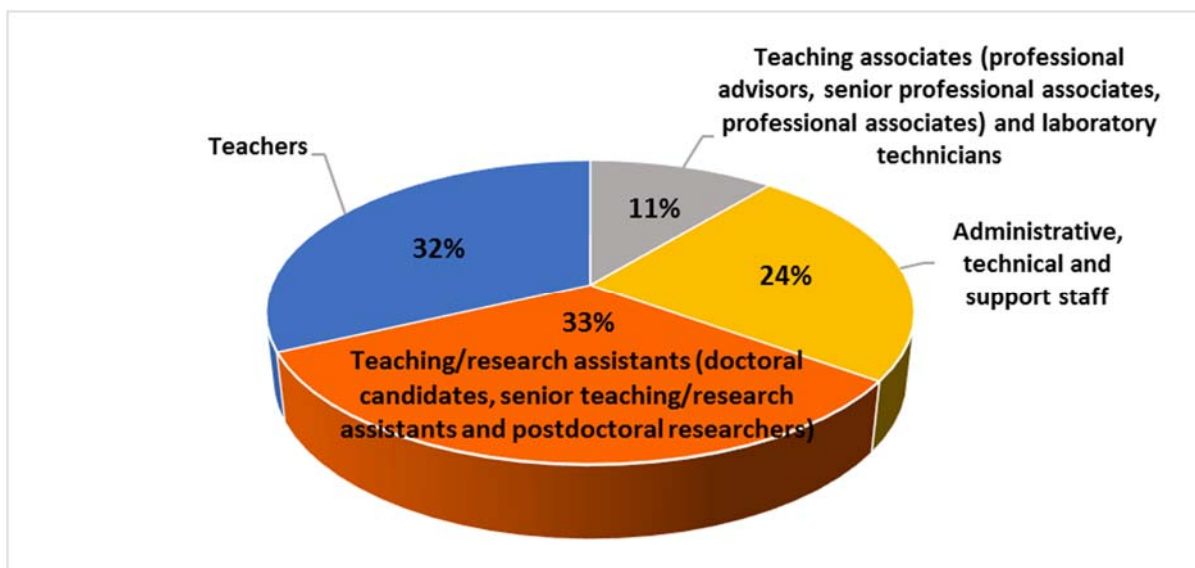


Figure 4.1 Share of teaching and non-teaching staff in the total number of employees

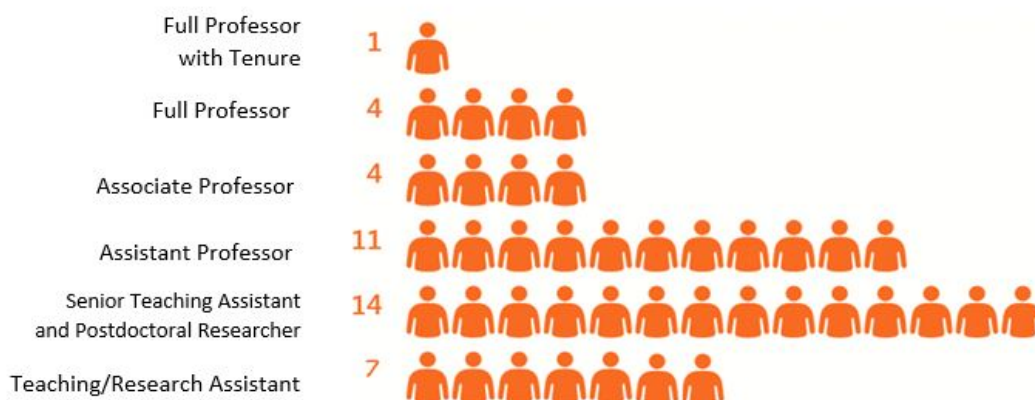


Figure 4.2 Number of teachers and assistants by rank or title

The average age of the teachers and the teaching/research assistants (Table 4.1 and Figure 4.3) is appropriate for their rank or title, thus the youngest group are the teaching/research assistants (31.6). Just a slightly older group are the postdoctoral researchers and senior teaching/research assistants including junior researchers (34.5), followed by assistant professors (38.1), associate professors (51) and full professors (58.6). The biggest difference in age is between the assistant professors and the associate professors, which is a result of human resources development of the Department. Namely, most assistant professors currently employed at the Department are a group of young and capable staff employed as junior researchers at approximately the same time. Along with their teaching assignments, they have successfully completed their doctoral studies and published the requisite number of scientific papers in the field of Biology (a very demanding criterion which, under the conditions of the Rectors' Conference, prescribes nine scientific papers for the appointment to a research rank, of which at least six must be cited in Current Contents (CC), and the others in SCI expanded).

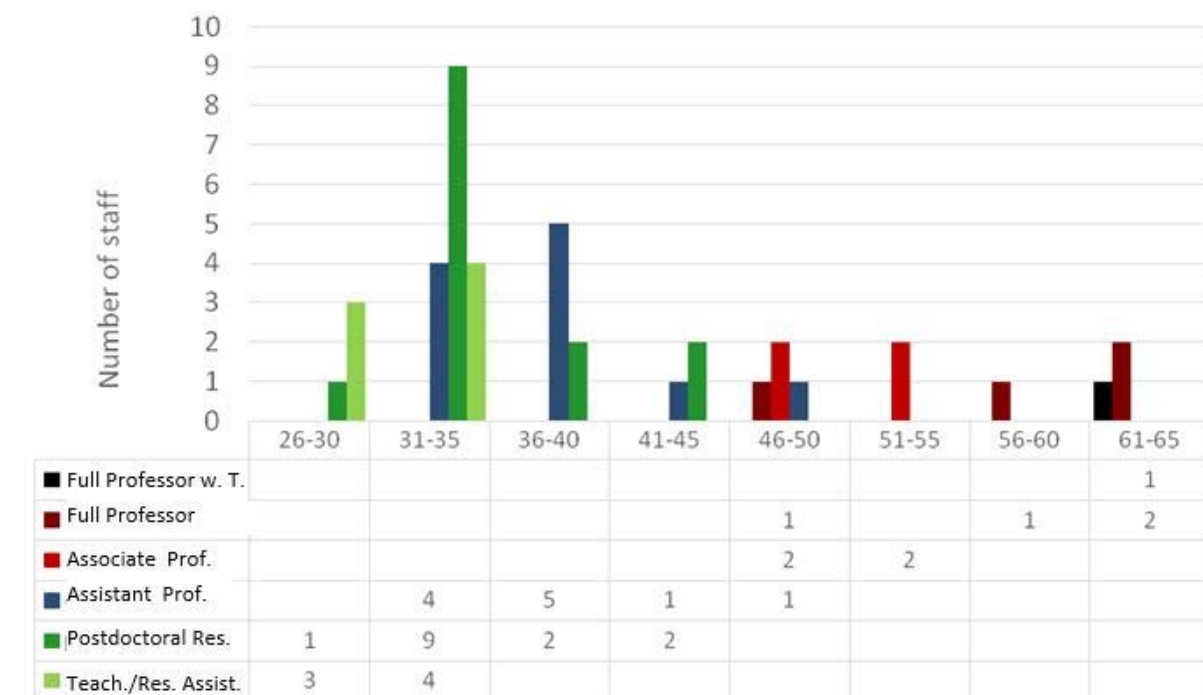


Figure 4.3 Number of employees in individual ranks with respect to age

The Department has only one Full Professor with Tenure with cumulative employment (40% Department of Biology, 60% Ruđer Bošković Institute in Zagreb).

There is no need for external associates in either the Graduate study programme in Biology (DZSB) or the Graduate study programme in Nature and Environmental Protection (DSZPO), whereas there was a total of 22 external associates engaged as teaching assistance in the Undergraduate study programme in Biology (PSB) and the Graduate study programme in Biology and Chemistry Education (DNSBK) in the academic year 2013/2014: three associate professors, nine assistant professors, one senior assistant – postdoctoral researcher, seven teaching/research assistants, a senior lecturer and a lecturer. They are primarily engaged in teaching chemistry-related courses, partly in teaching pedagogy-, psychology- and didactic-related (PPD) courses, and in physical education (PE); see Figure 4.4 and 4.5, and Table 4.1 and 4.2.

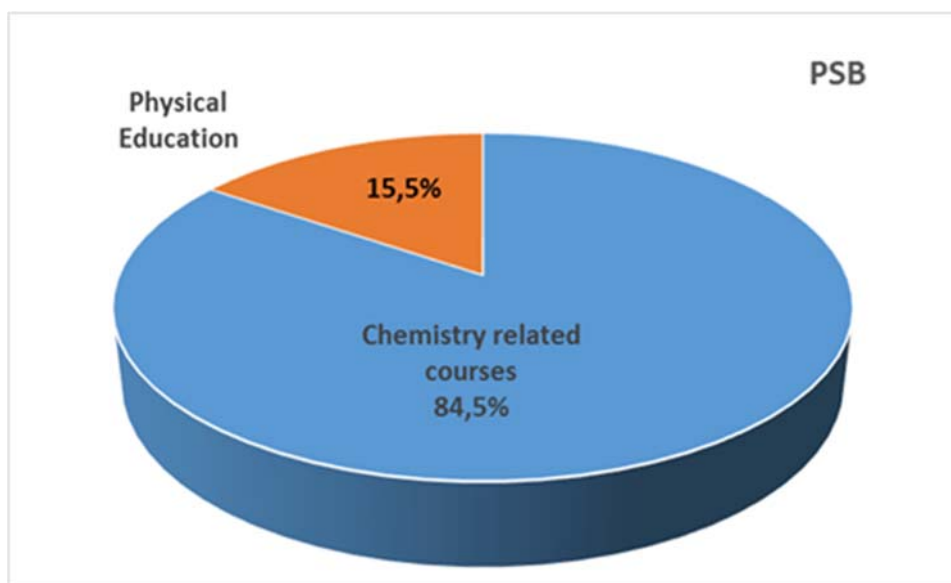


Figure 4.4 External associates in the Undergraduate study programme in Biology (PSB) by group of courses.

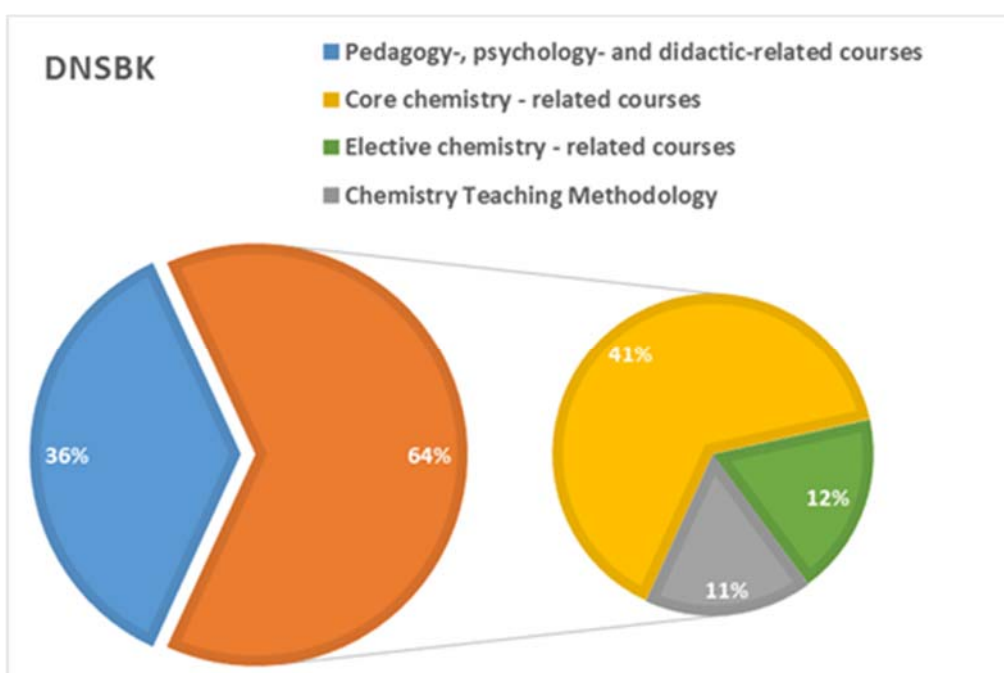


Figure 4.5 External associates in the Graduate study programme in Biology and Chemistry Education (DNSBK) by group of courses.

There is no permanently employed staff appointed to teaching titles at the Department; however, there are two external associates - one lecturer (Chemistry Teaching Methodology) and one senior lecturer (PE).

Part of the external associates engaged in teaching will never be able to become employees of the Department, as they are selected from other fields (teacher of physical education in the PSB and teachers of PPD courses, important and necessary for the DNSBK programme, Figures 4.3 and 4.4). The remaining associates are exclusively from the field of Chemistry (Figures 4.3 and 4.4, Table 4.2). Due to an adequate human resources policy, the share of external associates was reduced this academic year (Figure 4.6), owing to the appointment of one assistant professor in the Interdisciplinary field of Biology and Chemistry, by which she has acquired the right to teach chemistry-related courses as well. This trend will continue in the future in order to further reduce the need for external associates for chemistry-related courses.

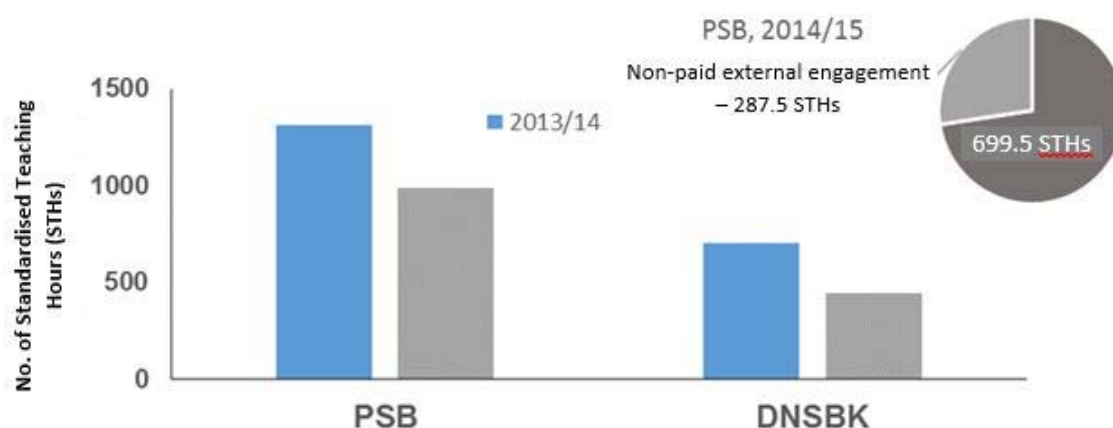


Figure 4.6 Comparison of the percentage of external associates in the Undergraduate study programme in Biology (PSB) excluding Physical Education (PE), and in the Graduate study programme in Biology and Chemistry Education (DNSBK) between the academic years 2013/2014 and 2014/2015.

Significant human resources potential of the Department lies in the number of senior teaching/research assistants and postdoctoral researchers (14), two of whom are in the process of advancement in rank (one colleague is in the process of appointment to the rank of Associate Professor, and another in the process of appointment to the rank of Research Associate). Their appointment to the rank of Assistant Professor will result in additional reduction in the student/teacher ratio, which will also contribute to the enhanced quality of teaching.

The data in Table 4.1 and 4.2, as well as in Figure 4.2 and 4.3 reflect the need of the Department for teaching/research assistants who are yet to enrol doctoral studies, and who would primarily be engaged in the delivery of laboratory practical classes and field courses. This is even more evident since the enrolment quota in the PSB programme was increased this academic year, thereby increasing the number of teaching hours for laboratory practical classes which account for a significant proportion of the teaching activities. This form of teaching requires the engagement of professional associates or laboratory technicians, whose number no longer meets the current needs of the Department. Furthermore, the new DSZPO

programme requires the engagement both of young staff such as teaching/research assistants or junior researchers, and of professional associates and laboratory technicians. The Department of Biology can serve as an example to the relevant institutions from which they can learn that the employment of outstanding young personnel and investment in their education can have long-term positive effects, and, therefore, enable us to open jobs for several teaching/research assistants and professional associates or laboratory technicians we need, which would reduce the share of external associates in teaching to the theoretical minimum. This would open up the possibility of engaging skilled professionals (as external associates) in the fields of Biology for the teaching of selected elective courses in all study programmes, which would also raise the quality of teaching at the Department.

#### 4.B. TEACHER/STUDENT RATIO

Specify and comment on the teacher/student ratio and its trend in the last 5 years.

The teacher/student ratio at the Department of Biology is in full compliance with quality performance of teaching activities.

In the past five academic years (2009/2010 to 2013/2014), one associate professor and eight assistant professors (junior researchers who fulfilled the conditions for appointment to the rank of Assistant Professor) were employed at the Department of Biology, while one Full Professor retired (Table 4.4). However, the total number of teachers in this period was increased by 10, owing to the advancement of a senior teaching/research assistant to the academic rank of Assistant Professor. The number of students in the same reference period remained the same, and ranged from 200 to 234. Therefore, the student-teacher ratio in the reference period ranged from 18:1 to 11:1, with a downward trend, while the student/assistant ratio ranged from 7:1 to 10:1, with a somewhat milder upward trend (Figure 4.7 and 4.8).

**Table 4.4 Employment of teachers at the Department of Biology in the past five years**

Year	Number of newly employed teachers	Number of teachers whose employment was terminated
2010	0	0
2011	2	0
2012	3	0
2013	2	1
2014	2	0

At its 6th session held on 29 April of the academic year 2013/2014 ([http://www.unios.hr/?podatak\\_id=16&g=1&i=52&panel=1#panel-1](http://www.unios.hr/?podatak_id=16&g=1&i=52&panel=1#panel-1)), the Senate of the Josip Juraj Strossmayer University of Osijek, adopted a decision on enrolment in which they

increased the enrolment quota in natural sciences studies, including the PSB programme of the Department of Biology. Therefore, in the current academic year 2014/2015, 69 students enrolled in the first year of the PSB programme. For these reasons, in the next two years, and probably after that, we expect a significant increase in the number of students in the study programmes of the Department. The increase in the enrolment quota is stimulating for both the Department and for the profession, and the existing teaching capacities will provide for quality work even with a larger number of students.

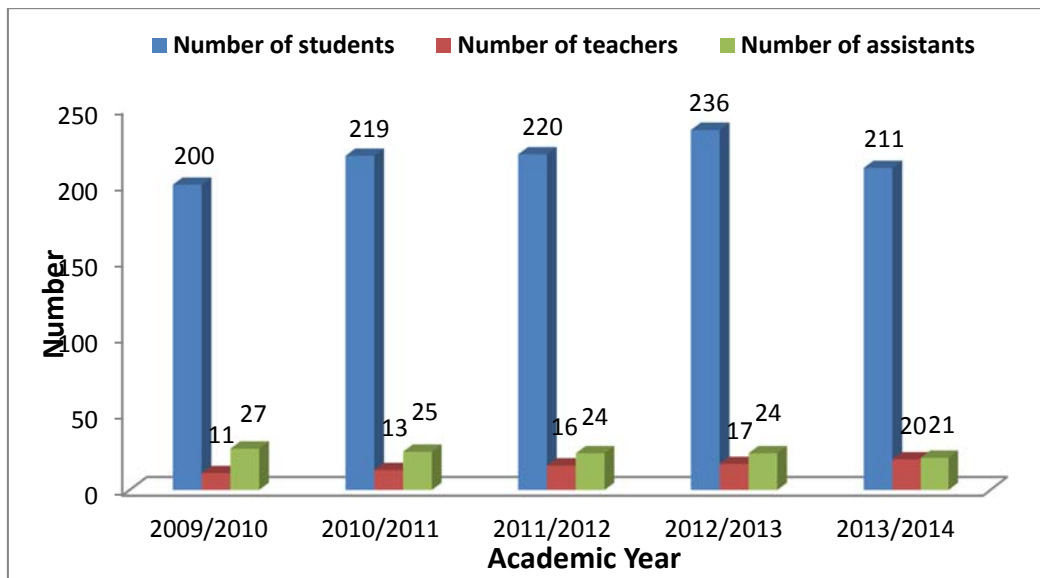


Figure 4.7 Number of enrolled students and employed teachers and teaching/research assistants in the past five years at the Department of Biology

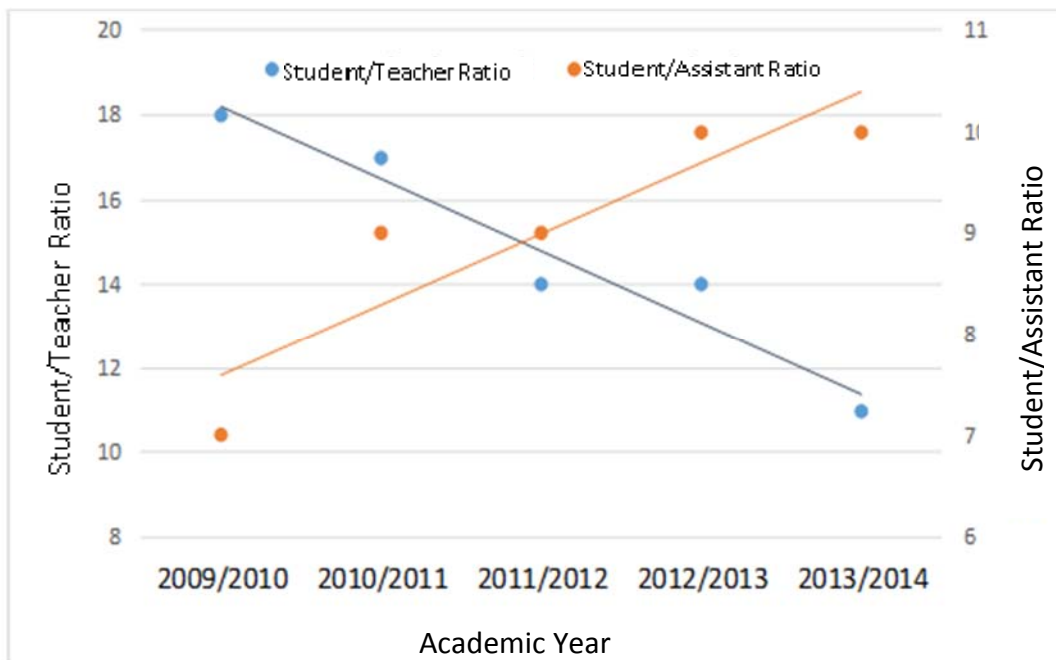


Figure 4.8 Student/Teacher and Student/Teaching Assistant ratio of the number of students in relation to the number of teachers and teaching/research assistants in the past five years at the Department of Biology

**4.C. SCOPE OF THE TEACHING WORKLOAD OF TEACHERS AND ASSOCIATES IN THE ACADEMIC YEAR 2013/2014**

Comment on the teaching workload of full-time and part-time teachers (external associates) (according to the data in table 4.2)

Table 4.2

STUDY PROGRAMME NAME	LECTURES			SEMINARS			LABORATORY PRACTICAL CLASSES				FIELD COURSES		
	FULL-TIME TEACHERS	FULL-TIME SENIOR TEACHING/ RESEARCH ASSISTANTS	EXTERNAL ASSOCIATES (PART-TIME TEACHERS)	FULL-TIME TEACHERS	FULL-TIME SENIOR TEACHING/ RESEARCH ASSISTANTS	EXTERNAL ASSOCIATES (PART-TIME TEACHERS)	FULL-TIME TEACHERS	FULL-TIME SENIOR TEACHING/ RESEARCH ASSISTANTS	FULL-TIME TEACHING/RE SEARCH ASSISTANTS	EXTERNAL ASSOCIATES (PART-TIME TEACHERS)	FULL-TIME TEACHERS	FULL-TIME SENIOR TEACHING/ RESEARCH ASSISTANTS	FULL-TIME PROFESSIONAL ADVISORS
UNDERGRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY	3,812	208	590	135	85.5	240*	412	1,560	888	480	181	104	60
GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY	1,026	230	0	118.5	84	0	99	221	157	0	0	0	0
GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY AND CHEMISTRY EDUCATION	540	100	480	80	75	135**	60	105	75	90	0	0	0

\* 180 - TEACHERS + 60 - TEACHING/RESEARCH ASSISTANTS

\*\* 67.5 - TEACHERS + 67.5 - TEACHING/RESEARCH ASSISTANTS

The table does not include the hours spent in mentoring work with students in the development of their master's theses, the work with students in research (DZSB) and teaching practice (DNSBK), as well as the hours of Physical Education (240 teaching hours, in the PSB programme, there is no corresponding column) .



Table 4.3 List of teachers of the Department of Biology

Teacher	Rank	Academic degree	HEI which issued the qualification	Field	Date of last appointment to academic rank	Cumulative employment percentage	Workload on the employer institution in standardised teaching hours				Workload on other institutions in standardised teaching hours
							PSB	ZSB	NSBK	Σ	
Vera Cesar - Lepeduš	Full Professor	PhD	Faculty of Science Zagreb	Biology	15 Jul.2013	100%	225	90	0	315	
Elizabeta Has-Schön	Full Professor	PhD	University of Zagreb	Biology	25 Feb 2013	100%	154	207	36	427	240 Department of Chemistry, Josip Juraj Strossmayer University of Osijek
Stjepan Krčmar	Full Professor	PhD	Faculty of Science Zagreb	Biology	16 Jan 2012	100%	195	0	37.5	232.5	
Tarzan Legović	Full Professor with Tenure	PhD	University of Zagreb	Biology	15 Nov 2008	40%	28	0	0	28	
Jasna Vidaković	Full Professor	PhD	Faculty of Science Zagreb	Biology	31 Jan 2011	100%	66	74	30	170	
Oleg Antičić	Associate Professor	PhD	Faculty of Science Zagreb	Biology	09 Feb 2012	100%	127.5	60	0	187.5	
Branimir Hackenberger Kutuzović	Associate Professor	PhD	Faculty of Science Zagreb	Biology	25 Oct 2012	100%	152	134	60	346	
Janja Horvatić	Associate Professor	PhD	Faculty of Science Zagreb	Biology	30 Oct 2014	100%	96	202.5	60	358.5	
Enrih Merdić	Associate Professor	PhD	Faculty of Science Zagreb	Biology	21 Dec 2010	100%	250	60	84	394	

Dubravka Čerba	Assistant Professor	PhD	Faculty of Science Zagreb	Biology	29 Nov 2012	100%	254.5	90	0	344.5	
Sandra Ečimović	Assistant Professor	PhD	Josip Juraj Strossmayer University of Osijek	Biology	16 Dec 2013	100%	0	26	0	26	
Davorka Hackenberger Kutuzović	Assistant Professor	PhD	Faculty of Science Zagreb	Biology	11 Nov 2013	100%	127.5	30	15	172.5	
Ljiljana Krstin	Assistant Professor	PhD	Faculty of Science Zagreb	Biology	28 Oct 2010	100%	216	60	97.5	373.5	
Melita Mihaljević	Assistant Professor	PhD	Faculty of Science Zagreb	Biology	05 Mar 2010	100%	130	64	82.5	276.5	
Alma Mikuška	Assistant Professor	PhD	Faculty of Science Zagreb	Biology	29 Nov 2012	100%	105	82.5	67.5	255	
Goran Palijan	Assistant Professor	PhD	Faculty of Science Zagreb	Biology	30 Nov 2011	100%	202.5	15	0	217.5	
Filip Stević	Assistant Professor	PhD	Josip Juraj Strossmayer University of Osijek	Biology	23 Jan 2014	100%	210	37	0	247	
Mirta Sudarić Bogojević	Assistant Professor	PhD	Josip Juraj Strossmayer University of Osijek	Biology	09 Jun 2014	100%	34	22.5	0	56.5	
Ivna Štolfa	Assistant Professor	PhD	Josip Juraj Strossmayer University of Osijek	Biology	30 Nov 2011	100%	217.5	45	75	337.5	
Valentina Pavić	Assistant Professor	PhD	Josip Juraj Strossmayer University of Osijek	Inter-disciplinary Natural Sciences (1.05 Biology and 1.04. Chemistry)	07 Jul 2014	100%	149	85.5	46.5	281	

Most of the teachers of the Department of Biology fit the prescribed workload of 300 standardised teaching hours  $\pm$  20%. Some younger colleagues who became assistant professors in the last academic year used to have a lower workload, and they have been assigned adequate teaching assignments only this academic year. For the same reasons, some teachers in higher academic ranks used to have a higher workload in the past than the recommended amount. Owing to the beginning of classes in the DSZPO programme this academic year, the workload of the teachers who used to have a lower teaching workload in the previous year will increase.

The share of external associates in the study programmes of the Department are commented on in detail in Section 4.A, and additionally presented in Figure 5.9. The total workload of external associates was 1310 standardised teaching hours in the PSB programme, and 705 standardised teaching hours in the DNSBK programme (without the pedagogy-, psychology- and didactic-related courses) in the academic year 2012/2013. This amounts to 15% of the total teaching hours in the PSB, and 40.5% in the DNSBK programme. The share of the workload of external associates in the PSB programme is acceptable, whereas the share in the DNSBK is too high, and measures must be taken to reduce it. Part of the external cooperation in the DNSBK will always be necessary for the purpose of instruction in pedagogy-, psychology- and didactic-related courses (PPD). The share of external associates in chemistry-related courses in the study programmes will be reduced by further research work and the appointment of our young teaching assistants and junior researchers in the Interdisciplinary field of Biology and Chemistry.

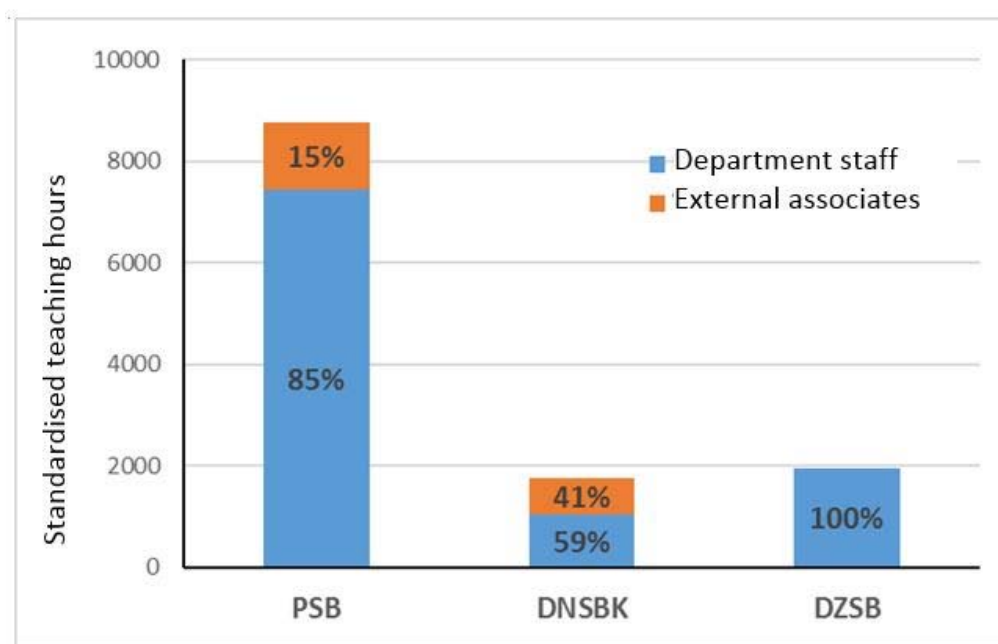


Figure 4.9 Share of external associates in the study programs of the Department of Biology in the academic year 2012/2013

#### 4.D. FORMAL PROCEDURES FOR THE MONITORING OF PART-TIME EMPLOYMENT OF TEACHERS FROM OTHER INSTITUTIONS

Specify formal procedures for monitoring part-time employment of teachers in other institutions.

Only persons whose qualifications meet the requirements for performing certain teaching activities, which must be accompanied by a valid document (e.g. the date of the last appointment to rank), are engaged as external associates. We also seek permission from the parent institution at which the person is employed when considering engagement at the Department. Instruction is organised in consultation with the external associates, and the schedules are published on the notice board and the website of the Department. During classes, the teacher keeps a record of regular attendance of students (roll call or student signatures), and after the completion of classes, the external associates (same as other employees of the Department) fill in the Course Reports (<http://biologija.unios.hr/webbio/nastava/evidencije-o-odradenoi-nastavi>) which are sent to the Deputy Head of the Department for Education in electronic format, and the signed printed form is submitted to the Head of Department's Office.

#### 4.E. SIZE OF STUDENT GROUPS BY INDIVIDUAL FORMS OF TEACHING

Specify the size of student groups for lectures, seminar, exercises (practical classes) and other forms of teaching and evaluate the efficiency of teaching in the groups. Comment on the student opinions about this issue mentioned in the surveys.

The number of students in individual forms of teaching is as follows:

- Lectures - up to 70 students (10-70)
- Seminars - up to 30 students
- Laboratory and teaching methodology practical classes, and field courses - 10 to 13 students

In the graduate study programmes, the number of students in lectures is lower due to the lower enrolment quota for these studies, as well as in elective courses (regardless of the study programme), where the groups often consist of 10 students. Namely, the study programmes actually provide for the possibility that the students select from among several offered elective courses the ones they are particularly interested in. Since last academic year, the Ministry has stipulated that the groups in lectures and practical classes should not be less than 10 students, which has limited the possibility for students to select the elective courses they are actually interested in, and forces them to collectively select the courses, especially in graduate studies (where the total number of enrolled students is lower). We believe that this

reduces the quality of learning and prevents the implementation of well-designed programmes which have envisaged the option of introducing students to a number of interesting topics in the field of biology.

For the above reasons, the number of students in laboratory practical classes often exceeds 10. This makes the work more difficult for the associates, but also does not allow every student to have the opportunity to acquire the necessary skills required for laboratory work. The teaching laboratory facilities of the Department have been envisaged for a maximum of 10 students, thus a larger number of students in the groups for laboratory practical classes makes the work more difficult and reduces the quality of teaching.

The students prefer to work in smaller groups as well, which is a necessary prerequisite for their active participation in the learning process and quality acquisition of necessary competencies. They are especially dissatisfied with the fact that they cannot select the elective courses according to their affinity, but have to adjust to the affinity of the majority.

#### 4.F. ASSESSMENT OF COMPETENCIES OF TEACHERS AND ASSOCIATES

Specify indicators for assessing competencies of your full-time and part-time teachers. Comment on the comparability of those indicators in the Croatian and international context. State opinions of the students mentioned in questionnaires and their effects

The competencies of teachers and associates of the Department are reviewed continuously, at least every five years in accordance with the legal obligation, as laid down in the Ordinance (Regulations) on advancement into academic rank, artistic-teaching rank, teaching, assistant and professional titles, and corresponding employment positions at the Josip Juraj Strossmayer University of Osijek, according to which teachers and associates must meet the minimum criteria for academic advancement in natural sciences, in the field of Biology, and the conditions of the Rectors' Conference. The websites of the mentioned documents are the following:

- <http://www.unios.hr/uploads/50PRAVILNIK%20o%20izboru%20u%20zvanja%20HR.pdf>
- [http://narodne-novine.nn.hr/clanci/sluzbeni/2006\\_12\\_138\\_3131.html](http://narodne-novine.nn.hr/clanci/sluzbeni/2006_12_138_3131.html)
- [http://narodne-novine.nn.hr/clanci/sluzbeni/2006\\_09\\_106\\_2376.html](http://narodne-novine.nn.hr/clanci/sluzbeni/2006_09_106_2376.html)

The regular advancement of teachers appointed to academic rank serves as proof of their competence. The conditions set by the Rectors' Conference additionally underline the necessity of qualified teachers' work with the students, which is verified by the number of mentorships of bachelor's papers, master's and doctoral theses, and the publication of the results of research work with the students. In addition, the appointment to the academic rank of Assistant Professor is conditioned by the completion of general pedagogical, psychological,

didactic and methodological training for those who have not passed such courses during their education. Another indicator of teachers' competence is their research work, i.e. their active participation in scientific and other projects, and their participation in scientific conferences, resulting in scientific publications. The teachers and assistants are required to continuously publish papers, which are evaluated not only by their quantity, but also by their quality. The publication in international journals cited in secondary databases (*CC*, *SCI expanded*) with a high impact factor and Q-factor is encouraged, and the number of citations is tracked. The Department of Biology is among the most productive at the University of Osijek (<http://news.unios.hr/july2014/>) by the number and quality of published scientific papers, and considering the conditions of research work and its funding, the Department can bear comparison with the larger university centres in Croatia.

Furthermore, the quality of the teachers' work is checked by means of student surveys conducted by the Department, as well as by the course lecturers for their own courses. In addition, almost every academic year, the University Student Survey is conducted at all University constituents, in which the Department teachers and assistants, in particular, are among the highest ranking (Figure 3.7). Regardless of the very high scores, there is still an evident trend of increasing ratings of teachers, particularly visible in the last survey (academic year 2013/2014, Figure 3.8). Moreover, by comparing the results of the survey of all University constituents, it is clearly visible that the Department of Biology is among the highest ranking, and in the academic years 2009/2010 and 2013/2014 was the best assessed in relation to other University constituents (Figure 3.7).

#### **4.G. METHODS OF PROFESSIONAL SUPPORT TO TEACHERS AND EXTERNAL ASSOCIATES IN THE FIELD OF TRAINING AND DEVELOPEMENT OF TEACHERS COMPETENCIES**

Specify methods of professional support to your full-time teachers and external associates (part-time teachers) in the field of training and improving teaching competencies. Specify methods of professional training of your full-time and part-time teachers at other Croatian and foreign HEIs and assess the scope and achievements of this process. Compare with other HEIs

The associates who are employed at the Department of Biology are sent for additional training in the field of pedagogy-, psychology-, didactic-, and teaching methodology-related courses, if they have not acquired such competencies in their prior education, in order to deliver instruction properly and in accordance with pedagogical standards.

As one of the study programmes of the Department is the DNSBK, which includes the courses in Biology Teaching Methodology and Chemistry Teaching Methodology, the teachers instructing these courses are encouraged to continuously improve their teaching methods.

This form of compulsory training involves participation in the work and organization of educational projects and workshops as well as attendance at appropriate training courses (such as the "How to ask questions?" workshop).

The Department also encourages the involvement of teachers in scientific and professional training at home and abroad, which further contributes to the quality of teaching in the context of our study programmes, as well as in the work with students who come from abroad to the Department as part of the Erasmus programme. Several teachers and teaching assistants have taken part in such trainings so far (Chapter 6), but we believe that this number should be increased.

#### 4.H. SPECIAL MEASURES FOR MOTIVATION OF TEACHERS

Specify special measures, if any, introduced by your *HE* institution to encourage better motivation and self-improvement of teachers (awards, acclaims, etc.) and comment on the effectiveness of such measures.

The measures aimed at motivating teachers for greater commitment have actually not been necessary, because the young people employed at the Department have been highly motivated in research and teaching in the field of Biology. This is best illustrated by an orderly advancement of our young junior researchers and teaching/research assistants, to which we can attribute the current favourable staffing structure. The motivation has primarily been a moral one, provided by the older colleagues and mentors, who properly and timely introduced them to the specific demands, values and goals of the profession which they must be fully devoted to. For both the teachers and the teaching/research assistants the biggest incentive to work still is, and hopefully will remain, the electronic message from a high-ranking world journal that their article has been accepted for publication. Assistance of other nature has been in the form of financial support for the purposes of attending scientific conferences (registration fee, accommodation and travel expenses) from the funds of the Department. For several consecutive years, the public praise following the publication of University Student Survey results, in which the teaching/research assistants and teachers of the Department have been rated the highest or have been among the highest ranking at the whole University of Osijek since the first day of the survey, has been extremely motivating. This year, due to a significant step forward in the publication of an impressive number of articles (43) in prestigious journals (Q1 and Q2 rank according to the ISI Web of Knowledge) in 2012 to 2014, at a Department Council session, the Head of Department publicly praised and gave monetary rewards to staff members who were the first authors or, in the case of cooperation with other institutions, the first authors from the Department of papers published in Q1 journals (19).

#### 4.1. TEACHING MATERIAL

Briefly describe and rate the type and quality of teaching material prepared by your teachers and specify selected textbooks of your teachers published in the last 5 years. Give your opinion on the coverage of your curriculum by appropriate literature.

The Department of Biology is one of the youngest units of the University of Osijek, founded 10 years ago (in 2005). Shortly after its founding, the Department Council appointed the Publishing Committee (in 2007), which has continuously been working to date. The publishing activities at the Department in the given period included peer-reviewed teaching materials, mainly teaching texts in electronic form, and one textbook, intended for students for the purpose of studying in individual study programme courses (all available on the website of the Department: <http://biologija.unios.hr/webbio/nastava/nastavni-materijali>). The number is not large given the relatively short period in which the Committee has been operating; however, there is an increasing trend, which is evident from the publishing activity plan for this academic year, which envisages 10 titles. In addition, some teachers of the Department have published teaching materials outside of the Department, and the data are available on the website of the Croatian Scientific Bibliography (CROSBI: [http://bib.irb.hr/lista-radova?sif\\_ust=285#aknjiga](http://bib.irb.hr/lista-radova?sif_ust=285#aknjiga)). The list of published teaching materials for teachers and external associates of the Department since 2007 until today can be found in Table 4.5.

In addition to the teaching materials published by Department staff members, there is a large number of textbooks and manuals in the Croatian language (by Croatian authors or translations of world famous books) to be used for the purposes of acquisition of the curricula, as well as an impressive number of teaching-related scientific publications in foreign languages, mostly English (Table 4.6). For some courses, there are websites available with supplementary teaching materials; however, none of the courses is implemented as an e-course.



**Table 4.5 The list of published teaching materials for teachers and external associates of the Department since 2007 until today**

List of teaching-related publications published by the teachers of the Department of Biology since 2009 (CROSBİ, <a href="http://bib.irb.hr/lista-radova?sif_ust=285#skripta">http://bib.irb.hr/lista-radova?sif_ust=285#skripta</a> ):
<b>Peršić Vesna</b> , Vukić Luši, Darija, <b>Horvatić Janja</b> . The effect of nutrient limitation and metal toxicity for the growth of marine diatom <i>Phaeodactylum tricornutum</i> Bohlin: microplate bioassay. In: Marine Phytoplankton. Kersey William T., Munger Samuel P. (Ed.). US: Nova Science Publishers, Inc., 2009. pp. 145-169.
<b>Has-Schön Elizabeta</b> . Metabolizam peradi. U: Kralik Gordana, <b>Has-Schön Elizabeta</b> Kralik, Davor, Šperanda Marcela. Peradarstvo: biološki i zootehnički principi: udžbenik za studente poljoprivrednih fakulteta. Kralik, Gordana (Ed.). Osijek; Mostar: Poljoprivredni fakultet, Sveučilište Josipa Jurja Strossmayera; Agronomski i prehrambeno-tehnološki fakultet, 2009. pp. 211-295.
Matija Franković, <b>Tomislav Bogdanović</b> . Vretenca-priručnik za inventarizaciju i praćenje stanja. Zagreb: Državni zavod za zaštitu prirode, 2009.
<b>Peršić Vesna</b> , <b>Čerba Dubravka</b> , Bogut Irella, <b>Horvatić Janja</b> . Trophic State and Water Quality in the Danube Floodplain Lake (Kopački Rit Nature Park, Croatia) in Relation to Hydrological Connectivity. In: Eutrophication: causes, consequences and control. Ansari A.A., Singh Gill S., Lanza G.R., Rast W. (Ed.). Dordrecht: Springer Netherlands, 2010. pp. 109-129.
Lichtenthal Melita, Bogut Irella, <b>Čerba Dubravka</b> , Marceljak Ilić Mihaela. Biologija 4. Novoselić Daniela (Ed.). Zagreb: Alfa d.d., 2010.
Lichtenthal Melita, Bogut Irella, <b>Čerba Dubravka</b> , Marceljak Ilić Mihaela. Biologija 4, Radna bilježnica iz biologije za 4. razred gimnazije. Novoselić Daniela (Ed.). Zagreb: Alfa d.d., 2010.
<b>Lepeduš Hrvoje</b> , <b>Cesar Vera</b> . Osnove biljne histologije i anatomije vegetativnih organa. Osijek: Sveučilište J.J. Strossmayera u Osijeku, 2010.
<b>Medvidović-Kosanović Martina</b> . Praktikum fizikalne kemije. Maja Dutour Sikirić (Ed.). Osijek: Sveučilište J.J. Strossmayera u Osijeku, Odjel za biologiju, 2012.
<b>Jovanović, Olga</b> ; Jelić, Dušan. Conservation and Declines of Amphibians in Croatia. In: Amphibian Biology, Volume 11 Part 4: Status of Conservation and Decline of Amphibians: Eastern Hemisphere: Southern Europe & Turkey. Heatwole, Harold Wilkinson, John W. (Ed.). Exeter, UK: Pelagic Publishing, 2015. pp. 34-40.
The peer-reviewed teaching materials on the website of the Department of Biology, <a href="http://biologija.unios.hr/webbio/nastava/nastavni-materijali">http://biologija.unios.hr/webbio/nastava/nastavni-materijali</a> :
<b>Vidaković Jasna</b> , Bogut Irella, <b>Čerba Dubravka</b> , <b>Galir Anita</b> , Priručnik za terensku nastavu 2 zoologija, Beskralježnjaci mora (Field cours Manual 2 Zoology, Marine Invertebrates), 2007.
<b>Merdić Enrih</b> , Opća zoologija (1. i 2. dio) (General Zoology – Part 1 and 2), 2008.
<b>Krčmar Stjepan</b> , <b>Hackenberger Kutuzović Davorka</b> , Ekologija životinja (Animal Ecology), 2008.
<b>Has Schön Elizabeta</b> , Predavanja iz predmeta Biokemija 1 (Lectures in Biochemistry 1), Informacijske makromolekule (Information Macromolecules), 2010.
<b>Has Schön Elizabeta</b> , Predavanja iz predmeta Biokemija (Lectures in Biochemistry) 3, 2010.
<b>Krčmar Stjepan</b> , Opća ekologija (General Ecology), 2012.
<b>Žuna Pfeiffer Tanja</b> , <b>Krstin Ljiljana</b> , <b>Štolfa Ivna</b> , Lovaković Tomislava, <b>Tikas Vera</b> , <b>Lepeduš Hrvoje</b> . Praktikum iz anatomije biljaka (Plant Anatomy Practicum). 2014.

Table 4.6 Teaching materials used in the last academic year (2013/2014)

Study programme name	Number of Croatian textbooks	Number of foreign textbooks translated into Croatian	Number of research papers related to teaching	Number of manuals	Number of courses for which there are reviewed manuals on the institution's web site	Number of courses for which there is a web page with supplementary teaching materials	Number of e-courses
UNDERGRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY	45	10	134	73	5	6	0
GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY	6	3	92	20	1	11	0
GRADUATE UNIVERSITY STUDY PROGRAMME IN BIOLOGY AND CHEMISTRY EDUCATION	15	4	39	27	1	6	0

#### 4.J. SATISFACTION WITH THE CURRENT SITUATION AND POSSIBLE IMPROVEMENTS

Specify to what extent you are satisfied with the current situation and propose possible improvements.

The current situation regarding teaching staff at the Department of Biology is satisfactory, as well as the envisaged advancement of senior assistants and postdoctoral researchers to the rank of Assistant Professor, and the advancement of teachers to higher ranks. After 30 September 2014, two additional teaching assistants have obtained their PhDs, three associate professors have fulfilled the conditions for appointment to the rank of Full Professor, and their appointment to the scientific rank of Research Adviser is underway; one assistant professor has fulfilled the conditions for appointment to the rank of Associate Professor, four senior assistants have met the conditions for appointment to the rank of Assistant Professor (for three of them, the procedure is in progress), two senior assistants have met the conditions for the appointment to the title of Professional Advisor, and one associate has qualified for the appointment to Senior Professional Associate. Such favourable personnel structure has been recognized by the Ministry of Science, Education and Sports, which, on 9 April 2014, issued a decision authorising the Department of Biology of the Josip Juraj Strossmayer University of Osijek, to conduct part of the procedure of appointment to research ranks in the field of natural sciences in Biology (1.05).

With regard to the envisaged advancements, the increase in the enrolment quota in the first year of the PSB programme, and the launch of the new DSZPO study programme, the Department is in need of teaching/research assistants and junior researchers, as well as teaching assistants and laboratory technicians who will be necessary for teaching laboratory practical classes and field courses, the study programmes have an abundance of. The employment of the above staff would help retain a favourable student/assistant ratio, which is required for this form of teaching.

We are not satisfied with the share and the structure of external associates, mainly covering chemistry-related courses in the PSB and DNSBK programme, and will aim to reduce the share by guiding the research interest and the appointment of teaching/research assistants in the Interdisciplinary field of Biology and Chemistry. However, we must be aware of the fact that part of the external co-operation cannot be avoided, due to the need for PE teachers in the PSB programme, and the teachers for the instruction in pedagogy-, psychology- and didactic-related courses in the DNSBK programme. In future, we will try to plan external cooperation in such a way that the Department attracts top experts who will organize the teaching in some elective courses, and thus further increase the quality of studying at the Department.

We will invest increased efforts in the training of teachers and associates both at home and foreign institutions of higher education, which, in our opinion, should be more represented in

comparison with other institutions of higher education, what is necessary to raise the quality of scientific and research work.

We believe that the teachers should put more effort into writing teaching materials necessary for mastering the study programmes of the Department, and we will encourage such work in the future. We are also aware of the fact that the currently available holding of textbooks needed for the classes in the study programmes of the Department is insufficient, which is why we strive to provide more of the required books in the future. This process will be coordinated by the establishment of the University Library on the University Campus area (which is currently under construction), whereby the book and textbook holding of the Department would be physically located in the immediate vicinity of the educational process.

## 5. Research and professional activity

### 5.A. STRATEGY PROGRAMME OF SCIENTIFIC RESEARCH

Describe the strategy of the research activity for at least a five-year period, concerning research in the scientific area for which your institution is registered in the Register of Research Organisations.

The Strategic Research Programme of the Department of Biology is largely based on the Strategy for Research Activities adopted by the Department at the Council session on 27 November 2014, and relates to the period from 2014 to 2019. The Department of Biology stresses three primary strategic goals. These are: scientific research, professional work and participation in the activities of scientific networks and centres of excellence. There are several important objectives that have been identified in terms of scientific research conducted at the Department: continue to improve the quality of scientific research through networking of research teams and interdisciplinary approaches, increase the participation of scientists in national and international research projects, encourage and reward excellence in scientific research, continue to provide support by the institution to academic advancement and training of scientific staff, strengthen human resources of scientific and associate staff and continue to improve research infrastructure (laboratory equipment and other facilities, software). The following objectives pertain to professional work: strengthen the impact of the Department of Biology at the level of local, national and international community; strengthen collaboration with industry and the public sector in defining and implementing the applied and professional research; strengthen technology transfer between the Department and the industry sector, the commercialization of research results, and continue to improve research infrastructure (laboratory equipment and other facilities, software). The third strategic objective is to participate in the activities of scientific networks and centres of excellence, which includes strengthening collaboration with other research institutions at home and abroad, improving research infrastructure, and strengthening human resources of research and associate staff. The priority of the Department in the coming period will be the implementation of projects such as those initiated by the Croatian Science Foundation, Horizon 2020, and economic projects. It is through national and international projects and collaboration with the industry sector that the Department intends to obtain financial stability, which will in turn improve the quality of scientific research. To this end, the Department of Biology will encourage researchers to make project proposals in that area and reward them if such projects are accepted. The Department of Biology in Osijek is a national junction of the Cro-BioImaging network which aims to coordinate the development of research infrastructure in the area of bioimaging in Croatia. The Cro-BioImaging network is integrated into the Euro-BioImaging network, which covers the infrastructure in the area of bioimaging at the EU level. As part of the Cro-BioImaging network the Department will strengthen its research infrastructure and increase researcher mobility and collaboration at

the national and international level. The Department also aims to become involved in the work of research centres of excellence that represent the backbone and the potential turning point in the area of scientific research. The participation of the members of the Department of Biology in scientific research work of the centres of excellence would result in promotion of scientific research at the Department and it at the same time offer the basis for the integration of the Department of Biology in the European Research Area. By accomplishing its objectives the Department of Biology expects to become a renowned interdisciplinary research institution in the following five years, which would be nationally recognizable thanks to its fundamental and applied research, as well as the popularization of scientific research and making it accessible to public.

## 5.B. IMPACT FACTORS OF RELEVANT SCIENTIFIC JOURNALS IN WHICH TEACHERS PUBLISH THEIR WORK

List 10 world-renowned scientific journals in which your teachers publish their works. Comment on the relevant impact factors. Specify several prominent cultural institutions museums and galleries where your teachers present their works.

Teachers of the Department of Biology publish their papers in a number of world-renowned journals that are indexed in relevant databases such as *Current Contents*, *Science Citation Index*, *SCI Expanded*, *Web of Science*, and *Scopus*. The papers authored by our teachers have been published in around sixty different world-renowned journals. While listing 10 world-renowned international scientific journals, our intention was to select primarily those that are relevant to and representative of a variety of areas in which our teachers publish their research results. The Table 5.1 lists the most prestigious journals in which the employees of our Department have published their papers. They have been grouped according to their impact factor, the highest one of which (6.275) belongs that of *Molecular Ecology*, in which one of our teachers from the Department has published one scientific paper. All the journals are in the first quartile (Q1 rank in *ISI Web of Knowledge*) and in each one of them our teachers have published at least one scientific paper.

Table 5.1 Most important scientific papers

No.	Scientific paper	WoS	Impact factor*	Total number of citations (2013)
1.	Molecular Ecology	BIOCHEMISTRY & MOLECULAR BIOLOGY; ECOLOGY; EVOLUTIONARY BIOLOGY	6.275	31185
2.	Soil Biology & Biochemistry	SOIL SCIENCES	4.410	24292
3.	Plant Science	PLANT SCIENCES; BIOCHEMISTRY & MOLECULAR BIOLOGY	4.114	10517

4.	Aquatic toxicology	MARINE & FRESHWATER BIOLOGY; TOXICOLOGY	3.761	10343
5.	Journal of integrative plant biology	PLANT SCIENCES; BIOCHEMISTRY & MOLECULAR BIOLOGY	3.448	2508
6.	Microbial Ecology	ECOLOGY, MARINE & FRESHWATER BIOLOGY; MICROBIOLOGY	3.277	7473
7.	Food chemistry	CHEMISTRY, APPLIED; FOOD SCIENCE & TECHNOLOGY; NUTRITION & DIETETICS	3.259	47395
8.	Marine pollution bulletin	ENVIRONMENTAL SCIENCES; MARINE & FRESHWATER BIOLOGY	2.793	14890
9.	Medical and Veterinary Entomology	ENTOMOLOGY; VETERINARY SCIENCES	2.333	2890
10.	River research and applications	WATER RESOURCES; ENVIRONMENTAL SCIENCES	1.971	2424

\* Impact factor refers to the year in which papers were published in the relevant journal.

### 5.C. MOST IMPORTANT PAPERS FOR *HE* INSTITUTION

List 10 most important papers of your institution in the last 5 years (for each scientific field your institution is working in). Specify and comment the citation of your papers according to the global databases (WOS, SCOPUS, Google Scholar). Compare the scope of your research achievements with comparable Croatian and international *HE* institutions.

List of 10 most important scientific papers authored by scientists from the Department of Biology:

1. Ježić M, **Krstin Lj**, Rigling D, Ćurković-Perica M (2012) High diversity in populations of the introduced plant pathogen, *Cryphonectria parasitica*, due to encounters between genetically divergent genotypes. *Molecular Ecology* 21:87-99.

IF2012 = 6,275; Q1 - BIOCHEMISTRY&MOLECULAR BIOLOGY, Q1 - ECOLOGY, Q1 - EVOLUTIONARY BIOLOGY

2. **Velki M, Hackenberger BK** (2013) Inhibition and recovery of molecular biomarkers of earthworm *Eisenia andrei* after exposure to organophosphate dimethoate. *Soil Biology & Biochemistry* 57: 100-108.

IF2013 = 4,410; Q1 - SOIL SCIENCES

3. **Vuković R**, Bauer N, Ćurković-Perica M (2013) Genetic elicitation by inducible expression of  $\beta$ -cryptogein stimulates secretion of phenolics from *Coleus blumei* hairy roots. Plant science. 199/200: 18-28.

IF2013 = 4,114; Q1 - PLANT SCIENCES

4. **Špoljarić D**, Čipak A, **Horvatić J**, Andrišić L, Waeg G, Žarković N, Jaganjac M (2011) Endogenous 4-hydroxy-2-nonenal in microalgae *Chlorella kessleri* acts as a bioactive indicator of pollution with common herbicides and growth regulating factor of hormesis. Aquatic toxicology. 105: 552-558.

IF2011 = 3,761; Q1 - MARINE & FRESHWATER BIOLOGY , Q1 - TOXICOLOGY

5. Šimić D, Lepeduš H, Jurković V, **Antunović J**, **Cesar V** (2014) Quantitative genetic analysis of chlorophyll a fluorescence parameters in maize in the field environments. Journal of integrative plant biology. 56(7): 695-708.

IF2013 = 3,448, Q1 - PLANT SCIENCES

6. **Palijan G** (2012) Abundance and biomass responses of microbial food web components to hydrology and environmental gradients within a floodplain of the River Danube. Microbial Ecology 64:39-53.

IF2012 = 3,277; Q1 - ECOLOGY, Q1 - MARINE & FRESHWATER BIOLOGY

7. **Amić A**, Marković Z, Dimitrić Marković J, Stepanić V, Lučić B, Amić D (2014) Towards an improved prediction of the free radical scavenging potency of flavonoids: The significance of double PCET mechanisms. Food chemistry. 152: 578-585.

IF2013 = 3,259; Q1 - CHEMISTRY, APPLIED, Q1 - FOOD SCIENCE & TECHNOLOGY

8. Vukić Lušić D, Lušić D, Pešut D, Mićović V, Glad M, Bilajac L, **Peršić V** (2013) Evaluation of equivalence between different methods for enumeration of faecal indicator bacteria before and after adoption of the new Bathing Water Directive and risk assessment of pollution. Marine pollution bulletin. 73: 252-257.

IF2013 = 2,793; Q1 - ENVIRONMENTAL SCIENCES, Q1 - MARINE & FRESHWATER BIOLOGY

9. Hesson J C, Rettich F, **Merdić E**, Vignjević G, Östman Ö, Schäfer M, Schaffner F, Foussadier R, Besnard G, Medlock J, Scholte E J, Lundström J O (2014) The arbovirus vector *Culex torrentium* is more prevalent than *Culex pipiens* in northern and central Europe. Medical and Veterinary Entomology, 28: 179-186.

IF2013 = 2,333; Q1 - ENTOMOLOGY, Q1 - VETERINARY SCIENCES



10. **Mihaljević M, Stević F, Špoljarić D, Žuna Pfeiffer T.** Spatial pattern of phytoplankton based on the morphology-based functional approach along a river-floodplain gradient. *River research and applications*. DOI: 10.1002/rra.2739.

IF2013 = 1,971; Q1 - WATER RESOURCES

Scientific productivity of the Department of Biology in Osijek expressed as the ratio of the number of scientific papers in journals indexed in Current Contents, WoS and Scopus databases, and the number of employees holding academic titles is shown in Table 5.2 and is 5.842. Scientific excellence is imperative for the Department of Biology, and it is reflected in the data according to which the teachers and associates of the Department published as many as 48 scientific papers in the last five years belonging to the first and second quartile in their respective fields (Q1 and Q2 rank according to *ISI Web of Knowledge*), which makes 38% of the total number of publications. The highest total number of published papers in *Current Contents* base written by one scientist is 34. According to the WoS base (search by the address of the institution), total number of citations of the Department of Biology pertaining to papers of teachers published in the last five academic years is 220, the average number of citations per year is 44, and the average number of citations per paper is 2.27. Total citations of scientists at the Department of Biology according to WoS base which includes all employees is more than 2000.

Scientific bibliography listed by sub-departments is presented in Table 5.3. The table shows that the Sub-department of Zoology has the highest scientific production, that is, 7.33 papers per teacher, while the Sub-department of Quantitative Ecology has the smallest production with 4.2 papers per teacher. It should be emphasized, however, that the Sub-department of Quantitative Ecology was established as a separate institute as recently as 2012, which makes it the youngest one and that is why the papers authored by its present members were listed under those published by their former sub-departments. Accordingly, the scientific productivity of the Sub-department of Quantitative Ecology members expressed as per number of teachers is lower, as the Table 5.3 shows the values covering the three-year period.

It is very difficult to compare the scope of scientific accomplishments of the Department of Biology with other scientific institutions in Croatia and abroad, because most of such institutions are Faculties of Science and cover all branches of natural sciences. The only comparison can be made with the Department of Biology of the Faculty of Science (PMF) of Zagreb University and the Department of Biology at the Faculty of Science (PMF) of Split University. The scientific productivity of the Department of Biology at the Faculty of Science in Zagreb expressed as the number of papers per teacher cited in *WoS* is 4.96, while the scientific productivity of our Department expressed as the number of papers per teacher cited in *WoS* is 5.32. In terms of works cited in the *WoS* database, our Department has a slightly higher research productivity than the Department of Biology of the Faculty of Science in Zagreb. The situation is reverse as far as the papers cited in *Current Contents* are concerned,

as PMF has a slightly higher number of papers per teacher (4.85) than the Department of Biology in Osijek (4.37). As far as scientific productivity of the Department of Biology of the Faculty of Science in Split is concerned, we did not receive any official data and could not consequently make any such comparison.

**Table 5.2 Bibliography (in the last five academic years)**

Publication category*	Total number of publications **	Number of publications that were the result of collaboration with other HEIs and scientific organisations	Ratio: Number of publications/number of teachers **
<b>Publications in journals included in the CC, WoS (SSCI, SCI-expanded and A&amp;HCI) and Scopus</b>	111	63	Total 111/19=5.842 CC 83/19=4.37 WoS 101/19=5.32
<b>Other peer-reviewed publications included in the databases recognized in the advancement into academic rank</b>	6	4	6/19=0.316
<b>Authorship of books published abroad</b>	0	0	0
<b>Authorship of books published in Croatia</b>	4	4	4/19=0.211
<b>Publications in national journals with international peer review</b>	27	24	27/19=1.421
Peer-reviewed publications in proceedings of international conferences at home and abroad ***	3	3	3/19=0.157
<b>Publications in national journals with national peer review</b>	3	3	3/19=0.157
Professional publications	8	2	8/19=0.421
<b>Chapters in peer-reviewed books</b>	2	2	2/19=0.105
Peer-reviewed publications in proceedings of national scientific conferences ***	2	2	2/19=0.105
Editorship of foreign books ***	0	0	0
Editorship of national books ***	0	0	0

\* Publications written in bold must be entered, while others are optional.

\*\* One teacher may be included into calculation only once.

\*\*\* Publications not subject to peer-review and selection procedure are not to be included

Table 5.3 Research productivity of the HEI organisational units (in the last five years)

Publication category *	Total number of publications	Publication number/ teaching staff number ratio for each unit **			
		SUB-DEPARTMENT OF PLANT ECOPHYSIOLOGY AND BIOCHEMISTRY	SUB-DEPARTMENT OF WATER ECOLOGY	SUB-DEPARTMENT OF ZOOLOGY	SUB-DEPARTMENT OF QUANTITATIVE ECOLOGY
Publications in the journals included in the CC, WoS (SSCI, SCI-expanded and A&HCI) and Scopus databases	111	21/4=5.25	25/4=6.25	44/6=7.33	21/5=4.20
Other peer-reviewed publications included in the databases recognized in the advancement into academic rank	6	0/4	1/4=0.25	5/6=0.833	0/5
Authorship of books published abroad	0	0	0	0	0
Authorship of books published in Croatia	4	0/4	3/4=0.75	1/6=0.25	0/5
Publications in national journals with international peer review	27	5/4=1.25	2/4=0.5	20/6=3.33	0/5
Peer-reviewed publications in proceedings of international conferences at home and abroad ***	3	0/4	0/4	3/6=0.5	0/5
Publications in national journals with national peer review	3	2/4=0.5	0/4	0/6	1/5=0.2
Professional publications	8	2/4=0.5	0/4	4/6=0.667	0/5
Chapters in peer-reviewed books	2	2/4=0.5	0/4	0/6	0/5
Peer-reviewed publications in proceedings of national conferences ***	2	0/4	0/4	2/6=0.33	0/5
Editorship of foreign books ***	0	0	0	0	0
Editorship of national books ***	0	0	0	0	0

\* Publications written in bold must be entered, while others are optional.

\*\* One teacher may be included into calculation only once.

\*\*\* Publications not subject to peer-review and selection procedure are not to be included

## 5.D. MOST IMPORTANT PUBLICATIONS (BOOKS, CONFERENCE PROCEEDINGS, ECT)

If your research area gives precedence to other types of publications (books, conference proceedings, etc.) list 10 most important publications of that type. Comment on the criteria for choosing them.

In accordance with conditions of the Rectors' Conference regarding the procedure of advancement into academic rank, one of the requirements that candidates must meet in order to advance into academic ranks of associate professors and full professors is the publication of books and textbooks. In order to be appointed associate professors candidates must author or co-author one published university textbook, scientific book or manual, or publish instructional material on the website of the higher education institution that has been positively evaluated by the expert committee. In order to be appointed full professors candidates are required to author or co-author two university textbooks, two scientific books or two manuals, and to publish lectures in the form of instructional material in two courses on the website of the higher education institution that has been positively evaluated by the expert committee. These criteria are applied optionally, which means that candidates must fulfil, for instance, four out of eight requirements.

There are two university textbooks and seven instructional texts published at the Department of Biology, mainly intended for courses within the Undergraduate university study programme in Biology. Three instructional texts are intended for students at the Graduate university study programme in Biology and Chemistry Education, while one is intended for students at the Graduate university study programme in Biology.

Below is a list of authors and titles of published university textbooks:

1. Lepeduš H, **Cesar V** (2010) Osnove biljne histologije i anatomije vegetativnih organa.
2. **Žuna Pfeiffer T, Krstin Lj, Štolfa I, Lovaković T, Tikas V, Lepeduš H** (2014) Praktikum iz anatomije biljaka.

Instructional materials are the following:

1. **Vidaković J, Bogut I, Čerba D, Galir A** (2007) Priručnik za Terensku nastavu 2. - Zoologija: Beskralježnjaci mora.
2. **Merdić E** (2008) Predavanja iz predmeta Opća zoologija (1. i 2. dio).
3. **Krčmar S, Hackenberger DK** (2008) Predavanja iz predmeta Ekologija životinja.
4. **Has-Schön E** (2010) Predavanja iz predmeta Biokemija 1, Informacijske makromolekule.
5. **Has-Schön E** (2010) Predavanja iz predmeta Biokemija 3.
6. **Krčmar S** (2012) Predavanja iz predmeta Opća ekologija.
7. **Medvidović-Kosanović M** (2012) Praktikum iz fizikalne kemije.

In addition to providing basic theoretical knowledge, the above textbooks and instructional material present the latest scientific knowledge regarding certain topics. Published textbooks and instructional texts are intended for students of Biology and students of Biology and Chemistry at the Department of Biology of the University of Josip Juraj Strossmayer in Osijek. Difficulties related to the study of biology and chemistry frequently stem from the fact that there are not many university textbooks and instructional material published in Croatian. The contribution of the above titles in complementing literature for biology students is immense, as they are originally written in the Croatian language, and as such will serve as primary or secondary reading not only for students of biology but also for students at other higher education institutions (e.g. Faculty of Agronomy and Forestry) offering similar courses within their study programmes. The tenth publication listed above is the book authored by Springer et al. (2003) titled "Kopački rit - Nature Park; Ecological Tourist Guide". Although it is not a direct product of publishing activities of the Department of Biology, the reason why we listed it here is that certain chapters were authored by the teachers from the Department of Biology, namely M. Mihaljević, E. Merdić and S. Krčmar. Also, it can be used as secondary or additional literature in teaching some courses at the Undergraduate university study programme in Biology and the Graduate university study programme Nature and Environmental Protection. The number of university textbooks and manuals published by the Department of Biology is not large, but there is a growing trend, as seen from the Plan of publishing activities for the academic year 2014-2015, where publication of a dozen new titles is planned.

#### 5.E. CRITERIA FOR RESEARCH PRODUCTIVITY FOR MENTORS OF DOCTORAL DISSERTATIONS

Specify the criteria for research productivity for mentors of doctoral dissertations at your doctoral study programmes and compare them with similar *HE* institutions in Croatia and abroad.

Most teachers of the Department of Biology teach at two postgraduate university interdisciplinary doctoral study programmes: Nature and Environmental Protection (NEP) (<http://www.unios.hr/?t=2&g=7&j=137>) and Molecular Biosciences (MOBI) (<http://www.unios.hr/molekularna/>). It is important to emphasize that there are also two laboratories at the Department that are official laboratories of these study programmes: the Laboratory of Entomology at the study programme in Nature and Environmental Protection and the Plant Molecular and Cellular Biology laboratory at the study programme in Molecular Biosciences. At both doctoral study programmes scientists or teachers can be mentors provided that they have obtained the following academic and/or teaching titles: Research Associate, Senior Research Associate or Research Adviser, Assistant Professor, Associate Professor or Full Professor. In addition, at the study programme in Molecular Biosciences (MOBI) each mentor must produce up to five scientific papers published in the last five years, where at least one of them should be related to the proposed doctoral dissertation. Should

the Council of Studies consider that scientific production is at an insufficient level, it may propose that the current mentor is replaced or additional mentor provided.

Article 12 of the Ordinance on Doctoral Studies of the Department of Biology of the Faculty of Science at the University of Zagreb ([https://www.pmf.unizg.hr/download/repository/Pravilnik\\_o\\_doktorskim\\_studijima\\_za\\_PMF-u\\_u\\_Zagrebu.pdf](https://www.pmf.unizg.hr/download/repository/Pravilnik_o_doktorskim_studijima_za_PMF-u_u_Zagrebu.pdf)) specifies which criteria the mentors of doctoral dissertations must fulfil. According to the said Article, a person can be appointed mentor if (s)he holds at least the academic title of Assistant Professor or Research Associate, or an equivalent rank in case the academic title was acquired abroad. Furthermore, a mentor must be an active researcher and a relevant in the scientific community, and should have published papers in the last five years related to the topic of the relevant doctoral research.

Formal requirements for being eligible to be mentors of doctoral dissertations abroad are generally no different from those described in our doctoral study programmes. For instance, at the interdisciplinary doctoral study programme in Molecular Enzymology in Graz (<http://dk.uni-graz.at/>) mentors of doctoral dissertations must be appointed at least to the academic rank of Assistant Professors, and must be either active or associate members of the doctoral study programme. However, it should be noted that the requirements for academic advancement at foreign universities are substantially different, which makes it really difficult to make comparisons.

## 5.F. POLICY OF *HE* INSTITUTION FOR YOUNG RESEARCHERS DEVELOPMENT

Comment on your policy for the development of young researchers

In accordance with the Ordinance of the Department of Biology ([http://www.unios.hr/sjednice/prilozi/1886\\_5pravilnikbiologija.pdf](http://www.unios.hr/sjednice/prilozi/1886_5pravilnikbiologija.pdf)) the following persons are responsible for looking after academic advancement and work of young scientists: Deputy Head for Research (Article 35 of the Ordinance) shall look after scientific and research work of junior researchers and associates and supervise their advancement), while the Head of the Sub-department (Article 15 of the Ordinance) shall organize and coordinate research, educational and professional activities of the Institute). In addition, advisors, mentors and co-mentors are provided to teaching/research assistants and junior researchers. Once a year, mentors of teaching/research assistants must submit an annual report on the work of teaching assistants (Table 5.4). The report is presented at the session of the Department Council, and the Council adopts it and makes the final annual evaluation. Internal analysis of postdoctoral candidates' work at the Department of Biology carried out in the form of a questionnaire that junior researchers are required to fill out, was not conducted until 2014. Pursuant to Article 69 of the Ordinance of the Department of Biology which was adopted in April 2014, postdoctoral candidates are required to submit to the Department Council a biannual report on their research and teaching activities. The form to be filled out (Table 5.5) contains

sufficient information for the provision of timely assistance to junior researchers. Also, pursuant to Article 69 of the Ordinance, once every two years the Department shall evaluate the work of mentors of the teaching/research assistants on the basis of the report on their activities and the teaching/research assistants' evaluation of their work (Table 5.6). Mentors who receive unfavourable evaluation twice may not be appointed mentors again. Young scientists, teaching/research assistants and junior researchers may become involved in scientific research from the day of their employment and enrolment into the Doctoral study programme. Doctoral candidates are required to publish papers in scientific journals cited in *Current Contents* and participate in scientific conferences. Moreover, the doctoral study programme gives a precise classification of papers and awards students (authors) the corresponding number of ECTS credits accordingly.

#### **5.G. NUMBER OF SCIENTIFIC PUBLICATIONS PRODUCED WITHIN INTERNATIONAL COOPERATION OF TEACHERS AND FOREIGN RESEARCHES OF HE INSTITUTION**

Comment on the number of scientific publications produced within international cooperation of your teachers and associates, with foreign researchers and artists as co-authors. Compare those results with the practice of other similar HE institutions.

Collaboration of 25 researchers from the Department of Biology with international scientists has resulted in a total of 35 publications in the last five years, which is 1.4 publications per collaborating scientist. Out of a total of 19 teachers, 12 of them (63.2%) have published 29 papers, which means that 1.53 publications per teacher have been published (or 2.42 as per number of teachers (authors)). The teachers have collaborated in various ways with numerous institutions from Europe and the United States of America. Some of these institutions are: UC Davis, California, SAD; Cedars-Sinai Medical Center, Los Angeles, California, USA; Norwegian University of Life Sciences (UMB), Noragric, Department for International Environment and Development Studies, Ås, Norway; Institute of Animal Science, University of Bonn, Bonn, Germany; Institute of Molecular Biosciences, Karl Franzens University, Graz, Austria; Uppsala University, Uppsala, Sweden; Faculty of Medicine, Slovak Medical University in Bratislava, Bratislava, Slovakia; Faculty of Public Health, Slovak Medical University in Bratislava, Bratislava, Slovakia; Department of Ecology and Hydrobiology, University of Pécs, Hungary; Department of Biology, Faculty of Science in Tuzla, Bosnia and Herzegovina; Slovenian Museum of Natural History, Ljubljana, Slovenia; Faculty of Mechanical Engineering, University of Ljubljana, Slovenia; Department of Biology and Ecology, Faculty of Science and Mathematics, University of Niš, Serbia.

GENERAL INFORMATION		
Name:		
Researcher identification number:		
Date of employment contract:		
Expiration date of employment contract:		
Job title as stated in employment contract:		
E-mail:		
Reporting year:		
Doctoral study programme, academic year and semester of enrolment:		
MENTOR(S)		
	Title, name:	Institution, country:
First mentor:		
Second mentor:		
ANNUAL REPORT		
Has the work plan been made?	YES / NO	
Has the teaching/research assistant achieved progress according to the work plan?	YES / NO	
If no, explain why and suggest ways of improvement.		
Briefly describe the work plan for the next period.		
Describe the progress since the last report		
On a scale from 1 to 5, assess the quality of scientific research progress	1 – poor 2 – satisfactory 3 – good 4 – very good 5 – excellent	
If you chose 1 or 2 in the last question, explain why:		
On a scale from 1 to 5, assess the total quality of scientific research	1 – poor 2 – satisfactory 3 – good 4 – very good 5 – excellent	
If you chose 1 or 2 in the last question, explain why:		



Teaching (courses you teach or participate in – state the type and duration):	Course	Mode of instruction	Contact hours
Participation in research and professional projects (in the previous academic year):	Institution	Project duration (from-to)	Project title
Training abroad (in the previous academic year):	Country	Institution and Head of Laboratory	Duration (from-to)
Participation in scientific and professional conferences (in the previous academic year):	Conference name and type of communication	Place and country	Date (from-to)
Scientific publications:	Number of CC publications	Other peer-reviewed publications recognized for the advancement into academic rank	Number of publications where you are the first or principal author
	Mentor's relation towards assistant (OVERALL IMPRESSION)		1 2 3 4 5
Osijek, Mentor (first and last name)			
Signature			

Table 5.5 Biannual report on the work of postdoctoral candidate:

GENERAL INFORMATION			
Name:			
Researcher identification number:			
Date of employment contract:			
Expiration date of employment contract:			
Job title as stated in employment contract:			
E-mail:			
Reporting years:			
BIANNUAL REPORT			
Has the work plan been made?	YES / NO		
Have you achieved progress according to the work plan?	YES / NO		
If no, explain why and suggest ways of improvement.			
Briefly describe the work plan for the next period.			
Describe the progress since the last report			
On a scale from 1 to 5, assess the quality of scientific research progress	1 – poor 2 – satisfactory 3 – good 4 – very good 5 – excellent		
If you chose 1 or 2 in the last question, explain why:			
On a scale from 1 to 5, assess the total quality of scientific research	1 – poor 2 – satisfactory 3 – good 4 – very good 5 – excellent		
If you chose 1 or 2 in the last question, explain why:			
Teaching (courses you teach or participate in – state the type and duration):	Course	Mode of instruction	Contact hours
Participation in research and professional projects (in the last two academic years):	Institution	Project duration (from-to)	Project title

Training abroad (in the last two academic years):	Country	Institution and Head of Laboratory	Duration (from-to)
Participation in scientific and professional conferences (in the past two academic years):	Conference name and type of communication	Place and country	Date (from-to)
Scientific publications:	Number of CC publications	Other peer-reviewed publications recognized for the advancement into academic rank	Number of publications where you are the first or principal author
<p>Osijek,</p> <p style="text-align: right;">Postdoctoral candidate (first and last name)</p> <p style="text-align: right;">Signature</p>			

Table 5.6 Evaluation of the mentor.

<p>On the scale 1-5 please evaluate the following: (1 - poor, 2 - satisfactory, 3 - good 4 - very good 5 - excellent)</p>	Clearly defines research objectives and expectations	1 2 3 4 5
	Provides assistance in planning annual research activities and professional training	1 2 3 4 5
	Mentors the assistant regularly	1 2 3 4 5
	Encourages and provides assistance in the publication of scientific papers	1 2 3 4 5
	Mentor's relation towards assistant (OVERALL IMPRESSION)	1 2 3 4 5
If you chose 1 or 2 in the last question, explain why:		
<p>Osijek,</p> <p style="text-align: right;">Teaching/research assistant (first and last name)</p> <p style="text-align: right;">Signature</p>		

Due to the lack of official data, the data used for comparison of teachers of the Department of Biology with teachers of other institutions where similar research is conducted, have been collected through the Croatian Scientific Bibliography. Figure 5.1 compares the number of scientific publications of project managers of the Department of Biology in Osijek, Department of Biology at the Faculty of Science of Zagreb University and Department of Biology at the Faculty of Science of Split University at which foreign researchers work. The figure shows that the number of scientific publications of project managers in which foreign researchers are included is uniform at all three associated higher education institutions.

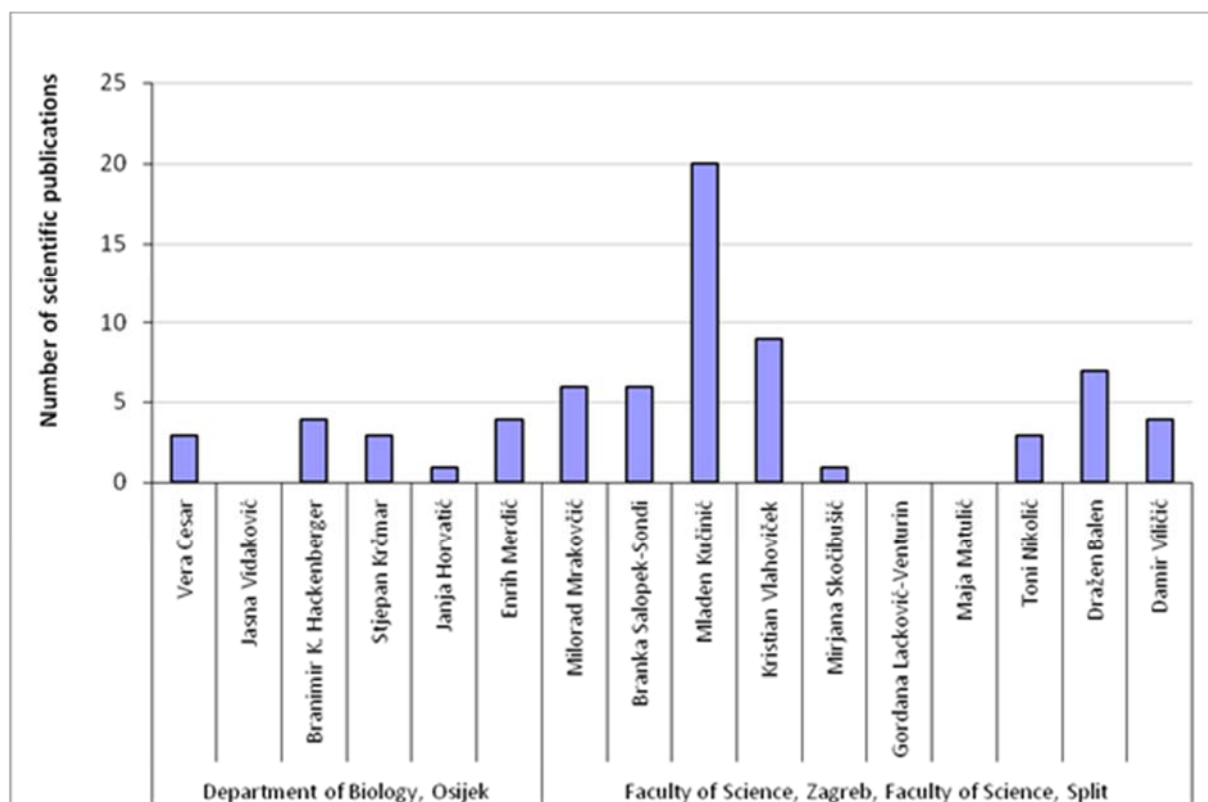


Figure 5.1. Comparison of the number of scientific publications of project managers of the Department of Biology of the University of Osijek in which foreign researchers are included with project managers from other related higher education institutions

## 5.H. OPINIONS OF ASSISTANTS ABOUT THE AVAILABILITY OF MENTORS FOR DOCTORAL DISSERTATIONS

Specify the opinions of assistants about the availability of mentors for doctoral dissertations, i.e. time allocated for their introduction into the methods of scientific research

For the purpose of conducting an opinion survey where teaching/research assistants were assessing the work and availability of mentors of doctoral dissertations in the period covered by this Self-Evaluation, 22 respondents were selected. The survey covered only the employees of the Department who have completed or are still students of one of the two postgraduate

university interdisciplinary study programmes, namely Nature and Environmental Protection, and Molecular Biosciences, and the Doctoral study programme in Biology at the Faculty of Science in Zagreb, whose mentors of the doctoral dissertation (at least one of them) is a current employee of the Department. A link to an anonymous questionnaire form was sent to e-mail addresses of 22 respondents, which was completed by 19 of them (86.36%). The results have shown that 89.48% of respondents are satisfied with the availability of mentors of doctoral dissertations, of which 42.11% are completely satisfied, and 47.37% are mostly satisfied (Figure 5.2).

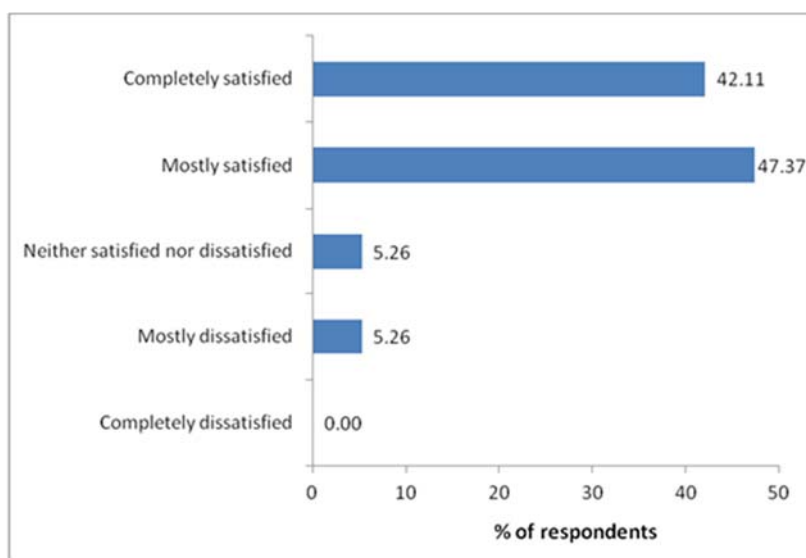


Figure 5.2 Assistants' opinion on availability of mentors of doctoral dissertations

Assistants are satisfied with the amount of time their mentors dedicate to consultations related to the doctoral dissertation (31.58% are completely and 47.37% mostly satisfied). 5.26% of respondents are mostly dissatisfied and 15.79% are neither satisfied nor dissatisfied (Figure 5.3).

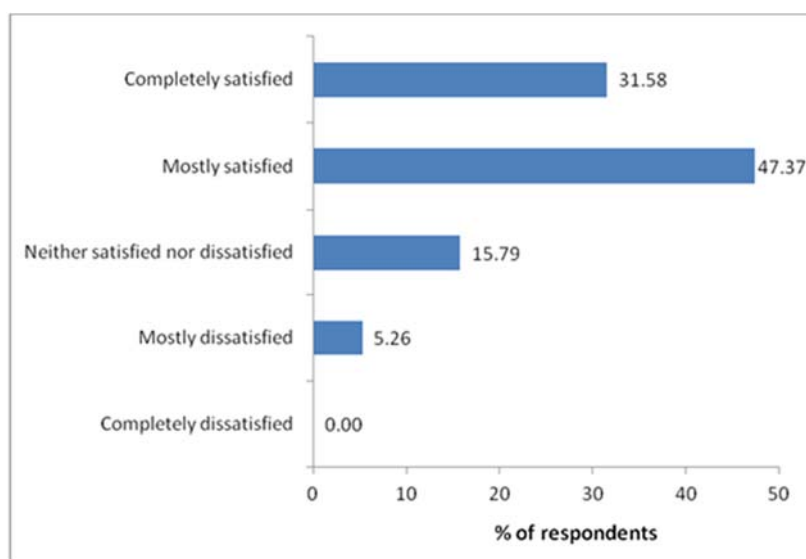


Figure 5.3 Assistants' satisfaction with the time dedicated by mentors for consultations

The number of assistants who are completely satisfied (31.58%) is equal to those who are mostly satisfied (31.58%) with the consultations with their mentors regarding the methods of scientific research, while 21.05% of them do not have a clear opinion on the issue. 15.79% of respondents are mostly dissatisfied (Figure 5.4).

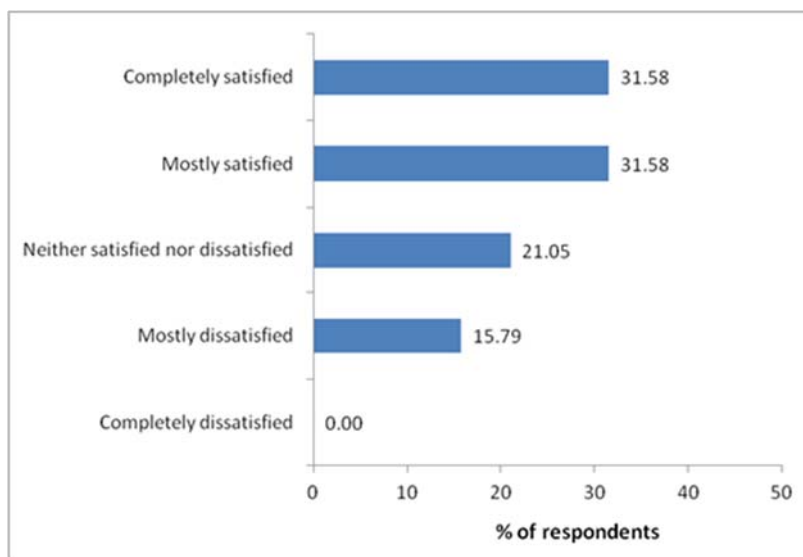


Figure 5.4 Assistants' satisfaction with consultations with mentors regarding methods of scientific research

The largest number of assistants is completely satisfied with their mentors' encouragement to research literature (47.37%), while 31.58% are mostly satisfied. Only 5.26% are mostly dissatisfied (Figure 5.5).

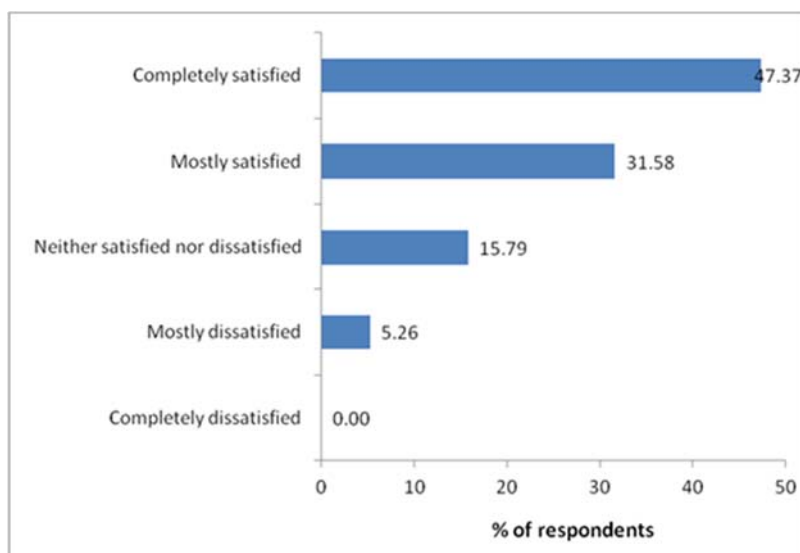


Figure 5.5 Assistants' satisfaction with mentor's encouragement to research literature

The overall work of mentors has mainly been evaluated by their assistants as excellent (36.84%) and very good (31.58%). A good grade has been given by 26.32%, and a satisfactory one by 5.26% of respondents (Figure 5.6). The average grade awarded to the overall work of mentors is 4.0. Data in Table 5.7 further reflect the efficiency and qualifications of our teachers

who have been mentors of doctoral dissertations. They show high research productivity of our teachers (mentors) in the last five academic years. Positive results of the questionnaire on the satisfaction with the work of mentors are further supported by the data on a high number of completed and successfully defended doctoral dissertations by teaching/research assistants and junior researchers in the previous period (Table 5.7) as well as the publication of the results of their research in prestigious scientific journals.

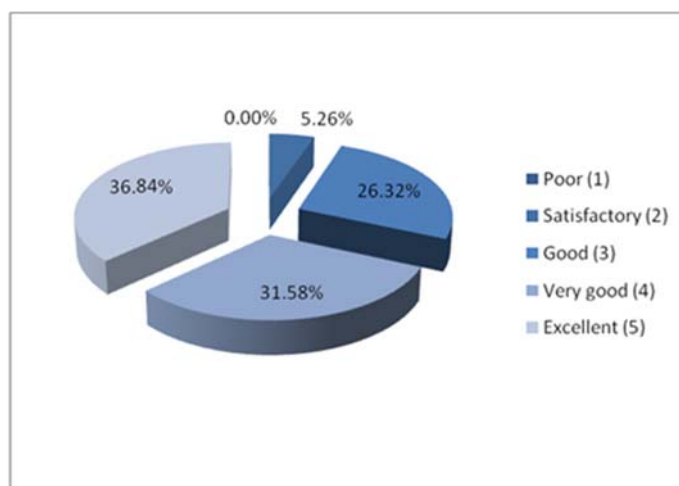


Figure 5.6 Evaluation of mentors' overall work

Table 5.7 Mentors

Doctoral study programme (specialisations)	Number of mentors of dissertations defended in the past 5 years	Number of doctoral dissertations defended in the past 5 years mentored by the teachers of the Department of Biology	Number of publications by mentors in peer-reviewed national scientific journals in the past 5 years *	Number of publications by mentors in peer-reviewed international scientific journals in the past 5 years *
MOBI	3	5	18	21
NEP	5	7	12	57
Faculty of Science, Zagreb	5	8	5	59
Faculty of Science, Tuzla	1	1	10	7
Faculty of Agriculture, University of Osijek	1	1	5	6
Faculty of Agriculture and Food Technology, University of Mostar	1	1	5	6
University interdisciplinary doctoral study programme in Environmental Management, University of Zagreb	1	1	1	10

\*Only peer-reviewed publications in the highest category according to the national classification, i.e., those cited in WoS and Scopus databases are taken into account



## 5.1. CONTENT AND CHARACTER OF 10 MOST IMPORTANT RESEARCH PROJECTS

Specify the content and character of 10 most important research projects of your institution in the last 5 years. State your opinion on the quality of work and results.

Scientific research activities of the Department of Biology have been related primarily to projects of the Ministry of Science, Education and Sports of the Republic of Croatia (MSES). In the period from 2009 until the present MSES has financed five projects conducted by the Department of Biology, of which four in the scientific area of natural sciences, field Biology, and one in the field of Biotechnology – Food technology (Table 5.8). In the same period, the employees of the Department have collaborated on a dozen other projects, and are currently actively involved in four scientific projects funded by the Croatian Science Foundation and several other research projects funded from other sources (Table 5.9). One of reasons why there are not many active projects of the Croatian Science Foundation whose principal researchers would be teachers of the Department of Biology is that the projects funded by the Croatian Ministry of Science, Education and Sports were only completed in 2014, while many employees of the Department were either principal researchers and/or project collaborators. There are currently five research projects being proposed. It is important to stress that in the past three years the Department of Biology has produced a new generation of young assistant professors, which further improved the chances of successful project proposals. This has also resulted in the approval of three so-called “assistant professors projects” that were financed in 2013 by the University of Osijek with a view to providing support to young researchers in increasing scientific productivity of the University constituents. Although the number of projects is small, scientific publications, dissertations and research results that have developed from them have been recognized both nationally and internationally. Because of a relatively small number of biological and ecological studies in Croatia, in particular in its eastern parts, the results of the projects are especially valuable. Also, the quality of research results is high, as they have been published in many scientific papers cited in *Current Contents*, many of which are in the top two quartiles (Q1 and Q2).

Below is an overview of the content and measurable results of five projects funded by the MSES.

1. **Water protection of Kopački Rit – interaction of the Danube and the floodplain** (285-0000000-2674), Project manager: Dr. Jasna Vidakovic, Full Professor

The project "Water protection of the Kopački rit – interaction of the Danube and the floodplain" has investigated hydrological and ecological interactions between the river and its floodplain.

Samples of water and sediment were collected and analyzed, and the basic abiotic features of the Danube and aquatic habitat floodplain during *LYMNOPHASE* and potamophase

established. The research included plankton (phytoplankton, bacterioplankton, zooplankton) and periphytic communities and benthic invertebrate fauna. Depending on hydrological conditions, the qualitative and quantitative composition of the investigated biocenosis of the floodplain is changed, particularly the composition of phytoplankton and zooplankton, as well as the dynamics of the development of bacteria. The research of the ratio of oligotrophic and copiotrophic bacteria allowed the assessment of the availability of dissolved organic matter in the Danube and the floodplain. The dynamics and duration of flooding affect the horizontal and vertical distribution of phytoplankton. Early spring flooding favours the development of phytoplankton, while late spring and summer floods represent a disturbance for its development. The flooding stage is characterized by a greater similarity of phytoplankton of the floodplain and the river, as well as the dominance of diatoms and the green algae Chlorococcales, while during hydrological isolation large amounts of nutrients allow the dominance of cyanobacteria. Dynamics of flooding also affect the dynamics of zooplankton communities. During flooding it comes to mixing of the entire column of water, where the number of metazooplankton reaches the number equal to those in the surface and the bottom layer of water. Prolonged flooding favours the development of all groups of metazooplankton, whereas runoff water from the floodplain reduces the number of planktonic crustaceans. Two very rare species of calanoida copepoda were recorded on the Croatian territory, *Eurytemora velox* and *Arctodiaptomus laticeps*.

The dynamics of development and succession of periphytic communities were observed on both natural and artificial substrates. The results obtained point to a great biodiversity of the periphytic community. Algae and cyanobacteria develop a rich three-dimensional structure of periphyton, where various heterotrophic organisms find shelter and food. In spring and winter periphyton is dominated by diatoms, while in summer and autumn cyanobacteria and green algae are very well developed in addition to diatoms. Availability of food, temperature, and in particular the dynamics of flooding are the most important factors that influence the development of the heterotrophic component of periphyton (Porifera, Nematoda, Oligochaeta, Cladocera, *Dreissena polymorpha*, the larvae of Chironomidae, Bryozoa). One of the best-studied groups of invertebrates in Kopački Rit are roundworms (Nematoda). Seasonal and spatial dynamics were established, as well as gender and age structure of roundworms in the sediment, epyphyton and periphyton. Also, one of the most numerous group of benthos and periphyton, larvae exuviae (Chironomidae, Diptera) was studied, whose representatives are used as bioindicators of water quality and represent a key link between different trophic categories of the food web. A presence of a number of invasive species of cyanobacteria/algae (*Cylindrospermopsis raciborskii*, *Didymosphaenia geminata*) and invertebrates (*Limnomysis Beneden*, *Dreissena polymorpha*, *Corbicula fluminea*, *Sinanodonta woodiana*) was established, whose presence and quantities continue to be monitored.

The results of all conducted studies significantly contribute to the understanding of a very complex interaction of river and floodplain regarding the dynamics of flooding and its impact on different trophic components of aquatic localities. The results obtained are of great value

for monitoring the process of eutrophication and the definition of protection measures of floodplain water and biodiversity and Kopački Rit, as well as other natural floodplains of the Danube basin.

Project results have been presented in 25 scientific papers cited in *Current Contents* database, six scientific papers in other, international peer-reviewed journals and four papers published in other journals. The results have been presented at a number of international and national conferences through abstracts and papers in conference proceedings. During the implementation of the project two master's theses and four doctoral dissertations were produced and many bachelor's theses were written under the supervision of the project manager and project collaborators.

## 2. Entomofauna of Kopački rit (285-1193080-2151), Project manager: Dr. Enrih Merdić, Associate Professor

The general objective of this research project was to introduce entomofauna of Kopački Rit as an important factor of biodiversity in Croatia. Other objectives have been accomplished too, such as: inventorying of insects species in Kopački rit, determining rare, endangered and protected species, determining eudominant and dominant species and their impact on the floodplain ecosystem, determining the distribution of insects from Kopački Rit to the surrounding area, evaluating the efficiency of sampling methods and assessing the attractiveness of attractants. Studies were performed with various groups of insects. Some groups of insects (mosquitoes and horseflies) were investigated much more extensively and the research results were published in renowned international journals. Other groups of insects (sawflies, black flies, aquatic insects, moths, ground beetles, Scarab beetles) were studied to the species level. A total of 723 species were identified. They are as follows: Culicidae 20, Tabanidae 26, Simuliidae 4, Hypoboscidae 2, Odonata 48, Carabidae 95, Lepidoptera – Rhoplocera 60, Lepidoptera – Heterocera 270, Symphita 73, aquatic Coleoptera and Heteroptera 73, Scarabeidae 13. Among these species there are also endangered in the European area according to the IUCN criteria, but have stable populations in the area of Kopački Rit. They are: *Carabus clathratus*, *Lestes macrostigma*, *Sympetrum depressiusculum*, *Birka cinereipes*, *Graphoderus bilineatus*, *Leucorrhinia pectoralis*. 10 insect species have been determined as new for the Croatian fauna, namely: *Trachelus tabidus*, *Callicera spinola*, *Chrysotoxum verralli*, *Eupeodes lapponicus*, *Paragus pecchiolii*, *Syrphus torvus*, *Xanthogramma laetum*, *Berosus geminus*, *Enochrus affinis*, and *Tabanus darimonti*. Special attention was paid to the study of attractiveness of attractants on hematophagous insects and dry ice was found to be the best attractant for mosquitoes, with a 95 m range of effectiveness. Octenol is a good attractant for horseflies in the inundated areas, while stale equine urine proved to be the best. The flight speed was determined for the most numerous mosquito species in the studied area: *Aedes vexans* 1 km/day (night), *Ochlerotatus caspius* 2.3 km/day (night).

A total of seven papers in journals cited in *Current Contents* database and nine papers in other bibliographic databases of scientific papers have resulted from project. The researchers have participated in 10 conferences with over twenty communications and two doctoral dissertations have been defended (by research assistants who participated in the project), three master's theses and seven bachelor's theses. Quite limited funding was used very judiciously.

**3. Genetic markers and role of attractants in haematophagous diptera abundance (285-0731674-2200), Project manager: Dr. Stjepan Krčmar, Full Professor**

Studies within this project included a large number of field experiments in which effectiveness of various chemicals was investigated, as well as excreta (urine) of domestic animals, and different types of traps in sampling horse flies from various habitat types. In addition, studies of butterfly fauna (Lepidoptera: Rhopalocera) was also carried out within this project in the area of Bansko Brdo in the Croatian part of Baranja region. Along the altitudinal transect Ogulin - Novi Vinodolski at Velika Kapela structural, spatial and temporal distribution of earthworm populations (Oligochaeta: Lumbricidae) was studied. 4-methylphenol proved to be a very effective attractant for sampling horse flies (Tabanidae) with modified Manitoba traps in comparison with other synthetic attractants (3- **ISOPROPYLPHENOL** and naphthalene). Mixture of synthetic attractants 1-octen-3-ol, acetone and ammonium hydroxide in a ratio of 5 : 3 : 2 proved to be very effective in sampling of horse flies by means of modified Manitoba traps. Aged donkey urine proved to be highly effective in sampling of horse flies with modified Manitoba traps and achieved approximately the same values as the above mixture of synthetic attractants. Aged urine of pregnant mares was also very effective in the sampling of horse flies with modified Manitoba traps. The maximum efficiency of modified Manitoba traps in the sampling of horse flies was determined at the height of the trap openings of 123-130 cm above ground instead of the standard 90 cm. Liquid trap (glossy black plastic sheet 80 x 55 cm covered with a thin layer of yellow salad oil) proved to be 16.5 times more efficient in sampling of horse flies than scented traps or standard Manitoba traps baited with a 1-octene-3-ol as the most efficient synthetic attractant. The analysis of the distribution of horse flies at Velika Kapela has shown that the horse fly fauna differs at certain altitudes depending on the impact of climatic factors (air temperature, relative humidity and wind). Furthermore, the impact of the variability of abiotic factors (temperature, rainfall and flooding) on horse fly population dynamics in the floodplains of the Danube in Croatia has been determined. In exploring the influence of colour on the trap efficiency, dark coloured box traps have proven to be more successful in sampling of horse flies from lighter coloured box traps.

Studies within the project have resulted in two doctoral dissertations, two master's theses and 27 bachelor's theses. 17 scientific papers have been published in scientific journals cited in *Current Contents*, 14 papers cited in other databases, one paper in conference proceedings, two book chapters and 16 abstracts at scientific conferences.

#### 4. Nutrients and development of floating macrophytes and algae in Eastern Croatia (285-0000000-3175), Project manager: Dr. Janja Horvatić, Associate Professor

54 sites in the floodplain of the Danube, Kopački Rit, and Spačva basin were studied. The incidence and coverage of floating macrophytes depended on the concentration of available nutrients and ecological parameters. In deep water currents submerged species were developed. Amphibious and terrestrial species were dominant in the dry season, while freely floating species were dominant in the increased precipitation periods. Due to the dominance of floating macrophytes, reduced availability of nitrogen and shade, the *in situ* growth of phytoplankton was limited. In the water of marsh habitats, the addition of nutrients in the bioassay caused the growth of algae *Chlorella kessleri*, which was proportional to the degree of limitation of these nutrients. According to the total biomass, conditions were mostly mesotrophic. A large range of values of the total biomass of algae *C. kessleri* (from oligomesotrophy to hypertrophy) has indicated significant saturation of investigated sites with nutrients. Along with the high value of the total biomass in waters of the River Bosut and canals in Baranja, the addition of N, and a combination of N and P resulted in the inhibition of growth of *C. kessleri*, which points to the presence of excess nutrients. According to the results of the bioassay that included enrichment of water samples from the River Danube, Čonakut channel and Lake Sakadaš with nutrients, co-limitation of nitrogen and phosphorus was determined. Correlation analysis has revealed a considerable positive correlation between total biomass of *C. Kessleri* obtained by bioassay and concentration of  $\text{NO}_3$  while negative correlation has been established between the total biomass of *C. kessleri* and level of  $\text{o-PO}_4$  in situ. The same experiment was repeated with the algal culture *Raphidocelis subcapitata*, which confirmed the results of bioassay with *C. kessleri*.

Algal culture *C. kessleri* was exposed to two herbicides in logarithmic and linear growth phase, S-metolachlor chloroacetanilide and triazine terbuthylazine, as well as Pro-oxidant  $\text{H}_2\text{O}_2$ . Toxicants have significantly affected the generation of ROS in the cells of *C. kessleri*, resulting in the formation of 4-hydroxy-2-nonenal (HNE) and changes in the growth and concentration of chlorophyll a and chlorophyll b. The content of HNE-His conjugates increased with the duration of treatment in both phases of growth. Lipid peroxidation suggests that the action of antioxidant enzymes (catalase, ascorbate peroxidase and glutathione reductase) and non-enzymatic antioxidants (phenol, ascorbic acid, and carotenoids) was not sufficiently effective at higher concentrations of toxicants in the logarithmic growth phase.

The abundance and vegetation coverage in the canals in the Danube region was studied using the quadrant method. The growth of freely floating macrophytes has shown a correlation with the concentration of nutrients in the water. A species of *Nuphar lutea* had the largest portion of the mass of fresh matter in Zmajevac canal, while *Lemna minor* had the smallest. In the Barbara channel, the species *Ceratophyllum demersum* and *Lemna trisulca* had the largest portion of the mass of the fresh matter sample. Regarding the number of individuals in the quadrant *L. minor*, *L. trisulca* and *Spirodela polyrrhiza* were dominant. To measure the activity

of antioxidant enzymes strains of *S. polyrrhiza* and *Salvinia natans* were selected as they were present in channels each time the samples were taken. Activity of *guaiacol peroxidase* and *catalase* enzymes were higher in strains of *S. polyrrhiza* than in strains of *S. natans*. Differences in the level of activity of enzymes in strains of *S. natans* with regard to different sites were not observed.

The analysis of the influence of nitrogen on the growth and development of *Lemna gibba* established that the largest increase and the number of plants occurred after treatment with nitrogen concentration of 5 mg L<sup>-1</sup> N, and as far as *S. polyrrhiza* is concerned, with the addition of 55.5 mg L<sup>-1</sup> N. In both species the addition of higher concentrations of nitrogen caused a statistically significant increase in the concentration of chlorophyll a, b, and carotenoids. The analysis of the influence of Hg, Cd and Cr on the enzyme activity, protein concentration, ascorbic acid and polyphenols as well as on lipide peroxidation products showed an increase of antioxidant system activity at higher and a decrease at lower concentrations of metals in the species *L. gibba* and *L. minor*. The toxicity of metals had a sequence Hg > Cd > Cr. In both types, the enzyme guaiacol peroxidase was more important in the removal of H<sub>2</sub>O<sub>2</sub> than CAT. *L. gibba* was more resistant to oxidative stress while polyphenols and ascorbic acid had a significant role. The effect of copper on growth of two cultures of species *L. gibba*, which were previously grown under different conditions, was established by a simple toxicological test. One culture was isolated from the drainage canals of Eastern Croatia and has since grown in laboratory conditions while another culture was isolated from the fishpond. Laboratory testing has revealed a higher sensitivity of *L. gibba* grown outdoors compared to *L. gibba* grown in laboratory conditions. All planned studies have been completed.

Based on the results of research carried out during the project, in 2013 seven papers cited in *Current Contents*, three scientific papers cited in other bibliographic databases and six abstracts in conference proceedings were published. Also, three doctoral dissertations were defended, one master thesis and five bachelor's theses.

**5. Interaction of the functional food ingredients with quality (285-0000000-3484),**  
Project manager: Dr. Branimir Hackenberger Kutuzović, Associate Professor

In order to achieve or enhance functionality various additives are added to food, which can interact with other ingredients. The consequences of such interactions may significantly affect the quality and safety of finished food products, as well as the needs for the technological processes in their production. The aim of this project was to establish the most important interactions between the functionality ingredients in the functional food made from cereal with ingredients found in food products in conventional quantities, and to determine and/or predict their impact on the quality of the finished food product. Measurable endpoints were determined for certain interactions that can be used to monitor and control the quality at the level of production and processing of raw materials, as well as the level of final consumption. Characterization of the interaction was carried out by means of modern laboratory methods,

whereas the quantification and evaluation of the results were carried out by means of classic (isobolograms, multivariate analysis) and modern statistical methods (fuzzy-analysis). Target interactions of this project were inhibition and induction of the enzymes and/or enzyme systems that are essential for the quality and technological processing, synergistic and antagonistic interactions with potential harmful substances, and the impact on oxidative status. Special attention is paid to ingredients such as tocopherol, inulin, beta-glucan, oligofructose and lysine in grain and flour products, as well as to the interaction with the antioxidant enzyme systems (superoxide dismutase, ascorbate peroxidase, monodehydroascorbate reductase, dehydroascorbate reductase and catalase) and enzymatic systems which are important factors of the technological processes (alpha-amylase, diastasis).

Studies were primarily based on one of the project objectives, which was to establish synergistic/ antagonistic effects of molecular interactions with sub-effective concentrations, and to monitor them in selected animal models. Target interactions of this project were inhibition and induction of the enzymes (acetyl cholinesterase, carboxyl esterase, superoxide dismutase, catalase) and/or enzyme systems (enzymatic and non-enzymatic indicators of oxidative stress) that are important for the synergistic and antagonistic interaction with potential harmful substances, such as pesticides in the raw material (grain) used in the production of final food products. Characterization of the interaction was carried out by modern laboratory methods (spectrophotometry, spectrofluorometrically methods), and the quantification and evaluation of the results were carried out by classic (isobolograms, multivariate analysis) and modern statistical methods (fuzzy-analysis). It should be noted that the results obtained from the project are universally applicable, both to the method of assessing the effectiveness of toxic properties as well as to the assessment of functional properties of additive mixtures in relation to their impact, which is measured at the level of molecular markers, while certain scientific techniques can be applied to solving other biological problems.

A total of 22 papers cited in *Current Contents*, three papers cited in other bibliographic databases, and 13 communications/abstracts in conference proceedings have resulted directly from this project. Also, three doctoral dissertations were defended and five bachelor's theses produced.

## 5.J. IMPORTANCE OF SCIENTIFIC RESEARCH IN OVERALL ACTIVITIES OF THE INSTITUTION

Describe the ways in which research activities contribute to teaching, intellectual and technological contributions to society and economy and other institutional activities.

In accordance with the mission of the Department, the objective of the teachers is to teach at the undergraduate, graduate and postgraduate level in various branches of biology, to continuously conduct and develop research and professional work in biology, and support the

application of acquired knowledge. University textbooks and manuals are used in teaching, as well as a variety of scientific and professional publications authored by the teachers of the Department. In addition, tools and equipment are used which are funded mainly from the budget earmarked for professional or scientific research projects. The aim of practical work and teaching of individual courses of study programmes is to introduce students to research activities, encourage them to participate in them and include them in projects currently conducted in the Department laboratories. By participating in scientific research and practical work, students are encouraged to design their own studies and make student project proposals. In selecting topics and methods for graduation papers, emphasis is placed on conducting research that will make a visible contribution to science. The selected topics are normally directly concerned with professional and scientific research projects carried out at the Department. Teachers present the results of their scientific research publicly at a number of national and international scientific and professional conferences and workshops, and in the form of lectures at the Scientific Colloquium that is organized by the Department. In this way, scientific research contributes to the adoption of policies and decisions that have an impact on further development of science and the profession itself. Through a variety of activities which the Department organizes (Alumni Club, Project "Biologist-and-Me" aimed at the popularization of science, Scientific Colloquium) and co-organizes (10<sup>th</sup> Croatian Biological Congress with international participation, scientific conference "Water for All") it wishes to bring together biologists and scientists from related areas in order to present research results and exchange opinions. At the same time, it aims to include primary and secondary biology teachers and their students into activities of the Department and provide them with the opportunity to gain insight into the most recent scientific and professional achievements related to primary, secondary, and higher education in Biology and their application in modern Biology classes. Through good cooperation with education institutions, local communities, businesses and public institutions the Department expects to contribute to the popularization of science in the wider community and to apply and commercialize intellectual property arising from scientific research through economic projects and ecological studies.



Table 5.8 Sources of funding for research projects

Start year	Project (name)	Duration (months)	State budget (ministries and public administration)	Local government budget	International funds	Business sector (private companies)	Business sector (public companies)	Other sources (list which)	TOTAL
2007	Genetic markers and role of attractants in haematophagous diptera abundance	84	338,549.85						338,549.85
2007	Water protection of Kopački Rit - interaction of the Danube and the floodplain	84	345,550.85						345,550.85
2007	Entomofauna of Kopački Rit	84	172,883.64						172,883.64
2008	Interaction of the functional food ingredients with quality	72	109,887.49						109,887.49
2008	Nutrients and development of floating macrophytes and algae in Eastern Croatia	72	183,125.96						183,125.96
2013	Trophic interactions fish and benthos, the importance of chironomid larvae	12						University funds 16,200.00	16,200.00
2013	Effect of hypovirus on <i>Cryphonectria parasitica</i> mushroom	12						University funds 18,000.00	18,000.00
2013	Biochemical-physiological basis of wheat biofortification	12						University funds 20,000.00	20,000.00

Table 5. 9 List of research and developmental projects in which employees of the Department of Biology have participated

Completed projects
Chestnut blight research in the Balkans and Georgia: population studies and biological control methods (Swiss National Science Foundation) (2009-2013)
The impact of oxidative stress on the organization and function of plant cells and tissues (MSES) (2011-2013)
The cell and tissue differentiation during development of plant organs (MSES) (2007-2010)
The role of lipid rafts and glycoconjugates in development and regeneration of the nervous system (MSES)(2007-2013)
Shortening of breeding period of carp ( <i>Cyprinus carpio</i> ) and improvement of meat (MSES) (2008-2013)
Stress physiology and agricultural characteristics of wheat and barley cultivars (MSES) (2008-2013)
Student competencies in science and biology classes (MSES) (2007-2011)
The role of BPM1 protein from <i>Arabidopsis thaliana</i> in chromatin remodeling (UNIZG) (2013.)
Biological control of plant diseases (MSES) (2007-2013)
Think unthinkable (The Dana Foundation) (2009)
Oxidation stability of meat of Hrvatica hens (UNIOS) (2013-2014)
Study of protected species of water beetles ( <i>Graphoderus bilineatus</i> ) in continental Croatia for the purpose of drafting proposals of potential NATURA 2000 sites (SINP) (2010-2011)
Monitoring of species of beetle <i>Graphoderus bilineatus</i> (De Geer, 1774) in important conservation areas in the Republic of Croatia (SINP) (2012-2014)
Active projects
Diversity and interactions of chestnut, chestnut blight fungus and biocontrol agent – virus: implications on chestnut recovery (CSF) (2014-2017)
Treating neuropathic pain with dorsal root ganglion stimulation – NeurMod
Multilocus sequence genotyping of tick borne pathogens: covering the gap between animals, ticks and humans (CSF) (2014-)
Genetics and physiology of multiple stress tolerance in maize (CSF) (2014-2017)
Invasive chestnut diseases - epidemiological research and management options (Swiss National Science Foundation) (2014-)

### 5.K. JOURNAL OF *HE* INSTITUTION

List your own journals and describe their importance (research/professional, composition of the editorial board, selection procedure, impact factor if any, etc.)

The Department of Biology does not publish any journals.

### 5.L. CONTENT AND CHARACTER OF PROFESSIONAL PROJECTS OF *HE* INSTITUTION

Specify the content and character of professional projects of your institution in the last 5 years (numerical data in Table 5.10). State your opinion on the quality of work and results.

In the period between 2009 and 2014 employees of the Department of Biology in Osijek concluded a total of 20 agreements on financing and implementation of professional projects (Figure 5.7)

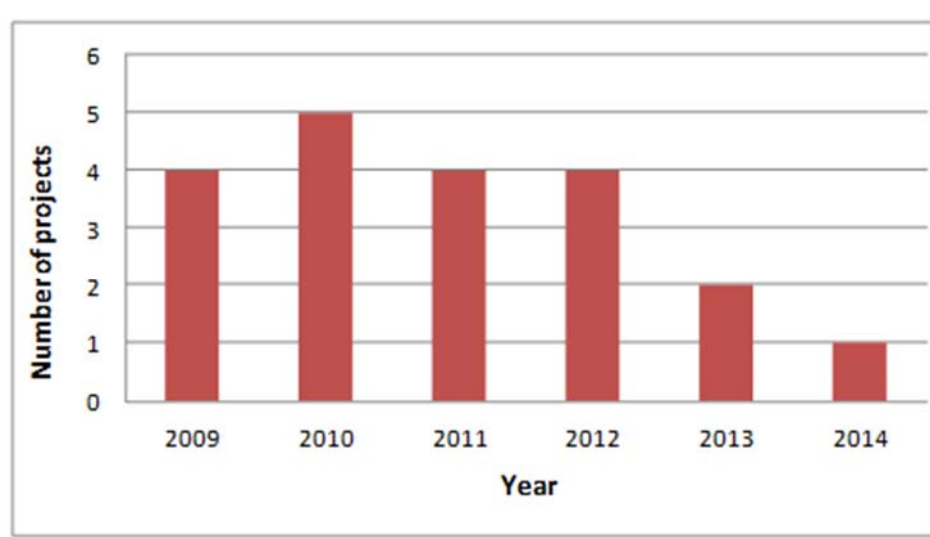


Figure 5.7 Total number of projects for the period 2009-2014

The projects are the result of collaboration of our employees primarily with local government units (counties, cities and municipalities) and public institutions of the Ministry of Environment and Nature Protection and the Ministry of Health and Social Welfare, followed by the collaboration with industry sector and legal entities. The total value of projects contracted in the said period amounted to HRK 2,398,777.00 (Table 5.10). A large number of projects point to the fact that the Department of Biology has been recognized as an important partner in the implementation of professional projects of interest to national and local community and the industry sector, which is in line with the Strategy of the Josip Juraj Strossmayer University of Osijek regarding the necessity of implementation of acquired knowledge for the purpose of general progress and well-being of the community at large. The

largest part of contracted and implemented projects pertains to collaboration with the local community and its financing of such projects, whose purpose is to improve living conditions and to preserve and protect nature and environment.

A significant number of the projects have been carried out in collaboration with local communities in the region, as well as other parts of Croatia, the objective of which have been finding more efficient mosquito control solutions and the impact of mosquito on human health. Other projects are mainly related to the study of fauna in protected areas of the Republic of Croatia and the preparation of environmental impact studies regarding specific economic projects. The objective of all professional projects is the application of scientific achievements and results obtained by the Department of Biology. The total number of contracted and implemented projects and their total financial value in the last six-year period shows the continuity of activities of the Department employees in terms of knowledge and technology transfer to the local community and the industry sector.

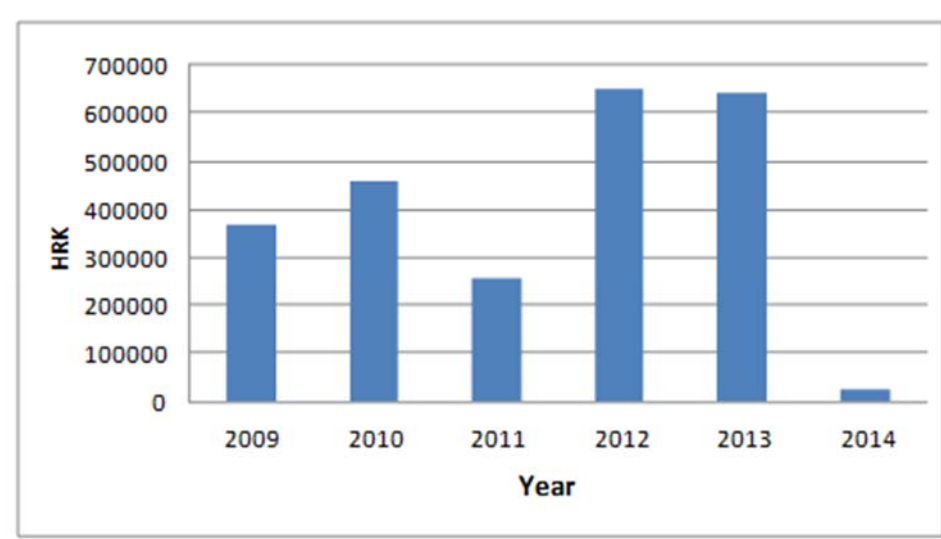


Figure 5.8 Value of projects contracted in the period 2009 – 2014 expressed in HRK

In 2014 both the number and value of projects (Figures 5.7 and 5.8) were reduced, because only one project had been registered in the accounting books by the time this Self-Evaluation was completed, while several other projects were in the implementation phase.

Table 5.10 Sources of funding for professional projects

God. početka	Projekt (naziv)	Trajanje projekta (mjeseci)	Državni proračun (ministarstva i javna uprava)	Proračun lokalnih jedinica	Međunarodni fondovi	Gospodarstvo (privatni sektor)	Gospodarstvo - javna poduzeća	Ostalo (specificirati)	UKUPNO
2014.	Projekt 1: Poslovi monitoringa i istraživanja komaraca u Međimurskoj županiji	8				25.000,00			25.000,00
2013.	Projekt 2: Antropogeni utjecaji na kopnenu makrofaunu s težištem na zaštićenim svojama u RH	9				40.000,00			40.000,00
2013.	Projekt 3: Monitoring i istraživanje komaraca u gradu Osijeku	18		600.000,00					600.000,00
2012.	Projekt 4: Istraživanje i vrednovanje ugroženih vrsta vretenaca (Odonata) na području ornitološki vrijednog područja Jezero kod Njivica na otoku Krku	9	12.500,00						12.500,00

Table 5.10 Sources of funding for professional projects (follow-up)

2012	Project 5: Monitoring and research of mosquitoes in the town of Osijek	9		418,750.00					418,750.00
2012	Project 6: Taking inventory of terrestrial mammals (Mammalia) of the National park "Krka", their zoogeographical analysis, vulnerability and status	16	86,875.00						86,875.00
2012	Project 7: Ecophysiological research of Javorica accumulation - Phase II	8					130,000.00		130,000.00
2011	Project 8: Monitoring and research of mosquitoes in Vukovar-Srijem County	12		125,000.00					125,000.00
2011	Project 9: Assessment of risk of dengue and chikungunya fever in Croatian coastal areas	4	9,375.00						9,375.00

Table 5.10. Sources of funding for professional projects (follow-up)

2011	Project 10: Monitoring of mosquitoes in the area of Osijek-Baranja county 2011	6		85,977.00					85,977.00
2011	Project 11: Research and assessment of endangered species of dragonfly (Odonata) in the ornithologically important site of Jezero near Njivice on the Krk Island	6	37,500.00						37,500.00
2010	Project 12: Biomonitoring of catchment water from the area of mineral fertilizer company Adriatica Dunav Ltd. in Vukovar	60				140,000.00			140,000.00
2010	Project 13: Environmental impact of regulation works on the Danube from 1380 km - 1433 km	10				125,000.00			125,000.00

Table 5.10 Sources of funding for professional projects (follow-up)

2010	Project 14: Taking inventory of terrestrial mammals (Mammalia) of the National park "Krka", their zoogeographical analysis, vulnerability and status	10	75,000.00						75,000.00
2010	Project 15: Monitoring of mosquitoes in the area of the town of Osijek and Osijek-Baranja County in 2010	4		85,977.00					85,977.00
2010	Project 16: Development of model for treating <i>Aedes</i> and <i>Culex</i> mosquitoes in area of the town of Osijek	3	34,843.20						34,843.20
2009	Project 17: Monitoring and research of mosquitoes, development of mosquito control programmes in the town of Vinkovci for 2009	8		19,980.00					19,980.00



Table 5.10 Sources of funding for professional projects (follow-up)

2009.	Project 18: Training of employees of the Public Health Institute of Šibenik-Knin County, sampling by means of CDC traps in the field, determination of species	7	27.000,00						27.000,00
2009.	Project 19: Revision of the environmental impact study (EIS) related to mineral fertilizer factory in Vukovar	12	150.000,00						150.000,00
2009.	Project 20: Professional background for potential use of larvicides Dimilin SC-48 in aqueous systems	12	170.000,00						170.000,00
	Total	231	603.093,20	1.335684,00	0	330.000,00	130.000,00	0	2.398.777,00

### **5.M. IMPACT OF PROFESSIONAL PROJECTS AND SERVICES ON THE DEVELOPMENTAL PROJECTS AND SERVICES ON THE PROGRESS OF THE CROATIAN ECONOMY, SERVICE, SECTOR AND STATE ADMINISTRATION**

Specify the impact of your professional and developmental projects and services on the development of the Croatian economy, service sector and state administration.

The results of research and professional development projects have fully met the specified objectives and facilitated commercialization and transfer of research results to the industry sector. Professional projects have resulted in the inventory of flora and fauna, the introduction of measures to protect the environment and biodiversity, as well as human health. Professional projects related to the monitoring of mosquitoes have had a direct impact on improving the quality of life of the residents of Osijek and its surroundings, primarily by using various methods to reduce the molestation effect of mosquito. The implementation of these methods was carried out by locally based companies under the expert supervision of researchers of the Department of Biology. Professional studies conducted by researchers from our institution have produced important guidelines for reducing the impact of economic activities on the environment and natural processes occurring in it. Projects aimed at taking inventory of flora and fauna, especially in areas that are under direct protection of the Republic of Croatia, have contributed to a much better understanding of great biological diversity, and monitoring of protected species and taxa. The result of all of these projects are many scientific papers that link scientific and economic activities through discovery and application of new methods related to the protection of environment and human health.

### **5.N. POLICY OF MONITORING THE VOLUME AND QUALITY OF RESEARCH ACTIVITY AND METHODS OF EFFECTIVE APPLICATION**

Specify the ways in which you established a systematic policy of monitoring the volume and quality of research or artistic activity at your institution, and describe its elements and methods of effective application.

For the purpose of earmarked funding of science, the Department of Biology is actively involved, on an annual basis, in the collection and analysis of data (number of papers and citations, number and importance of national and international projects, projects in collaboration with the industry sector, mobility and activities related to the popularization of science) at the level of the University of Osijek. Due to the success of researchers from the Department, certain funds (i.e. capitation fees) are awarded to the Department that are distributed among teachers. Also, the results and comparative data obtained through the University are regularly analyzed at the level of the Department Council and Sub-departments, and specific recommendations or suggestions are given as to which types of incentives are to

be provided. Furthermore, all teachers/researchers are required to continuously enter their papers in the Croatian scientific bibliography. The Department encourages activities related to the popularization of science, keeping track of the number of popular scientific lectures, books and articles, and comparison with previous years. Also, in order to monitor and learn about research areas of individual researchers from the Department, the Scientific Colloquium is organized in which researchers present the most important results of their research to all employees and the public. Since January 2012, 12 such colloquia have been held.

Also, the Department keeps detailed records of defended doctoral dissertations, mentoring, teaching/research assistants and postdoctoral candidates who are full time employees, research funding and scientific papers published in journals cited in the most prestigious databases. Accomplishments in all areas are commended, honoured and awarded at the sessions of the Department Council.

#### 5.O. POLICY OF PROVIDING INCENTIVES AND AWARDDING FOR PUBLISHING IN HIGHLY RANKED SCIENTIFIC JOURNALS

Describe your policy of providing incentives for and awarding publishing in the highly ranked scientific journals (or with renowned publishers when books are concerned), that is, the support system for publishing in prestigious journals in your field (e.g. translation, peer-review, system of informing on submission deadlines etc.)

As already described in chapter 4.h), measures to provide incentives and award publishing in highly ranked scientific journals or with renowned publishers were not required because all teachers of the Department are highly motivated for research work in the field of Biology. The incentivizing and awarding policy is built into the system of academic advancement, or appointment to the academic and/or teaching ranks, and the criteria for these procedures are clearly defined in the Ordinance on the Advancement into Academic rank. Candidates who wish to advance in the scientific field of Biology and be appointed research associates shall have nine papers published in international peer-reviewed journals, and at least two-thirds of these papers must be published in journals cited in *Current Contents* (CC). To advance into the academic rank of senior research associate (a total of 18 papers in peer-reviewed international journals - 2/3 in CC) and research advisor (a total of 30 papers in peer-reviewed international journals - 2/3 in CC) the candidate shall have been the first or principal author of at least one third of the publications which are required for the advancement and which are cited in *Current Contents*. The candidate for a research advisor shall have at least one third of papers published in journals cited in CC with an above-average impact factor for the corresponding scientific field in accordance with the *Journal Citation Reports* – ISI Thompson classification. Since 2010 it has been possible to replace the publications cited in *Current Contents* with those not cited in that database, provided that their impact factor is higher than the median impact factor for the field (as defined and calculated by *ISI*). In accordance with

the Ordinance the teachers of the Department are required to regularly publish papers in highly ranked journals with an equally high impact factor, as such papers are necessary for their advancement. In the current academic year (2014-2015), as a result of a major step forward in terms of publication of papers in prestigious world journals (Q1 and Q2 rank on the basis of ISI Web of Knowledge) in the last three years (43 papers), the Head of Department has made a decision to publicly commend and award employees who were first authors of Q1 publications, or, in case of collaboration with other institutions, first authors from the Department. Also, some material expenses for participation in conferences (registration fee, accommodation or travel expenses) were co-funded by the Department in previous years. Finally, several laboratories at the Department (e.g. Laboratory of Entomology) give their members material rewards, particularly the principal authors of *Current Contents* publications.

### 5.P. MONITORING RESEARCH ETHICS

Explain your methods of monitoring research ethics, and implementing European and global standards for employment of the best research staff (such as the implementation of The European Charter for Researchers)

In accordance with the Statute and the Code of Ethics of the Josip Juraj Strossmayer University in Osijek, the Ethics Committee was established at the Department (Article 47 of the Ordinance of the Department of Biology). The Ethics Committee consists of five members who are appointed and relieved of duty by the Department Council. The Head of Department proposes two members of the research and teaching staff, one teaching/research assistant, one member who represents other employees and the fifth member is a student proposed by Students' Union of the Department. Members of the Ethics Committee are appointed for the period of four years and the same persons may be re-appointed. The Ethics Committee (Article 48) monitors the implementation of the Code of Ethics of the University at the Department and establishes the violations of the Code of Ethics of the University at the Department. It also instigates the proceedings for the violation of the Code of Ethics of the University at the Department on its own initiative or the initiative of the teaching staff, other employees, students, or other persons who believe that the Code of Ethics of the University has been violated in a particular case. In the case of serious violation of the Code of Ethics, the Ethics Committee shall submit to the Head of Department a proposal for the instigation of the disciplinary action. The task of the Ethics Committee is to prepare annual reports on its activities, the procedures carried out for the purpose of establishing the violation of the Code of Ethics and submit them to the Head of Department and the Department Council. In accordance with the specific ethical principles of the Code of Ethics of the University of Osijek, and bearing in mind the specific nature of research conducted by certain sub-departments within the Department which includes animals, the Ethics Committee for the welfare of animals in research shall meet if necessary. Previous activities of the Ethics Committee were

mainly related to assessing whether ethical principles were met within research project proposals. The Department carries out the procedure of advancement into scientific and teaching ranks and appointment into corresponding job positions pursuant to the Scientific Activity and Higher Education Act, the Statute of the Josip Juraj Strossmayer University in Osijek, a special Ordinance adopted by the Senate of the University and the Ordinance of the Department, and on the basis of open competitions published on the Department website, the University of Osijek website, daily newspapers, the Official Gazette, and on the EURAXESS Portal. Such competitions ensure the employment of the best research staff. Selection of the best candidate is carried out by an expert committee consisting of an odd number of members, which is set up for that particular purpose.

## 5.R. SATISFACTION OF CURRENT SITUATION AND MEASURES FOR POSSIBLE IMPROVEMENTS

Specify to what extent you are satisfied with the current situation and propose possible improvements.

The presented data on scientific bibliography of researchers of the Department of Biology clearly indicate that it strives for scientific excellence. Nevertheless, we believe that scientific and research potential of the Department has yet to be fully exploited. Although the research results have been published mainly in high-ranking publications, they have not been fully integrated yet as to have a greater impact on the wider scientific and professional community. Linking research teams and an interdisciplinary approach might help to strengthen the future recognisability of the Department at the national and international level. In accordance with strategic scientific and research objectives, the Department of Biology should continue to strengthen collaboration with other research institutions in Croatia and abroad through research projects and involvement in the work of scientific networks and centres of excellence. Scientists should be motivated to become more involved in national and international projects and provided with adequate administrative and financial support. In the current year five scientific research projects have been proposed. However, the driving force of the Department in the coming period is the large number of young researchers who have yet to realize their full research potential and prepare project proposals. Also, collaboration with the industry sector should be continued and advanced in order to commercialize research results and attain the financial stability of the Department. Results of scientific and professional projects are applied in teaching and contribute to the improvement of education quality and the adoption of policies and decisions regarding the promotion of further development of science and profession. Through various activities and constructive collaboration with education institutions, local communities, companies and public institutions, the mission of the Department of Biology will reflect in a more active work on the systematic promotion and popularization of science and the Department as a renowned scientific and research institution

## 6. Mobility and international cooperation

### 6.A. INTERNAL MOBILITY OF STUDENTS

Specify how you support internal mobility of students (possibility of transfer for students who have graduated from similar study programmes).

The Department of Biology carries out university education at the undergraduate level (Undergraduate university study programme in Biology) and at three university study programmes at the graduate level (Graduate university study programme in Biology, Graduate university study programme in Biology and Chemistry Education, and Graduate university study programme in Nature and Environmental Protection), organized by the Josip Juraj Strossmayer University of Osijek in accordance with a special Act, while study programmes themselves are carried out by the Department of Biology in accordance with the Programme of Studies and the Statute. By completing the Undergraduate study programme in Biology, students meet eligibility criteria for enrolment in graduate study programmes (as verified by documents on accredited undergraduate study programme). Article 38 of the Ordinance (Regulations) on studies and studying at Josip Juraj Strossmayer University of Osijek ([http://www.unios.hr/uploads/50pravilnik-o-studiranju\\_2013-09-27.pdf](http://www.unios.hr/uploads/50pravilnik-o-studiranju_2013-09-27.pdf)) defines internal mobility of students within the University as follows:

#### Article 38

- (1) A student may enrol individual courses with the same or other studies – the study holder of the University, if the study holder has determined these courses in the study program.
- (2) A student may enrol each elective course according to the list of elective courses at the University which is for each academic year based on proposals of study holder at the University which brings the Senate of the University for all those studies at the University.
- (3) Passed exams in those courses are scored with a number of ECTS credits as each course is consistent with the study program at the home institution of the study holder – constituent and is attributed to the point value of other courses of the study.
- (4) The course that the student chose to study at another study holder institution is entered in the index. The holder of the course confirms the student's fulfilment by signing the index and registration of grades and earned ECTS.
- (5) Costs of performance of courses in the student mobility within the University are determined by special agreement.

Study programmes of the Department of Biology are fully adapted to the Bologna study system, whose primary objective is mobility of students at all levels and from all education profiles. A large portion of elective courses allows for supplementing the basic programme when selecting the graduate studies at the Josip Juraj Strossmayer University and other

universities in Croatia. In order to encourage internal mobility of students, the Department of Biology offers elective courses that students from other university units can attend on an annual basis. Upon completion of the undergraduate study programme students have a selection of graduate study programmes in the natural sciences that they can enrol in, such as graduate study programmes at the Faculty of Science of the University of Zagreb and the Faculty of Science of the University of Split, and other European universities whose programmes are aligned with the Bologna Declaration.

Since new Graduate university study programme in Nature and Environmental Protection was launched only recently (academic year 2014-2015) all forms of student exchange with related institutions of higher education in Croatia and abroad are expected in future. Holders of a BA degree from undergraduate study programmes who earned 180 ECTS credits from fields such as natural sciences, interdisciplinary sciences, biotechnical and biomedical sciences may enrol in this graduate study programme. Since it is modelled after European studies, this study programme provides horizontal and vertical mobility of students, and it is compatible with similar study programmes in the Republic of Croatia. National mobility is ensured through a variety of elective courses offered within other related study programmes in the Republic of Croatia.

## 6.B. OBJECTIVES AND FORMS OF INTERNATIONAL COOPERATION

Describe the objectives you wish to accomplish through your institution's international cooperation. Specify the forms of cooperation (European projects, bilateral agreements with foreign *HE* institutions, individual research cooperation, short- and long-term stays abroad – teachers and students, organisation of international conferences in Croatia, participation at international conferences and other forms of cooperation) and assess the scope and success of your institution's existing international cooperation.

The objectives of international cooperation of the Department of Biology are reflected in a vision defined in the Strategy of the Department of Biology of the University of Josip Juraj Strossmayer in Osijek for the period 2012 – 2017, and are as follows: "Strengthening of the position of university and scientific-research impact factors in Croatia and abroad through continuously raising the quality of higher education and research; Strengthening of cooperation with the industry sector in the field of biology, biotechnology and environmental and nature protection as recognizable priorities in the coming period both at the national and European level through launching new study programmes and research projects". It is evident from this vision that the Department aims to achieve international recognisability and gain new experience and knowledge that will ensure a higher quality of teaching process and scientific research. Strengthening of the international cooperation of the Department of Biology is vital for achieving both excellence and recognisability not only in Croatia but also in the European Union.

Main objectives of the international cooperation of the Department of Biology are the following:

- provide continuous support to international project proposals and participation in such projects. The Department of Biology is not a legal entity and does not have its "own" office for international cooperation; instead it works closely with the Office for International and University Cooperation of Josip Juraj Strossmayer University in Osijek.
- intensify research activities on international level
  - The Department of Biology funds short visits of its employees to foreign countries for the purposes of establishing cooperation and preparation of projects
  - It provides incentives for employees who are actively involved in international research projects
- connect the Department with international institutions by increasing mobility of its employees, as well as joining international research projects
- provide training of employees of the Department at international institutions, thus ensuring the promotion of their knowledge and skills
- apply knowledge acquired at international universities and institutions in the teaching process, thus ensuring continuous improvement and increase of the quality of undergraduate and graduate study programmes at the Department of Biology
- present research results and promote the work of the Department of Biology at international conferences and workshops
- secure funds from international projects needed to fund research, secure job positions and purchase laboratory equipment for scientific research
- increase student mobility through international exchange programmes that will provide students with the opportunity of learning, training and gaining experience abroad and thus increase their competitiveness in the labour market
- increase the number of postdoctoral candidates and researchers from abroad at the Department of Biology through international exchange and scholarship programmes
- increase the number of courses in English in the existing study programmes and establish joint graduate study programmes with foreign partners.

#### Types of international cooperation

Initial networking of the Department of Biology with international research institutions dealing with research of floodplains in the Danube basin has been achieved through the project BIOWETMAN – “A science based approach to understand biodiversity driven functions and services for improving wetland management”. The project was carried out in the period 2008 – 2009 as part of the “Research Cooperation and Networking between Austria and South Eastern Europe”. The project manager was Dr. Thomas Hein, Full Professor, from Water research cluster Lunz, University of Natural Resources and Life Sciences (BOKU), Austria. The project involved almost all researchers of the Department of Biology and research teams from



four Danube basin countries (Austria, Bulgaria, Romania and Serbia), and the results of the project were published in a joint scientific paper.

Exceptionally successful collaboration with the research team led by Dr. Thomas Hein, Full Professor from Austria continued after the successful implementation of the project BIOWETMAN. The researchers of the Sub-department of Water Ecology of the Department of Biology are included in the planning of joint research projects of the Danube. The success of the project is further visible in the collaboration within the student exchange programme ERASMUS.

There has also been good cooperation with the Institute of Biodiversity and Ecosystem Research of Bulgarian Academy of Sciences, Sofia, Romania (IBER-BAS). Cooperation with Dr. Roumen Kalchev, Full Professor, and collaborators on the study of floodplains in the Danube region began through the project BIOWETMAN and continued through cooperation with the International Association for Danube Research (IAD). Two researchers of the Department were invited to deliver lectures at IBER-BAS workshop of the FP7 EC project WETLANET – Wetlands along the Lower Danube: functioning, modelling, conservation and management respectively, namely Dr. Enrih Merdić, Associate Professor (Wetland Management for Mosquito Control) and Dr. Melita Mihaljević, Assistant Professor (Cyclic shift between alternative states in floodplain lake driven by hydrology). The workshop was held in Sofia from 17 to 20 May 2011.

A long-lasting and productive research collaboration has also been maintained with the University of Natural Resources and Life Sciences (BOKU), Austria, namely with Prof. Helmut Habersack, Full Professor, from the Institute of Water Management, Hydrology and Hydraulic Engineering (IWHW). It included the participation of representatives of the Department of Biology at the initial meetings in Vienna and Bucharest where the preparation of the international project "Danube Research and Management" (DREAM) was discussed. As a result, the Department of Biology was involved in the preparation of the project proposal for "Horizon 2020 – the Framework Programme for Research and Innovation", while Dr. Melita Mihaljević, Assistant Professor, from the Department of Biology, as a leader of one of the five expert groups, participated in an interdisciplinary research team for the preparation of the project proposal entitled "Danube river research and management – coordination action" (DREAM-CO). A total of 14 partner organizations from 13 countries (Austria, Hungary, Croatia, Romania, Serbia, Bulgaria, Slovenia, Ukraine, Czech Republic, United Kingdom, Netherlands, Germany and Slovakia) were involved in the preparation of the project proposal.

Another project, that is, "Regional COOPERation for understanding of Common Mechanisms of Diseases", was proposed in the framework of Horizon 2020 Funding. The project is a result of a long-lasting work of the organization Regional Cooperation for understanding of Common Mechanisms of Diseases (RECOOP CMD) consisting of 17 associations of universities and academic institutions from eight countries (Croatia, Czech Republic, Hungary, Romania, Slovakia, Ukraine, Denmark and the United States). The collaborators in the project RECOOP CMD from the University of Osijek are the Faculty of Medicine and the Department of Biology.

The collaboration so far has resulted in the publication of scientific papers cited in Current Contents database, and in participation in international conferences.

The most prominent of all the types of international cooperation are those among individual researchers of the Department of Biology, who work together on projects, collaborate in joint research and maintain numerous personal contacts. Despite the fact that cooperation of employees of the Department of Biology in international projects has yet to become the dominant form of cooperation, a lot of effort is being put into increasing it. Some examples are the following: the participation of members of the Department of Biology at the COST actions funded by the EU (Linking belowground biodiversity and ecosystem function and European forests (BioLink) FP1305; Climate Change Manipulation Experiments and Terrestrial Ecosystems - Networking and Outreach (ClimMani) ES1308; Innovative optical Tools for proximal sensing of ecophysiological processes (optimize) ES1309), as well as several international project proposals (e.g. RECOOP HST and START). Some research staff members of the Department collaborate on international projects managed by other Croatian institutions (e.g. Projects SNSC – Swiss National Science Foundation in cooperation with the Faculty of Science from Zagreb University).

In addition to collaborating on various projects, employees of the Department of Biology take part in many other research studies whose results can be seen in joint publications and dissertations (with universities in the United States, such as Baltimore, Connecticut, and Los Angeles, universities in Serbia and Hungary, Biodiversity, Education & exploration Society (BEES) in Sri Lanka). Further important collaboration of the Department of Biology is that with the Agency for Rural Development of the South East Europe SGW-RRD (inter-governmental organization) through the work of a member of the Department of Biology in an advisory working group on water and forestry management (Regional Expert Advisory Working Group on Water-Forestry management in SEE) with many meetings and conferences held in Austria, Kosovo, Serbia and Bosnia and Herzegovina).

Some of the teachers of the Department of Biology spent shorter periods of time abroad for the purpose of research, professional training, and writing doctoral dissertations: Dr. Mirta Sudarić Bogojević, Assistant Professor, stayed in CVMVCD – Coachella Valley Mosquito and Vector Control District, Indio, California, USA (October - December 2007), Dr. Irena Labak, Teaching/Research assistant, stayed at the Yale School of Medicine, Yale University, New Haven, Connecticut, USA (November 2011) and Senka Blažetić, Research Assistant, stayed at The Johns Hopkins University School of Medicine, Baltimore, USA (January to July 2011). Dr. Ljiljana Krstin, Assistant Professor, a contributor to international Scopes project "Chestnut blight research in the Balkans and Georgia: population studies and biological control methods", the Swiss National Science Foundation (SNSF) stayed at the Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf, Switzerland (May 2010). Dr. Tarzan Legović, Full Professor with Tenure, stayed at the Mediterranean Action Plan, Athens, Greece in May 2012, in Samara State Aeronautical Institute, Samara, Russia in December 2013, and the University of Toulouse, France in October 2013. Students' visits abroad through

ERASMUS programme and IAESTE traineeship and work experience are described under 6.i) and 6.j).

The Department of Biology participated in the organization of the Fourth Scientific Conference with international participation "Water for All", which took place in Osijek on 20 March 2014. As members of the organizing committee, several members of the Department of Biology participated in the organization of the 9th International Conference on Cormorants and 6th Meeting of Wetlands International Cormorant Research Group in 2014, held from 23 to 27 April 2014 in Osijek. One of the employees of the Department also participated in the organization of four international conferences: International Program Committee, CroArtScia 2013 - Asymmetry: Art & Science & Education, held in Zagreb, from 8 to 11 May 2013; Ecological Modelling for Ecosystem Sustainability in the context of Global Change, held in Toulouse, France, from 28 to 31 October 2013; 7th European Conference on Ecological Modelling in Riva del Garda, Italy, from 30 May – 2 June 2011; World's Conference of the International Society for Ecological Modelling, Quebec City, Canada, 6 to 9 October 2009.

Teachers of the Department of Biology actively participate in the international exchange of scientific achievements and experiences. From the academic year 2009-2010 to 2013-2014 the teachers published 70 abstracts in conference proceedings with international peer-review, three scientific papers in conference proceedings with international peer-review and held three plenary lectures at conferences with international peer review. Due to frequent participation at international conferences, only the summarized data is presented above, while a detailed overview is available in the CROSB database: [http://bib.irb.hr/lista-radova?sif\\_ust=285](http://bib.irb.hr/lista-radova?sif_ust=285).

The above data show that international cooperation of the Department of Biology has taken place in the form of international scientific project proposals, collaboration among individual researchers, short study visits to universities abroad, student mobility through ERASMUS programme and IAESTE traineeship and work practice. However, the success rate of international cooperation is very different depending on its form. For instance, student mobility is satisfactory and a relatively large number of students have taken the opportunity to participate in ERASMUS exchange programme, while the mobility of employees of the Department of Biology has been low, and the duration of visits abroad was rather short. Teaching and non-teaching staff have not been using the opportunity to visit international universities and institutions to the fullest. In the future, the Department of Biology intends to encourage greater mobility of its employees, especially long-term mobility. While there is collaboration among research staff of the Department of Biology with foreign researchers, there is lack of participation of the Department in large EU projects. In order to intensify international cooperation, the Department of Biology will encourage the involvement of all employees of the Department in international research projects in the following period, while one of the priorities will be to encourage and support proposals of EU projects.

## 6.C. INTERNATIONAL ASSOCIATIONS

Specify international associations of similar institutions of which you are a member and describe how you actively contribute to the common objectives.

The Department of Biology is not a member of any international association, but teachers and researchers of the Department are members of a variety of international associations.

The Department of Biology is a long-time active member of the International Association for Danube Research (IAD), the objective of which is to promote and coordinate research in the Danube basin (limnology, water management, water protection and sustainable development). In terms of its organizational structure, the IAD (Member Country Representative, MCR) is made up of representatives of 14 Danube region countries, and one employee of the Department of Biology is currently the representative of Croatia. At the annual meetings of MCR, expert groups (e.g. Phytoplankton / phytobenthos, ecology floodplains) analyze active issues and plan future research. The IAD plans to hold one of the upcoming meetings (in the period 2014-2018) in Croatia, which will be organized by the Department of Biology.

Through their membership in the Croatian Association for Biochemistry and Molecular Biology, a large number of researchers of the Department of Biology are also members of the "Federation of European Biochemical Societies" (FEBS), one of the most prominent international biology and molecular biology organizations.

The Secretary-General of the International Society for Ecological Modelling, who is also a former President of the European department of that Society, is also an employee of our Department and has so far taught a total of 48 courses in ecological modelling, ecosystem control, data analysis in biology and physics of the environment at 16 universities in Africa, America, Asia and Europe. He is also a member of the Compliance Committee of the Barcelona Convention for the conservation of sea based in the Mediterranean Action Plan in Athens, Greece. The said Committee is the highest Barcelona Convention committee, and consists of seven members appointed by 22 countries of the Convention.

Researchers of the Department of Biology are long-time active members of the European Mosquito Control Association (EMCA), whose aim is to exchange experience and promote research that would result in the most efficient mosquito control in Europe. In addition to memberships from all over Europe (and the world) EMCA has a Board of Directors and one of the members of the Department of Biology is a member of the said Board, which controls the operation of that organization and which organized a Workshop of EMCA in Osijek back in 2004.

## 6.D. FORMS OF THE DEPARTMENT INVOLVEMENT IN INTER-INSTITUTIONAL COOPERATION

Describe forms of your involvement in inter-institutional cooperation through the ERASMUS programme and other types of European projects, bilateral cooperation, joint programmes etc.

In 2009 the University of Josip Juraj Strossmayer in Osijek was awarded the ERASMUS Extended University Charter for participation in the activities of the ERASMUS programme until academic year 2013-2014 and in 2014 it was awarded the charter for a new programme called ERASMUS+. The Department of Biology is actively involved in the implementation of activities organized by these programmes. The interest of students in the ERASMUS programme has been clearly evident from the very start of the mobility programme, when as many as 25% of second year graduate students of Biology went to study visits to foreign universities in academic year 2009-2010. The interest of the students continued in the following years of the ERASMUS programme implementation and in each academic year 15-25% of second year graduate students of Biology participated in the mobility programme.

Through participation in the ERASMUS+ programme the importance of modernization and internationalization of the Department has been stressed, as well as the importance of mobility of students, teaching and non-teaching staff. Further participation would improve the quality of higher education and student experience, while participants themselves would be better prepared to compete on the European labour market. The Department of Biology has appointed ERASMUS and ERASMUS+ coordinator who offers assistance to incoming and outgoing students and works closely with the Office for International and Inter-university Cooperation of Josip Juraj Strossmayer University in Osijek. The Department of Biology continuously encourages its students to make use of mobility opportunities through meetings with students, and timely announcements of current competitions on the web pages of the Department. In order to promote mobility programmes the examples of good practices and experiences of students who participated in exchange programmes are regularly published on the website of the Department. Outgoing mobility of students of the Department of Biology is described in more detail in chapter 6.i).

According to the list of foreign partner universities and ERASMUS bilateral agreements (<http://www.unios.hr/uploads/46NOVI%20-20ERA+%20list%20of%20agreements%202014-2020.pdf>) the University has concluded 212 ERASMUS agreements with universities abroad, which represent the basis for the implementation of mobility.

Involvement of the Department of Biology in the inter-institutional cooperation through other European projects and joint programmes is described in section 6b).

### 6.E. APPLICATION OF TEACHER'S AND ASSOCIATE'S FOREIGN EXPERIENCE, ACQUIRED THROUGH LONGER VISITS (A YEAR OR MORE) TO RENOWNED *HE* INSTITUTES WORLDWIDE

Analyse the application of your teachers' and associates' foreign experience, acquired through longer visits (a year or more) to renowned *HE* institutions or institutes worldwide. Compare this with other similar institutions and give your opinion on this matter.

Teachers and associates of the Department of Biology stayed at foreign universities and institutes for periods shorter than one year (as described in section 6b). They have been applying the gained experience and the acquired knowledge in teaching by way of improving instructional content and advancing research by introducing new research methods. Potential reasons for short-term mobility (up to and including one semester) are teachers' obligations related to teaching at the Department of Biology and associates' obligations related to the work on their doctoral dissertation. However, in accordance with its strategic plans and development visions, the Department of Biology systematically encourages employees to increase mobility and visit international universities and institutes, particularly on a long-term basis.

### 6.F. EXCHANGE OF TEACHERS AND ASSOCIATES WITH FOREIGN *HE* INSTITUTIONS

If there is one, describe and assess cooperation in the area of the exchange of teachers and associates with other foreign *HE* institutions. State possible students' opinions and comments about the visiting teachers.

#### Lectures given by foreign professors at the University of Osijek and the Department of Biology

As part of the course Fundamentals of Horticulture, first year graduate students in Biology and Biology and Chemistry Education attended lectures by foreign teachers at the Fourth Croatian-Austrian Scientific Days held in Osijek from 24 to 25 May 2013. The topics of the lectures were: "1991 – 2013 – Years of progress and significant changes in science and technology". Foreign lecturers were prominent researchers from Austria and Croatia. Invited lectures were attended by teachers of the Department of Biology. No formal surveys after the lectures were carried out, but the response rate of students point to the fact that such lectures are indeed interesting and necessary.

Several invited lectures by foreign professors were held at the Department of Biology. They were attended by students and teachers of the Department of Biology.

On 18 October 2011 Dr. Peter M. Eckl, Full Professor, (University of Salzburg, Department of Cell Biology, Salzburg, Austria) gave a lecture entitled " $\beta$ -Carotene: a molecule with two faces". Since it was organized by the Postgraduate university interdisciplinary doctoral study programme in Molecular Biosciences and the Croatian Society of Plant Biology, the lecture was attended by both doctoral candidates in Molecular biosciences and undergraduate and graduate students of the Department of Biology, along with the members of the Croatian Society of Plant Biology.

Dr. Jan Lundström, DVM (Uppsala University, Sweden) held a lecture "Mosquitoes as biological vectors" (2011-2012), which was attended by a large number of undergraduate and graduate students. Dr. Lundström presented current studies related to mosquitoes as biological vectors that are carried out within various projects at the University of Uppsala, Sweden.

On 21 March 2014 Boris Erg (Head of IUCN's Office for South-East Europe) gave a lecture entitled "IUCN in South East Europe – With cooperation to Protection". IUCN is the world's leading nature protection organization. A variety of courses is taught at the Department of Biology, whose curriculum covers a variety of topics in nature protection (protection of areas, habitats and species). This lecture was also attended by a large number of both students and teachers. The lecturer explained the organizational structure of IUCN, projects in which the Office for South-East Europe participates, as well as ways of involving students in the work of IUCN.

**Invited lectures by teachers of the Department at other universities and international conferences abroad are the following:**

Dr. Tarzan Legović, Full Professor with Tenure, delivered the following lectures:

- Life support system for interplanetary missions (invited lecture), Samara State Aeronautical Institute, Samara, Russia, 7 December 2013
- International Society for Ecological Modelling: Possibilities of cooperation, (invited lecture) Samara State Aeronautical Institute, Samara, Russia, 5 December 2013
- Principles concerning maximum sustainable yield in ecosystems (keynote lecture), The Best Paper, Special Awards Certificate
- International Scientific Conference on Advanced Information Technologies and Scientific Computing, Samara State Aeronautical Institute, Samara, Russia, 4 December 2013
- Maximum sustainable yield in ecosystems (plenary lecture), International Society for Ecological Modelling World Conference 2013, Toulouse, France, 28 - 31 October 2013
- The biggest disaster performed by humanity in the second part of the 20<sup>th</sup> century: worlds fishery and the role of modelers, (plenary lecture), 7<sup>th</sup>

European Conference on Ecological Modelling, Riva del Garda, Italy, 30 May - 2 June, 2011

- Maximum sustainable yield and species extinction in ecosystems (plenary lecture), World ISEM Conference 2009, Quebec, 6 – 9 October 2009
- Integrated monitoring, modelling and satellite observations of ecosystems (invited lecture), WBC-INCO Workshop on Environment, Skopje, 16 - 17 June 2009
- Carrying capacity of protected area for tourism, (invited lecture) Workshop MedPAN South on Characterization of protected marine areas, Brijuni, 3 - 5 June 2009

Dr. Branimir K. Hackenberger, Associate Professor, delivered an invited lecture "Hormetic effects in ecology and toxicology" at the Institute for Biological Research Siniša Stanković in Belgrade, Serbia (15 May 2013).

#### **Lectures within the framework of scientific cooperation on international projects**

In the framework of the International Neighbourhood Programme Slovenia-Hungary-Croatia (SLO-HU-CRO 2006/01/167/HU DRAVA – INTERECO) in which teachers of the Department of Biology participated in February 2008, the following two lectures were held:

Dr. Jenő Purger, Full Professor (University of Pécs, Faculty of Sciences Department of Animal Ecology, Hungary) presented the "MANUAL for the investigation of BIODIVERSITY ALONG the RIVER DRAVA" as well as the conference proceedings "Biodiversity studies along the Drava river" containing the results of research of valuable habitats, and the incipient states of populations and species in the border area of Hungary and Croatia along the Drava river. Both the manual and the conference proceedings resulted from collaboration of Hungarian and Croatian researchers.

The other lecture was given by Dr. Sándor Farkas, Full Professor (Kaposvár University, Faculty of Agricultural and Environmental Sciences, Department of Nature Protection, Hungary). Professor Farkas presented research of Isopod (Isopoda: Oniscidea) fauna at the level of species and populations in border areas of Hungary and Croatia, and introduced students to specific features of researching this particular population. The above lectures were discussed by teachers and students in class, as part of their course activities, and it was concluded that lectures given by researchers and related to their own field of research motivate students to actively participate in research.

In 2011 Dr. Michaela Beshkova (Institute of Zoology, Department of Hydrobiology Bulgarian Academy of Sciences, Bulgaria) held a lecture at the Department of Biology on the investigation of the structure, dynamics and functional groups of phytoplankton in the area of the Danube Delta within the FP7 EC project WETLANET (Workshop "Wetlands along the Lower Danube: functioning, modelling, conservation and management").



### Teachers of the Department of Biology who have taught at foreign universities

In the academic year 2007-2008 Dr. Stjepan Krčmar, Full Professor, taught a course in Animal Ecology and Zoogeography at the Faculty of Science, Department of Biology, University of Tuzla, Bosnia and Herzegovina. Dr. Tarzan Legović, Full Professor with Tenure, teaches Ecological Modelling at the University of Innsbruck, Austria as a visiting professor on an annual basis.

### 6.G. SUPPORTING THE COURSES CONDUCTED IN ENGLISH

State how you support courses in English or some other world language in order to attract foreign students.

Attracting foreign students is one of the key objectives of the Department of Biology. Students are offered a large number of courses delivered in English. These courses are listed on the website of the University of Osijek and offered to foreign students under ERASMUS exchange programme. They are taught at both undergraduate and graduate study programmes of the Department of Biology. Out of a total of 32 listed courses, 15 are taught at the undergraduate level (Table 6.1), and the remaining 17 at the graduate level (Table 6.2).

Table 6.1 Courses at the Undergraduate study programme in Biology delivered in English

Course	Teacher	UNI -Code	ECTS
<i>ANIMAL PHYSIOLOGY I</i>	Branimir K. Hackenberger, Associate Professor	BIO01-001	8
<i>BIOCHEMISTRY 1</i>	Elizabeta Has-Schön, Full Professor	BIO01-002	4
<i>BIOCHEMISTRY 2</i>	Elizabeta Has-Schön, Full Professor	BIO01-003	6
<i>CELL BIOLOGY</i>	Vera Cesar, Full Professor	BIO01-004	6
<i>CELL ORGANELLES ULTRASTRUCTURE</i>	Vera Cesar, Full Professor	BIO01-005	2
<i>GENERAL ZOOLOGY</i>	Enrih Merdić, Associate Professor	BIO01-006	6
<i>GENETICS</i>	Vera Cesar, Full Professor	BIO01-007	4
<i>MICROBIOLOGY</i>	Ljiljana Krstin, Assistant Professor, Goran Palijan, Assistant Professor	BIO01-008	4
<i>PLANT MICROTECHNIQUE AND MICROSCOPY</i>	Vera Cesar, Full Professor	BIO01-009	2
<i>QUANTITATIVE BIOLOGY</i>	Tarzan Legović, Full Professor with Tenure, Branimir K. Hackenberger, Associate Professor	BIO01-010	4
<i>TOXICOLOGY</i>	Branimir K. Hackenberger, Associate Professor	BIO01-011	2
<i>ZOOGEOGRAPHY</i>	Enrih Merdić, Associate Professor	BIO01-012	6
<i>LABORATORY ANIMAL SCIENCE</i>	Elizabeta Has-Schön, Full Professor	BIO01-013	2
<i>PHYTOPLANKTON</i>	Filip Stević, Assistant Professor	BIO01-014	2
<i>PHYSICAL FUNDAMENTALS OF INSTRUMENTAL METHODS IN BIOLOGY</i>	Vera Cesar, Full Professor, Branimir K. Hackenberger, Associate Professor	BIO01-015	4

Table 6.2 Courses at the Graduate study programme in Biology delivered in English

Course	Teacher	UNI -Code	ECTS
<i>ANIMAL BEHAVIOR</i>	Mirta Sudarić Bogojević, Assistant Professor	BIO02-001	3
<i>ANIMAL PHYSIOLOGY II</i>	Branimir K. Hackenberger, Associate Professor	BIO02-002	4
<i>BIOCHEMICAL MECHANISM OF TOXICITY</i>	Branimir K. Hackenberger, Associate Professor	BIO02-003	2
<i>BIOCHEMISTRY 3</i>	Elizabeta Has-Schön, Full Professor	BIO02-004	5
<i>DEVELOPMENTAL BIOLOGY OF PLANTS</i>	Vera Cesar, Full Professor	BIO02-005	3
<i>ECOLOGY OF FRESHWATER HABITATS</i>	Jasna Vidaković, Full Professor; Melita Mihaljević, Assistant Professor	BIO02-006	8
<i>MOLECULAR ECOTOXICOLOGY</i>	Branimir K. Hackenberger, Associate Professor	BIO02-007	4
<i>PLANT CELL AND TISSUE CULTURE</i>	Vera Cesar, Full Professor	BIO02-008	2
<i>PLANT MICROTECHNIQUE AND MICROSCOPY</i>	Vera Cesar, Full Professor	BIO02-009	2
<i>SUPRAMOLECULAR STRUCTURES</i>	Elizabeta Has-Schön, Full Professor	BIO02-010	2
<i>UNDERWATER BIOLOGICAL RESEARCH</i>	Branimir K. Hackenberger, Associate Professor	BIO02-011	2
<i>AVIAN METABOLISM</i>	Elizabeta Has-Schön, Full Professor	BIO02-012	2
<i>BIOMOLECULES IN FOOD</i>	Elizabeta Has-Schön, Full Professor	BIO02-013	2
<i>ENZYME KINETICS</i>	Elizabeta Has-Schön, Full Professor	BIO02-014	2
<i>IMMUNOLOGY</i>	Elizabeta Has-Schön, Full Professor	BIO02-015	3
<i>MODELLING BIOLOGICAL PROCESSES</i>	Tarzan Legović, Full Professor with Tenure, Branimir K. Hackenberger, Associate Professor	BIO02-016	2
<i>QUANTITATIVE BIOLOGY 2</i>	Tarzan Legović, Full Professor with Tenure, Branimir K. Hackenberger, Associate Professor	BIO02-017	4
<i>MOLECULAR MECHANIZMS OF OXIDATIVE STRESS</i>	Vera Cesar, Full Professor	BIO02-018	2

## 6.H. INTERNATIONAL COOPERATION OF STUDENTS

Analyse international cooperation of your students, especially from professional standpoint (professional student symposiums, study visits, etc.), and from the standpoint of association in order to promote student rights.

Graduate students of the Department of Biology took part in the First scientific camp organized by International Association for Danube Research (IAD), which was held in July 2013 in Ecopark Dunasziget in Hungary. Students and young researchers gained scientific experience under the guidance of lecturers of the Danube Research Institute in Vácrátót, University of Mosonmagyaróvár, Hungary and Bioforschung, Austria. Students have expressed great satisfaction with the acquired experience, as well as with contacts they established with colleagues from 10 European countries.

Students of the Department of Biology took part in the international students' conferences and scientific-professional conferences. Student Mirna Velki held a lecture at the International scientific conference in Neum, Bosnia and Herzegovina, held from 24 to 26 October 2007, entitled "Fish farming in reservoirs – possibilities of environment management and protection". She also presented her research work in a form of an oral communication at two student conferences, namely "International Life Sciences Students Conference 2008" in Warsaw, Poland (10 to 14 September, 2008) and the "International Life Sciences Students Conference 2009 - Meeting the future of life sciences" in Kiev, Ukraine (19 - 23 August 2009). Student Ivana Plavšin participated in the 3<sup>rd</sup> Young Environmental Scientists (YES) meeting "Interdisciplinary discourse on current environmental challenges" in Krakow, Poland, (11 to 13 February 2013) with a poster presentation.

The Department of Biology encourages international cooperation of students, which has so far been demonstrated mainly through ERASMUS and IAESTE programmes. In early 2014, the students of the Department of Biology founded the Biology Students Association - ZOA, which promotes biology and students' research and professional work. The Department has provided funding and logistical support to the Association, whose objectives are as follows:

- Promotion of Biology as a profession,
- Advancement of Biology studies at the University of Josip Juraj Strossmayer in Osijek,
- Improvement of scientific-professional competences of biology students,
- Networking and cooperation with students', civil and other organizations at the University, in the Republic of Croatia, Europe and worldwide,
- Ensuring that students' rights and freedoms are fully respected,
- Protection of students' standards and social status,
- Encouragement and improvement of students' cultural, entertainment, sporting, educational and research activities,

- Evaluation, preservation and protection of nature and biodiversity through sustainable development, and
- Attainment of a modern, liberal, democratic, pluralistic, tolerant and non-violent society.

Although the Biology Students Association - ZOA has not participated in any international events yet, one of its main objectives is the international networking of students. The Department intends, as it has done so far, to support the activities of the Association, especially if they focus on student mobility and international cooperation with related organizations from other countries.

### 6.1. POSSIBILITY FOR STUDENTS TO SPEND A PART OF THEIR STUDIES ABROAD

Comment on the possibilities for your students to spend a part of their studies abroad and forms of institutional support for it.

The Department of Biology has recognized the importance of student study visits to foreign institutions of higher education and encourages and assists students in many different ways to spend some of their studies abroad. Students of the Department of Biology make use of opportunities offered through ERASMUS programme to study at foreign universities and gain practical experience through traineeship in scientific and educational institutions throughout the European Union. In participating in such programmes, the students of the Department of Biology have the opportunity to acquire knowledge in various branches of biology, especially those which are not as highly developed at their home institution. In addition, the experience of study visits at universities and scientific institutions in the EU contributes to the development of autonomy, raising awareness of cultural diversity and acquisition of foreign language skills, which are prerequisites for any work in a multicultural environment.

Students of the Department of Biology are awarded additional ECTS credits on account of traineeship at foreign institutions, while students who are preparing their bachelor's theses at a foreign university and are co-mentored by teachers from that university may have their graduation papers written in English. Furthermore, the Department of Biology financially supports outgoing mobility by co-funding some of their travel expenses. All this has resulted in a large outgoing mobility of students of the Department of Biology.

A total of 18 students participated in outgoing mobility within ERASMUS exchange programme in the period from academic year 2009/2010 to 2013/2014, 11 of which were on a study visit, and 7 took part in traineeship (Table 6.3) In the period from 2009 to 2014, a total of 13 students of the Department of Biology gained work experience abroad through IAESTE programme (Table 6.4). Study visits as part of the ERASMUS exchange programme that last one semester were usually preferred by fourth semester graduate students, as they made it possible for them to work on experiments that are parts of their Bachelor's theses

for which they were consequently given excellent grades. Moreover, a number of students who stayed abroad were invited to continue their education at the doctoral level at the respective universities, which most of them eventually did. Since the academic year 2009-2010 to the present students of the Department of Biology spent a total of 27 months of traineeship through the ERASMUS exchange programme, mainly at universities in Austria, the UK, Hungary, Czech Republic, Slovenia and Poland. It has generally been proven that students who made use of mobility programmes find employment faster and easier, especially in research institutions.

**Table 6.3 The outgoing ERASMUS student mobility (2009/2010 – 2013/2014)**

	Student name	Home institution	Country	Foreign University	Period of mobility
<b>Academic year 2009/2010</b>					
Study visit	1. Mirna Velki	Department of Biology	Czech Republic	University of South Bohemia in České Budějovice	summer semester
	2. Marta Balog	Department of Biology	Austria	Karl-Franzens University of Graz	summer semester
	3. Dunja Šajatović	Department of Biology	Czech Republic	University of South Bohemia in České Budějovice	summer semester
	4. Ivan Mihaljević	Department of Biology	Germany	Technischen Universität Dortmund	summer semester
	5. Jelena Jelenić	Department of Biology	Poland	Adam Mickiewicz University in Poznań	summer semester
<b>Academic year 2010/2011</b>					
Study visit	1. Ivana Mauzer	Department of Biology	Hungary	University of Debrecen	summer semester
	2. Matija Pleša	Department of Biology	Hungary	University of Debrecen	summer semester
Traineeship	1. Marta Balog	Department of Biology	Belgium	Katholieke Universiteit Leuven	15 Oct 2010 – 15 Jan 2011
	2. Zrinka Orešković	Department of Biology	Czech Republic	University of Veterinary and Pharmaceutical Sciences Brno	15 Apr 2011 – 19 Sept 2011
<b>Academic year 2011/2012</b>					
Study visit	1. Vesna Grujić	Department of Biology	Czech Republic	University of South Bohemia in České Budějovice	summer semester
	2. Andreja Kust	Department of Biology	Czech Republic	University of South Bohemia in České Budějovice	summer semester
	3. Dina Vorkapić	Department of Biology	Austria	Karl-Franzens University of Graz	summer semester
Traineeship	1. Ivana Matković	Department of Biology	Slovenia	Univerza v Ljubljani	2 Apr 2012 – 2 Jul 2012.
	2. Jelena Spišić	Department of Biology	Czech Republic	University of South Bohemia in České Budějovice	1 Apr 2012 – 30 Jun 2012

Academic year 2012/2013					
Traineeship	1. Ivana Oršolić	Department of Biology	United Kingdom	University College of London	11 Feb 2013 – 30 Jul 2013
Academic year 2013/2014					
Study visit	1. Marina Ivanković	Department of Biology	Austria	Universität für Bodenkultur Vienna	summer semester
Traineeship	1. Adrijana Baković	Department of Biology	Austria	Universität für Bodenkultur Vienna	23 Jun – 22 Sept. 2014
	2. Ivana Plavšin	Department of Biology	Czech Republic	University of South Bohemia in České Budějovice	3 Mar – 2 Jun 2014

**Table 6.4 The outgoing IAESTE student mobility**

No	First name	Last name	Traineeship country	Year
1	Lara	Barišić	Poland	2014
2	Dina	Vorkapić	Japan	2012
3	Iva	Andračić	Slovenia	2012
4	Lavinija	Mataković	Bosnia and Herzegovina	2012
5	Željka	Perić	Brazil	2010
6	Zrinka	Orešković	China	2010
7	Dina	Vorkapić	Poland	2010
8	Ivana	Parađiković	Poland	2010
9	Matea	Bistrović	Spain	2010
10	Mario	Tuthorn	Turkey	2010
11	Ivan	Mihaljević	Germany	2009
12	Mario	Tuthorn	Germany	2009
13	Dina	Vorkapić	Spain	2009

## 6.J. VISITS OF FOREIGN STUDENTS

Describe visits of foreign students to your *HE* institution (duration and content, table 6.5).

One student from the University of Adam Mickiewicz University in Poznań, Poland, studied at the Department of Biology in the winter semester of the academic year 2011/2012 through ERASMUS programme (Table 6.5). She successfully passed all courses she had enrolled for and earned the planned number of ECTS credits. There was another student at our Department from the same University on a study visit in the winter semester of the current academic year (2014/2015) within the framework of the ERASMUS+ program (Table 6.5). In addition to courses they took at the Department of Biology, foreign students enrolled for the course in the Croatian language, which is also offered by the University in Osijek. In the following period the incoming students will be able to choose from a large number of courses in different areas within the new Graduate university study programme in Nature and Environmental Protection. In the past five academic years (2009/2010 to 2013/2014) there were two students gaining work experience in the laboratory of Entomology at the Department of Biology through IAESTE programme of international exchange of students of natural sciences and engineering (Table 6.5). There had been four other students before them (since 2005). Through IAESTE programme the Department of Biology has provided foreign students with an opportunity to gain practical experience, which is of utmost importance for broadening their knowledge. It has also facilitated work experience of its own students abroad, since the exchange is based on the principle of reciprocity (number of incoming students equals the number of outgoing students).

In July 2011 and July and August 2012 and 2013 respectively, two doctoral candidates from Bosnia and Herzegovina stayed in the Plant Molecular and Cellular Biology Laboratory of the Department of Biology, where they prepared a part of their doctoral dissertation. A student from Nigeria has been working in the same laboratory since September 2014, where he is currently mastering methodology required for his doctoral dissertation at the Postgraduate university interdisciplinary doctoral study programme in Molecular Biosciences.

**Table 6.5 The incoming student mobility at the Department of Biology through ERASMUS, ERASMUS+ and IAESTE exchange programmes from academic year 2009/2010 to 2013/2014**

Name	Programme	Foreign university	Period of mobility
Agnieszka Obarek	Erasmus	Adam Mickiewicz University in Poznań, Poland	winter semester 2011/2012
Olga Sawościanik	Erasmus+	Adam Mickiewicz University in Poznań, Poland	winter semester 2014/2015
Marek Swiątek-Brzezinski	IAESTE	Gdansk University of Technology-Environmental Engineering, Poland	18 Jun 2012 – 27 Jul 2012.
Juan Antonio Minguez Real	IAESTE	Polytechnic University of Valencia, Spain	22 Jul 2013 – 1 Sept 2013

**6.K. SATISFACTION WITH CURRENT SITUATION AND POSSIBLE IMPROVEMENTS**

Specify to what extent you are satisfied with the current situation and propose possible improvements.

The data on mobility and international collaboration clearly demonstrate that additional effort is required in order to improve the results in this particular area. Although outgoing mobility of students is high (15-25% of second year graduate students of Biology studied at international universities every year) and the Department of Biology is satisfied with the number of students who stay at foreign universities for the purposes of study and traineeship (ERASMUS programme, IAESTE traineeship and work experience), incoming mobility should be increased and larger numbers of international students attracted. So far, international exchange has generally been carried out at the level of IAESTE traineeship and work experience, and it is vital to increase the number of students whose study visits will be funded through ERASMUS+ or similar programmes. For this purpose it is necessary to further promote the Department of Biology and ensure that foreign students who are interested in mobility obtain information on study and research possibilities at the Department. A brochure in English will soon be published on the web pages of the Department of Biology and the University of Josip Juraj Strossmayer in Osijek providing all the necessary information for students who are interested in mobility. We also believe that the new Graduate university study programme in Nature and Environmental Protection will, thanks to its content and employment opportunities within a wide range of jobs, attract study visits of foreign students. Further promotion of this particular study programme is also planned. Students are awarded ECTS credits on account of study visits and traineeship so as to be encouraged to visit international universities and institutions. In addition, they are given the opportunity to prepare and defend their bachelor's theses in English. Given that some students make use of traineeship opportunities to conduct experiments as part of their theses, we believe that this will further encourage students to mobility as there will be no need for translation of their theses into Croatian.

Teachers of the Department of Biology are involved in international cooperation through various activities, such as participation in EU projects, collaboration of individual researchers, teaching at higher education institutions abroad, membership in international associations of related institutions etc. However, generally speaking, international cooperation is insufficient and it is therefore necessary to encourage teachers to intensify it, especially in terms of international teacher mobility, which is almost completely absent (visits are generally only few and rather short). Since further development of the Department of Biology requires improvement in the quality of teaching and research work, inter alia through increased international cooperation and mobility, we plan to inform teachers on the possibilities to visit international universities through promotion and organization of lectures, point to the



benefits of such visits, and thus encourage them to visit international universities and institutions.

In order to significantly increase the international activities of the Department of Biology and its better recognisability at the international level, courses taught in English are very important. To achieve this, introduction of an even larger number of courses delivered in English is possible for ERASMUS+ students at both undergraduate and graduate study programmes.

**Table 6.6 Teacher and associate mobility in the last 3 years**

	Number of study visits of home institution's teachers and associates			Number of visits by foreign teachers to this institution		
	1 - 3 months	3 - 6 months	6 months and more	1 - 3 months	3 - 6 months	6 months and more
Research	5	-	1	-	-	-
Artistic	-	-	-	-	-	-
Teaching	-	-	-	-	-	-
Professional	-	-	-	-	-	-

**Table 6.7 Student mobility in the last 3 years**

	Number of students in international exchange		
	1 - 3 months	3 - 6 months	6 months and more
Own students	12	1	-
Foreign students	2	1	-

## 7. Resources: administrative and support services, space, equipment and finances

### 7.A. ANALYSIS OF THE NUMBER OF EMPLOYEES IN RELATION TO THE NUMBER OF TEACHERS AND ASSOCIATES, THE NUMBER OF STUDENTS, SPACE, EQUIPMENT AND FINANCES OF THE DEPARTMENT

Analyse the number of administrative, maintenance and supporting staff in relation to the number of teachers and associates, the number of students, teaching space, technical and other maintenance equipment and the institution's financial capacities.

The analysis of the number of administrative, maintenance and supporting staff implies comparison to the space available, the number of teachers and associates and the number of students of the Department of Biology in Osijek. The Department of Biology in Osijek is located in a building built in 1905 and renovated in 2011. The total surface area used is 2,003 m<sup>2</sup> (Table 7.1).

**Table 7.1** The buildings of the higher education institution

Identification of the building	Location of the building	Build year	Year of upgrade or reconstruction	Total surface area for higher education activities in m <sup>2</sup>	Total surface area for the implementation of research in m <sup>2</sup>
1	Cara Hadrijana 8/A	1904/1905	2011	2003	388.09

At the Department of Biology there are 15 employees working in administrative, maintenance and supporting jobs at the Department of Biology which makes 31.25 % in relation to the number of teachers and teaching/research associates, and 6.19 % in relation to the number of students.

**Table 7.2** Comparison of the number of administrative, maintenance and supporting (AMS) staff with the number of teachers and students

Administrative, maintenance and supporting staff (AMS staff)	Number	Number of teachers (20)/AMS staff	Number of teachers and teaching/research associates (48)/AMS staff	Number of students (242)/AMS staff
Administrative staff	9	2.22	5.33	45.38
Maintenance staff	3	6.67	16.00	15.13
Supporting staff	3	6.67	16.00	15.13
Total	15	1.33	3.20	16.13

The present structure of the administrative, maintenance and supporting staff is satisfactory considering the needs of the Department of Biology. However, the Decision on the classification of employment positions at the Department of Biology shows that we need at least two more employees in administration in order to be fully satisfied with the structure of administrative and maintenance staff, and the fulfilment of the obligations for the Department as follows:

- the Head of the Legal, Personnel, Professional, General and Administrative Affairs Office - Assistant Secretary (university degree)
- the Head of the Quality Assurance Office (university degree)

**7.B. QUALIFICATION STRUCTURE OF NON-TEACHING STAFF AND POSSIBILITIES FOR THEIR PROFESSIONAL TRAINING**

Comment on the qualification structure of non-teaching staff and possibilities for their professional training.

Administrative staff by their qualification structure consists of three employees with a university degree, one employee with a college degree and eight employees with secondary school qualification (Figure 7.1).

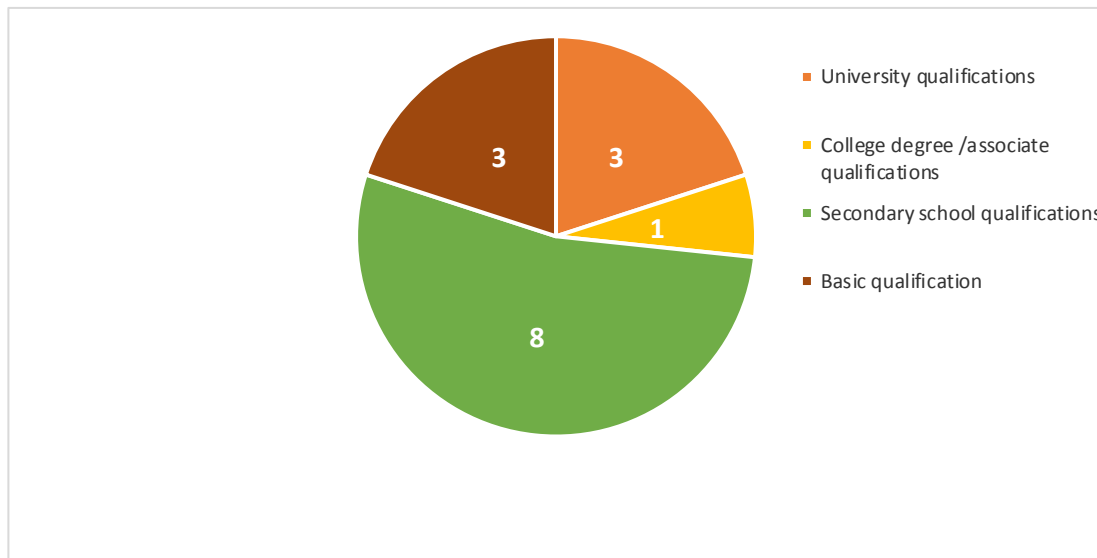


Figure 7.1 The qualification structure of non-teaching staff

The non-teaching staff (except for one employee) meets the requirements of the Decision on the classification of employment positions at the Department. As for the professional training of the non-teaching staff, it is mainly practised through participation at various seminars and workshops (Table 7.3) in order for them to be continuously informed about current issues and problems of the profession.

Table 7.3 Professional training of the non-teaching staff in the period 2010-2014

Seminar	Date and place	Number of participants
Income tax	25 Nov 2010, Osijek	1
Preparations for the final calculation of the VAT for budget users	3 Dec 2010, Osijek	1
Seminar: Privacy	24 Feb 2011, Rijeka	1
Application of the Labour Act	29 Apr 2011, Osijek	1
Preparation and draft statements on fiscal responsibility	3 Feb 2012, Osijek	2
Labour relations in the system of higher education and science	24 May 2012, Zagreb	1
Specialized workshop: Obligations of faculties and institutes in relation to making statements about the fiscal responsibility and the financial management system, and the specifics of the records of business events and transactions on the eve of assembling semi-annual financial reports and the preparation of financial plans	15 Jun 2012, Zagreb	1
Modification of the questionnaire on fiscal responsibility	30 Nov 2012, Osijek	1
Budget news in higher education	25 Jan 2013, Osijek	1
Calculation of the VAT after the accession to the EU	19 Jun 2013, Osijek	1
VAT and payments after 1/7/2013	4 Jul 2013, Osijek	1
News and preparations for the annual tax and financial reports	25 Oct 2013, Osijek	2
Professional training and education in the prevention of money laundering and terrorist financing for 2014	18 Mar 2014, Osijek	1
Reimbursement of costs for commuting in public services, tax domicile, and corrections and additions of the JOPPD form (Report on income, income tax and surtax and contributions for compulsory insurance)	12 May 2014, Osijek	1
Financial management of the EU projects - for budget users	29 Apr 2014, Osijek	1
News in regulations primarily applied by the institutions in Science and Higher Education 2014	12 Sep 2014, Osijek	1
Amendments to the accounting plan	23 Sep 2014, Osijek	2
Non-taxable receipts	1 Oct 2014, Osijek	1

To continuously improve the service, the Department of Biology has a regular subscription to several professional journals, which the employees regularly use in their work:

1. Tim4pin
2. RRiF
3. BUG

At the Josip Juraj Strossmayer University of Osijek there are regular meetings of the secretaries of all University constituents. The Secretaries' Cabinet is an advisory expert body of the University consisting of the secretary general and the secretaries of the University of Osijek constituents. The Secretaries' Cabinet convenes, as a rule, once a month, to discuss professional and legal issues from the scope of work of the Secretariat, consolidating the application of regulations and decisions of the university bodies, providing expert opinion on academic issues, and preparing general acts of the University and the academic and artistic-educational University constituents.

### 7.C. CURRENT SITUATION AND SATISFACTION WITH THE EXISTING CLASSROOMS AND RESEARCH AND TEACHING LABORATORIES

Describe the current situation and your satisfaction regarding the existing number of classrooms and laboratories for teaching, taking into account the existing number of students, enrolment quotas and optimum number of students. Compare your own spatial capabilities with those of similar *HE* institutions.

It is evident from the Table 7.4 and 7.5 that there are four classrooms and four research and teaching laboratories at the Department of Biology. The total area of useable space for teaching is 410.6 m<sup>2</sup>, while the total number of students in all study programmes of the Department of Biology in the academic year 2013/2014 was 229. Putting the ratio of the total area of usable space and the total number of students, according to the above data, there is 1.79 m<sup>2</sup> of usable space per each student, which is more than the recommended 1.25 m<sup>2</sup> per student. To perform laboratory exercises, especially for practical teaching in elective courses, together with the aforementioned four research and teaching laboratories, the premises intended for research purpose only are also used (11 laboratories with a total area of 388.09 m<sup>2</sup>, Table 7.9). If these areas were included in the total area of usable space and the total number of students, the resulting ratio would be significantly higher than the recommended one and would amount to 3.47 m<sup>2</sup> per student.

Table 7.5 shows that there are on average 30 hours of lecture in the research and teaching laboratories weekly. It should be noted that the lectures of all study programmes are organised in a block system (the change in the way lecture is performed started in the academic year 2014/2015), so that in some blocks, there were up to 60 hours of lecture held weekly in the teaching laboratories. In some blocks, a part of the lectures was held at

unsuitable times, the late afternoon and evening. The problem of the late afternoon and evening lectures was partly solved by, already mentioned, usage of the premises intended for research. Besides the extra space to work with students, such space can be used for performing exercises with sophisticated equipment, thus improving the quality of teaching.

As the building of the Department of Biology was renovated in 2011 and the classrooms and teaching laboratories are equipped with modern, though not necessarily new, furniture and technical devices, the condition of the rooms is at an appropriate level. The classrooms are equipped with audio-visual teaching aids: computer, LCD projector, control consoles, and overhead projectors. The investment in teaching premises and purchasing of equipment is continuous and according to financial possibilities.

For the purpose of delivering part of the field courses, the Department has a Biological Station in Sunger (Table 7.6). The building of the former primary school has been rented on the basis of a long-term contract with the municipality of Mrkopalj, Gorski Kotar, and it has been renovated and adapted to accommodate students and teachers during their field courses. In the building, there are 2 large bedrooms, a dining room, a kitchen, a bathroom, three apartments for teachers and a large classroom (lectures, practical exercises, projections, social life). The present state of our classrooms in relation to other related faculties is at an appropriate level, while the state of teaching laboratories could improve. The advantage of the Department of Biology in relation to the biology studies at the University of Zagreb is that the whole Department is accommodated in one building, which enables faster and easier communication between students and teachers. The comparison indicates a lower number of teaching laboratories.

Table 7.4 Classrooms

Building identification	Number or designation of classroom	Space (in m <sup>2</sup> )	Number of seats for students	Number of hours used per week	Rating of equipment * (1-5)
1	201	90.59	80	30	5
1	307	37.92	12	30	3
1	319	76	56	30	5
1	320	28.05	24	30	4

Table 7.5 Laboratories used for teaching

Building identification	Internal designation of the room research and teaching laboratories	Space (in m <sup>2</sup> )	Number of working places for students	Number of hours used per week	Rating of equipment (1-5)
1	301	44.55	10	30	4
1	302	44.55	10	30	4
1	303	44.47	10	30	3
1	304	44.47	10	30	3

Table 7.6 Teaching stations (working places) for field courses

Building identification	Name of the teaching station (working place)	Number of students attending a teaching station	Number of hours (per week) held in a teaching station
2	Sunger	45	20

#### 7.D. STATE AND FUNCTIONALITY OF COMPUTER EQUIPMENT OF THE FACULTY USED IN TEACHING

Specify the state and functionality of computer equipment of your faculty used in teaching. Especially describe the possibility of students using this equipment outside classes.

The Department of Biology in Osijek offers a total of 98 personal computers, 87 desktop and 11 notebook computers for teaching, research, administrative-technical support and student activities. Server rooms contain several pieces of hardware. The main link is threaded through an optical cable to the second floor, and has a top speed of up to 1 Gbit/s. There is also equipment for the local network in the communication cabinet that is rated for up to 1 Gbit/s. There are two such cabinets at the Department of Biology, one on the second and one on third floor, both linked to the cables, where they branch off into *Allied Telesis* 1 Gbit/s devices. The servers are the *DELL PowerEdge 2850*, which was supplied by CARNet to be used at the Department, and the *DELLPowerEdge R410*.

The CARNet knot, mainly up to three years old, except for the Powerededge2850 server, is in excellent condition. The Network Server [www.biologija.unios.hr](http://www.biologija.unios.hr) is active 24/7 throughout the year, serving about 400 users, and its data security is provided daily by data backup onto CARNet servers. For the studying process, the students have a computer lab available (307) which houses 12 computers for students and one computer for teachers (Table 7.7.). In this room, students can search online databases, surf the Internet for their seminars, lectures and alike. The computers are in a very poor condition regarding hardware, but all of them are operational and are equipped with software applications that are technically aligned with the available hardware.

In the academic year 2014/2015, the complete restoration of the computer lab has been envisaged with a new seating arrangement to offer 15 computers for students and one computer for teachers, a new LCD projector and video surveillance, which will provide for full open access for students, except in the case when teaching activity takes place in this classroom. After the renewal of the computer equipment in the computer lab, the old computers will be moved to the students' room to provide students with permanent access to computers.

The computer lab is currently not permanently available, since it is open when there are no teaching activities in the classroom, with the requirement that the students ask for the key from the Department's staff (custodian, cleaners, administrator) and they are also obliged to show their ID and take the responsibility for the situation in the classroom after use.

As far as the wireless network access points are concerned, students can connect to it by using their private notebook computers, cell phones and tablets. The Department open network (protected by a password which is available to students) is on the third floor of the building of the Department of Biology.

By the end of 2014 it is planned to make the public network available on the second and third floor of the building that would cover the whole building with the wireless signal. This way, students will be able to use the *eduroam* service via their AAI identity, and the wireless network used by the Department staff will be separated.

If we make a cross-section of the entire IT equipment at the Department used in teaching, the common denominator would be that the equipment is operational. The computer equipment at the Department is generally older than five years, and the management of the Department invests in IT equipment in accordance with its possibilities.

**Table 7.5 Equipment of the computer lab**

Number of new computers (up to 3 years old)	Number of computers older than 3 years	Rating of functionality (1- 5)	Rating of maintenance (1-5)	Rating of the possibilities to use it out of the classroom (1-5)
0	13	3	3	3

## 7.E. INTERNAL POLICIES OF COMPUTER PURCHASE AND USE.

Reflect on the internal policies of computer purchase and use.

The annual plan for procurement of computer equipment starts with requests submitted by the laboratories /sub-departments in terms of earmarked (planned) funds, which are then approved by the Head of Department.

The purchase of computers is implemented through a public tender at the Josip Juraj Strossmayer University of Osijek usually once a year. The purchase starts by the filling out of an application followed by a procedure in which, the Accounting Office, the Procurement Office, the person/s who submitted the request and the IT Service handle all the inquiries (type of equipment, sufficient funds, equipment compatible with the current systems available at the Department).



Once all the items in the tender have been used it is not possible to purchase new equipment, unless a new tender is opened regardless of the calendar year. All this must be defined in the annual procurement plan and the funds must be earmarked either from the projects or from the own resources of the Department.

As the public tender for the equipment of the Department of Biology is part of a tender at the University level, we have to agree with other University constituents on launching another tender per calendar year.

Since there is an increase in the number of employees and students at the Department of Biology, the need for computer equipment is great, and the level and dynamics of purchasing are determined exclusively by the availability of funds.

## 7.F. TEACHERS' OFFICES, THEIR NUMBER AND FUNCTIONALITY

Reflect on the teachers' offices, their number (data from the Table 7.6) and functionality. Assess the appropriateness of offices for performing teaching and scientific activities of your teachers and associates.

The Department of Biology in Osijek has 29 teachers' offices. According to the average surface area of the cabinet (15.35 m<sup>2</sup>) and the assessment of equipment (4), it can be concluded that the offices are appropriate and suitable for carrying out teaching and research activities.

On the other hand, the average area of cabinet space per full-time teacher/associate is 9.7 m<sup>2</sup>. The teachers with a higher academic degree have their own offices, but the drawback is that the younger teachers and assistants have to share offices, making it difficult to carry out research and educational activities.

Table 7.8 Teachers' offices

Building identification	Number of teachers' offices	Rating of space in m <sup>2</sup>	Rating of equipment (1-5)	Average space in m <sup>2</sup> per full-time teacher / associate
1	29	15.35	4	9.7

**7.G. SIZE AND EQUIPMENT LEVEL OF THE SPACE USED FOR RESEARCH ACTIVITY**

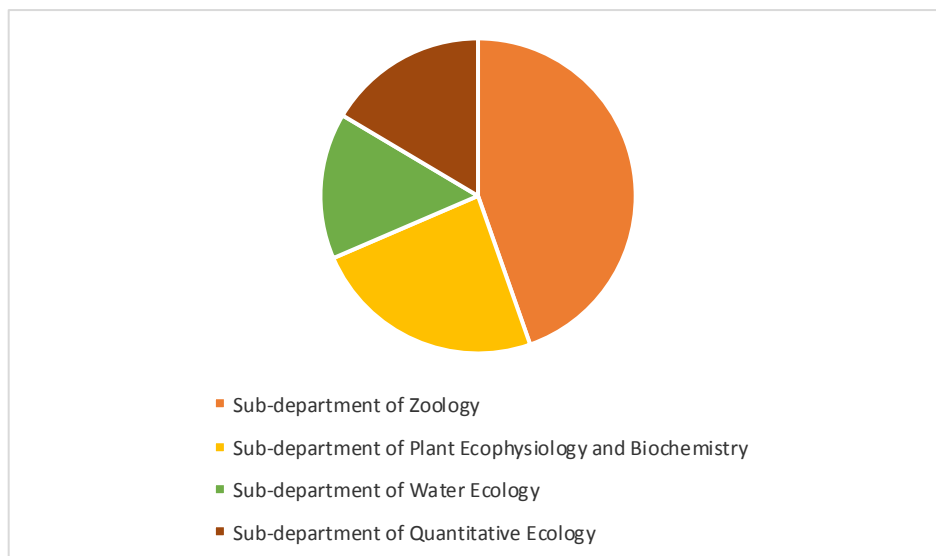
Describe the size and equipment level of the space used only for research activity and estimate how well the space is used.

At the Department of Biology in Osijek, there is currently no space used exclusively for scientific research, since the rooms are used not only for research, but also, if necessary, for teaching purposes. We have to mention that, in accordance with the needs and possibilities, all the teaching laboratories are used for the purpose of research as well.

The total area of 11 laboratories (space for research activity) is 388.09 m<sup>2</sup>, with an average of 35.28 m<sup>2</sup> per each. From the analysis of laboratory equipment it can be concluded that it is at an appropriate level and suitable for carrying out research activities. Furthermore, the number of hours the laboratories are used is extremely large, up to 8 hours on a daily basis (in many cases even more), and there is no time when the laboratories are not used.

The distribution of laboratory space per Sub-department is as follows:

1. Sub-department of Zoology – 173.2 m<sup>2</sup>
2. Sub-department of Plant Ecophysiology and Biochemistry – 92.8 m<sup>2</sup>
3. Sub-department of Water Ecology – 58.25 m<sup>2</sup>
4. Sub-department of Quantitative Ecology – 63.84 m<sup>2</sup>



Picture 7.2 Surface area for research activities at Sub-departments

**Description of equipment of the space for research activities:****Sub-department of Zoology:**

**Laboratory of Entomology (222)** contains the complete equipment for entomological research in the field and in the laboratory - entomological traps, extractor fans and clamps for collecting insects, entomological cabinets and boxes, entomological needles, chemicals for insect preparation, equipment and accessories for sampling insects in aquatic habitats, cages for breeding insects, glass trays for growing insects, nets, canvas and fabric for sampling, dissection tools, equipment for collecting insects by night, DVDs, video CDs and software equipment, various scientific books, popular books and manuals on insects and for determination of insects. Within the laboratory there is a darkroom for breeding and development of insects, and various research on insects at all stages, equipped with devices for changing photoperiod, temperature and humidity. Laboratory includes a fume hood for handling hazardous chemicals, microscope (2 pieces), Leica stereo microscope (2 pieces), and a stereo zoom magnifier SZX16 with a digital camera and software (1 piece), probes for measuring physical and chemical parameters of water Consort C931, computer with equipment (8 pieces), dinghy for the field work (1 piece), 1 vehicle Lada Niva, 1 vehicle Dacia Sandero Stepway.

**Animal Ecology Laboratory (216)** is equipped for the purposes of the preparation of vertebrates and insects. In the laboratory there are adequate surfaces during preparation (hot and cold water, a suitable drain), 96% alcohol, containers and utensils for preparation. There is one stereo microscope and 9 binoculars for field research. In the laboratory, there is one entomological cabinet with horseflies, and a collection of wet preparations (horseflies). There are nine workplaces for students (electricity, water, appropriate surface), and one workplace equipped with a computer. Also, in the laboratory, there is literature for teaching available to students. Equipment and chemicals necessary for DNA isolation are stored in cabinets, but DNA isolation is done in other laboratories.

**Plant Molecular and Cellular Biology Laboratory (316)** contains equipment for spectrometric determination of the concentration of photosynthetic pigments and a sequence of molecules as well as the activities of enzymes associated with oxidative stress and antioxidant response of plants (UV-VIS spectrometer, centrifuges), analysis of protein composition (systems for electrophoresis and immunodetection), DNA analysis (thermoblock), determining the activities of photosystems I and II (several sophisticated fluorometer to measure the energy levels of photosynthetic systems: mini PAM, handy PEA, mPEA), making permanent microscopic preparations for light and electron microscopy (cryostat, rotary microtome, ultramicrotome), microscopes, systems for determining the production of oxygen (oxygen electrode for measuring in liquid and gas phase), and the breeding chamber with highly defined conditions for the cultivation of plants, plant growth chamber with a variable photoperiod and temperature, a darkroom and a sterile chamber.

**Sub-department of Plant Ecophysiology and Biochemistry**

**Plant Ecophysiology Laboratory (306)** contains equipment for performing vegetation (phytocoenological) research focused on aquatic macrophyte vegetation of lowland lakes and canals. In the laboratory, there is a breeding chamber for growing algae and macrophytes (variable photoperiod, shaking, temperature), and the breeding chambers for growing plants with variable photoperiod and temperature, equipment for the spectrophotometric determination of the concentration of photosynthetic pigments and activities of enzymes related to oxidative stress and antioxidant response of plants .

Laboratory equipment: UV-VIS spectrophotometer, centrifuge, dryer, water bath, analytical scales, pH metre, MS spectrophotometer for microplates, Innova Incubator Shaker (microplates, Erlenmeyer flasks), field equipment (Van Dorn bottles for water sampling, Van Veen grabber for sediment sampling, multimeter for measuring pH, EC, DO). In addition to research teaching activities are also carried out in the Plant Ecophysiology Laboratory.

**Biochemistry Laboratory (312)** contains the equipment necessary for the implementation of the basic biochemical and molecular analyses (various types of homogenizer, water bath, centrifuge, UV-VIS spectrophotometer, vertical electrophoresis system, horizontal electrophoresis system, and a system for Western blot analysis). In addition, in the Laboratory there are fume hood and sterile cabinet with laminar Air Flow and small and basic laboratory inventory such as refrigerators, analytical scales, pH metres, magnetic stirrer, hot plate, vortex mixer, etc.

Biochemistry Laboratory is intended primarily for research, available to all researchers (assistants, postdoctoral) and students (practitioners, graduates, volunteers) of the Department of Biology, as well as researchers from other institutions. In addition to research, a lot of practical training for undergraduate and graduate students of biology takes place in the Biochemistry Laboratory.

**Molecular Ecology Laboratory (313)** contains equipment for basic molecular analyses (PCR device, system for digital photo documentation of gels with a camera and UV-transilluminator and horizontal electrophoresis system with a source of direct current). Furthermore, the laboratory contains a sterile chamber (laminar with vertical air flow), laboratory scales, vortex mixer, microwave, stove, refrigerator and a computer. Laboratory is used daily, primarily for research, but also for the purpose of teaching and student training and doing master's theses.

**Sub-department of Water Ecology**

**Algal Ecology Laboratory (207)** of the Department of Biology contains the equipment and chemicals necessary for conducting the analyses of water quality, with particular emphasis on the qualitative and quantitative analysis of phytoplankton and periphytic algae. The equipment for collecting samples includes a deep bottle and a sampling net and a device for measuring the light intensity in the water. Laboratory equipment includes a light microscope with a built-in digital camera (Moticam 2300), invert microscope equipped with a digital camera (Canon PowerShot G10), chambers for quantitative analysis, identification keys,

accessories and equipment for making permanent microscopic preparations for light microscopy and equipment and chemicals for determination algae pigments.

**Aquatic Invertebrates Laboratory (202)** of the Department of Biology contains equipment for sampling zooplankton (Zooplankton mesh), macrophyte communities (cylinder and frame), benthos (grabber and cylinder) and ichthyofauna (various nets). The laboratory is equipped with a device with variable-electrodes to determine the physical and chemical properties of water (saturation and oxygen concentration, conductivity and pH) in situ, sonar, spectrophotometer, muffle furnace, sonicator, stereo microscope and light microscopes, darkroom with a fluorescent microscope (built-in digital camera connected to a computer (Olympus Camedia 4040Z), with the possibility of digital image processing and measuring photographed objects), various determination keys, accessories and chemicals needed for processing micro-, meio-, macrofauna and ichthyofauna and equipment and chemicals to determine the concentration of photosynthetic pigments and nutrients in the water. Within the laboratories there is a fume hood.

#### **Sub-department of Quantitative Ecology**

**Laboratory for Analysis of Biological Systems (220)** contains the equipment needed for research in the field of ecotoxicology. In the laboratory, there is the equipment for spectrophotometric and fluorometric measurement of biochemical biomarkers (biomarkers of exposure to environmental contaminants, biomarkers of oxidative stress, markers of metabolic and health status), for separation of proteins (electrophoresis), and for making permanent histological preparations (microtome). The laboratory also contains a pH metre, stereo microscope, microscope, and scales.

**Laboratory for Ecobiogeography (221)** contains the equipment needed for research in the field of applied ecology. In the laboratory there is all the equipment necessary for the sampling of soil invertebrates, and materials needed for carrying out the ecological experiments under controlled environmental conditions, including two refrigerators, and an incubator with the CO<sub>2</sub> control. For the ecological research in the field an autonomous flying device with a camera (Iris +) is used, "data loggers", and vehicle Ssangyong Actyon.

**Laboratory for Ecological Modelling (219)** contains the equipment needed for research of modelling of biological systems, and biostatistics. Within the laboratory there is a computer cluster established. In the laboratory, there is literature that is available to students.

On average the equipment intended for research can be assessed as good, partly because of necessity for modernization and completion of equipment for better functionality, and partly because of lack of space.

The Department of Biology in Osijek has only two pieces of capital equipment (centrifuge and chamber for plant growth testing), whose purchase value is over HRK 200,000.00 (around €26,000.00). The capital equipment is purchased by the Ministry of Science, Education and Sports in the annual competition for the purchase of capital equipment.

Table 7.9 Space used mainly for research activities

Building identification	Internal room designation or laboratory designation	Space (in m <sup>2</sup> )	Number of hours used per week	Rating of equipment (1-5)
1	202	29.15	40	4
1	207	29.1	40	4
1	216	28.8	40	3
1	219	14.84	65	3
1	220	39	65	4
1	221	10	65	3
1	222	56.45	19	4
1	306	45.6	30	3
1	312	22.1	65	3
1	313	25.1	40	3
1	316	87.95	65	4

Table 7.10 Capital equipment

Name of the instrument (equipment)	Purchase value	Age
Centrifuge	215,532.00	9
Chamber for plant growth testing	266,570.00	9

## 7.H. LIBRARY OF THE DEPARTMENT OF BIOLOGY

Describe your institution's library space and its working hours for students, teachers and associates at your institution, as well as outside visitors, if applicable. Comment on the number of books and journals (home and foreign) in the library, and on the amount of funds used annually for the purchase of new books and journals.

After the relocation of the Department of Biology to the newly renovated premises in 2011, the Library has remained at the old location, namely the Department of Mathematics. The Library covers three departments: the Department of Mathematics, the Department of Physics and the Department of Biology. At the time of relocation, the Library was not separated not only because of the lack of appropriate space, but also because of the restraints of hiring staff to work in the Library. We believe that physical separation is not a big problem,

and the solution may be the construction of a new University Library within the University Campus the Department of Biology has already been a part of. The construction of the University Library is planned in the near future. Furthermore, various manuals and textbooks that are directly used in teaching are stored in the rooms and laboratories where teaching takes place, and are always available to students. The Library and the Reading room are located on a total area of 168.85 m<sup>2</sup>. The Library has its own database for books and journals, accessible via the Internet. In the library, there are three computers that are available to students for searching in the database registry, and there are desks and chairs placed in the Reading room. The Library opening hours are Monday to Thursday 7:30 to 17:00 and Fridays from 7:30-14:30. The holdings of books, especially more recent editions, is insufficient, but the Department tries, depending on financial resources, to update it annually. Unfortunately, the update is not large, and in the past few years, the Department has invested around HRK 20,000.00 (around €2,600.00) for the purchase of literature. The holding of books is updated also by occasional donations. Subscription to the professional and scientific journals varies from year to year, however, due to the physical separation of the Library the journals are located in the offices arranged according to the research subjects. The nonexistence of a separate library for the Department of Biology, too few relevant books and textbooks, and an inadequate ratio of the number of titles and volumes of books based on the number of students is a problem that is given a high priority by the Department, and already by the end of 2014 there is a planned purchase of a number of books for the new graduate university study programme in Nature and Environmental Protection.

Table 7.11 Library

Space (in m <sup>2</sup> )	Number of employees	Number of seats	The number of students who use library	Is there an electronic database of books and journals
168.85	2 (not employees of the Department of Biology)	21	228	YES

Number of books	Number of textbooks*	Rating of contemporary books and textbooks (1-5)	Number of foreign journals	Number of home journals	Rating of functionality of a catalogue of books and journals	Rating of equipment (1-5)**	Rating of the quality and availability of the electronic content (1-5)***
797	470	4	5	11	4	4	4

\* Broj udžbenika podrazumijeva sve udžbenike bez obzira na broj primjeraka.

\*\* Mogućnosti kopiranja za nastavnike i studente, nabava kopija iz drugih knjižnica, katalozi radova nastavnika itd.

\*\*\* Pod elektroničkim se sadržajima podrazumijevaju elektronička izdanja knjiga, časopisa, baze podataka, ali i katalozi vlastite i vanjskih knjižnica.

### 7.I. IT LEVEL OF THE LIBRARY

Assess the IT level of your library. In particular, specify electronic databases of books and journals available to teachers, associates and students, and describe the manner and frequency of use. Compare this with other similar institutions.

The IT level of the Library meets the needs for the time being, although it should be increased in the future. The Library itself has its own database for books and journals that is available via the Internet. Furthermore, the Library database contains data about all stored final, graduation and other assessed papers. In addition, since 2010, the graduate theses are available in .pdf format on the website of the Department. The links to the databases of scientific journals, Croatian and foreign, that are available to us through the subscription of national licenses of the MSES/CARNet can be found at the website of the library (<http://www.mathos.unios.hr/index.php/odjel/knjiznica>), as well as on the website of the Department of Biology ([www.biologija.unios.hr](http://www.biologija.unios.hr)). The frequency of use is hardly definable since the access is enabled through the IP address of the local computers in the offices, and we do not have a proper feedback. The IT level is comparable with other comparable institutions, considering that the vast majority uses only the databases the subscription of which is paid by the MSES. Also, the database for browsing books and journals available in the library is similar to the databases at other comparable institutions, but we fall behind in the holdings of books.

### 7.J. OFFICES OF ADMINISTRATIVE AND SUPPORT SERVICES

Comment on the offices of administrative services (such as the secretariat, accounting and finance, IT services etc.).

Prostor za rad stručnih službi Odjela za biologiju u Osijeku primjereni su radu i potrebama djelatnika i studenata. Prostorije tajništva i Ureda pročelnika u potpunosti zadovoljavaju potrebe za svakodnevnim obavljanjem poslova i za rad sa strankama. Prostor je opremljen suvremenim namještajem i stolnim računalima i pisačem koji se nalazi na hodniku, a kojeg koriste svi djelatnici Odjela. Svaki djelatnik ima svoj radni prostor koji je opremljen odgovarajućim namještajem za odlaganje dokumentacije i dosjea djelatnika. Ured pročelnika i tajništvo nalaze se na 2. katu zgrade, a pristup invalidnim osobama omogućen je korištenjem dizala, pristupne rampe i širokim hodnicima.

Prostori financijsko-računovodstvene službe zadovoljavaju sve potrebe za kvalitetnim radom. U tri prostorije smještene su djelatnice čiji je posao međusobno povezan, tako da im prostorije koje se nalaze u nizu omogućuju bolju funkcionalnost i iskorištenost radnog vremena.



Table 7.12 Offices of administrative and support services

Administrative and support services	Number of rooms	Total space in m <sup>2</sup>	Number of employees	Average space per employee in m <sup>2</sup>
Head of Department's Office and Secretary's Office	3	79.30	3	26.40
Accounting and Finance	3	24	4	8
Students' Service	½	17	2	8
Archive	1	18		
IT service	1	13	2	6.5
Building Maintenance Caretaker and Maintenance Service	1	20	2	10
Cleaners	1	15	3	5
<b>TOTAL</b>	<b>10.5</b>	<b>186.30</b>	<b>16</b>	<b>63.90</b>

#### 7.K. THE RATIO OF THE FACULTY'S STATE BUDGET AND MARKET INCOMES, THE DEGREE OF AUTONOMY AND FLEXIBILITY IN FINANCIAL OPERATIONS

Give your opinion on the ratio of the institution's state budget (teaching, scientific and artistic) and market incomes, and comment on the degree of your institution's autonomy and flexibility in its financial operations.

Taking the total income in 2012 into account, the largest share, or 91.45 %, was state budget, while market income was at 8.55 % of total income. In 2013, the ratio was almost the same, namely the state budget was at 91.08 % and market income was at 8.92 %. The revenues from the budget for the salaries of employees are directly sent to their accounts, while all other revenues are sent to the Department's account.

In the financial operations, the Department of Biology complies with the relevant regulations, primarily the Budget Act, and allocates financial resources carefully depending on the inflow of funds to the business account, in order to maintain the liquidity and solvency of the Department. The Department is completely autonomous in spending its own financial resources.

## 7.L. STRUCTURE OF MARKET INCOME SOURCES OF THE DEPARTMENT

Provide a more detailed comment on the structure of market income sources (charging tuition fees from students, research projects, services, other activities) of your institution.

Of the total funds, approximately 9 % is market income which consists of revenues from the budgets of other public sources, interest income, and income from own activities. The income from own activities are the incomes from professional projects, tuition fees for undergraduate and graduate studies, enrolment fees, and other sources such as the income from refund claims, income from the sale of equipment and the donations of companies.

The structure of these revenues is shown in the following table and figure:

	2012	2013	index
Public sources	20,000.00	75,272.38	376.36
Interest income	2,350.94	1,957.13	83.25
Professional projects	440,580.00	502,460.00	114.05
Tuition	369,722.62	341,608.87	92.40
Enrolment fees	80,691.53	69,313.32	85.90
Other	9,490.25	0.00	0.00
<b>TOTAL :</b>	<b>922,835.34</b>	<b>990,611.70</b>	<b>107.34</b>

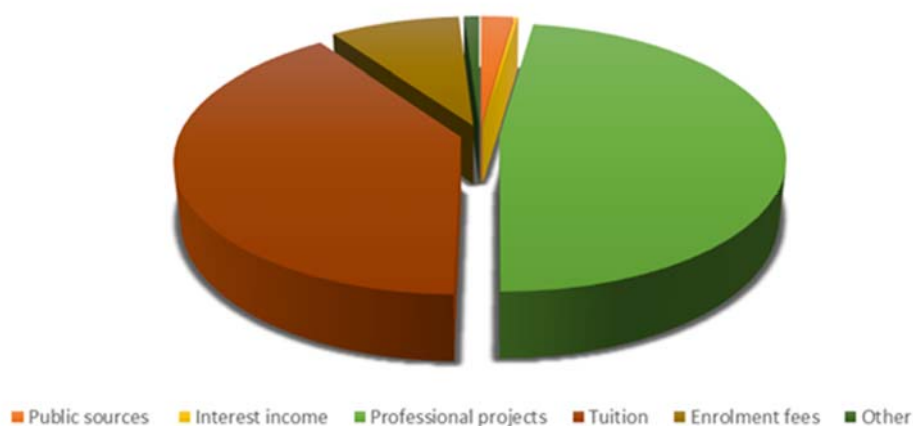


Figure 7.3 Graphic of the structure of market income sources of the Department of Biology in percentage.

From the above figure it is evident that in the structure of market income, the largest share belongs to professional projects and tuition fees, while a negligible percentage of income derives from interests and other sources.

It is significant to note that the comparison of the two reference periods showed that there has been a multiple increase in revenues from public sources, and the revenue from professional projects, by 14.05 %, whereas the revenue from tuition and enrolment fees has been reduced.

### 7.M. MANAGEMENT OF INCOME FROM MARKET SERVICES OF THE DEPARTMENT

Comment on the institutional management of income generated from market services in order to improve the quality of your activities.

Management of income, including market income, is regulated by the Budget Act, the Ordinance on budgetary accounting and internal regulations of the Department, i.e. the Ordinance on the exercise of the rights to use the Department's own, earmarked and other income.

Taking into account the legal and sub-legal acts, the realized market income is used for covering the material costs, improving our primary activity by increasing the quality of computer and laboratory equipment, by investment in human resources through the financing of professional training courses and symposia, while a portion of these revenues is used to pay the salaries and substantive rights of employees.

### 7.N. STRUCTURE OF INVESTING MARKET INCOME OF THE DEPARTMENT

Provide your comments on the percentage structure of investing market income and estimate to what extent a reduction or lack of these funds can impact the institution's functionality and its primary activity.

By analysing Table 7.15 and 7.16 we can conclude that a relatively small percentage of total expenditure is covered from market income, and most of it is used to cover the material expenditure, other expenditure (donations, scholarships for employees), and expenditure for non-financial assets.

Due to the small percentage of expenditure covered from market income, it is necessary to increase significantly the extent of market income, either by improving the mechanism of collecting tuition fees, or through additional engagement in the market with professional and research projects.

**Table 7.15 Percentage structure of investing market income of the Department of Biology in 2012**

	<b>Total expenditures in 2012</b>	<b>Expenditure of market income</b>	<b>Percentage</b>
Expenditure for employees	8,225,511.35	173,141.09	2.10
Material expenditure	2,194,585.62	504,579.68	22.99
Financial expenditure	12,953.76	512.95	3.96
Other expenditure	38,700.00	18,700.00	48.32
Expenditure for non-financial assets	86,720.94	49,455.43	57.03
<b>TOTAL:</b>	<b>10,558,471.67</b>	<b>746,389.15</b>	<b>7.07</b>

**Table 7.16 Percentage structure of investing market income of the Department of Biology in 2013**

	<b>Total expenditures in 2012</b>	<b>Expenditure of market income</b>	<b>Percentage</b>
Expenditure for employees	8,697,841.69	189,237.48	2.18
Material expenditure	1,969,404.32	583,711.42	29.64
Financial expenditure	6,071.58	92.08	1.52
Other expenditure	36,800.00	31,800.00	86.41
Expenditure for non-financial assets	272,125.02	82,144.00	30.19
<b>TOTAL:</b>	<b>10,982,242.61</b>	<b>886,984.98</b>	<b>8.08</b>

		<b>N-2 calendar year 2012</b>	<b>N-1 calendar year 2013</b>
	INCOME	10,607,618.43	11,097,463.10
1.	STATE BUDGET INCOME	9,684,783.09	10,106,851.40
1.1	Employees' salaries	7,898,608.28	8,269,621.38
1.2.	Operational costs (including field work)	555,680.00	450,000.00
1.3.	External employment in teaching	282,253.26	256,012.07
1.4.	Domestic research projects	155,834.00	266,183.64
1.5.	International research projects	-	-
1.6.	International cooperation	10,000.00	8,051.08
1.7.	Organization of conferences	-	-
1.8.	Purchase of journals	-	-

1.9.	Current maintenance	-	-
1.10.	Construction and investment maintenance	-	-
1.11.	Equipment	-	-
1.12.	Other types of income (specify)	782,407.55	856,983.23
	- commuting costs	348,554.80	278,128.00
	- jubilee awards	36,863.41	5,254.36
	- sickness benefit reimbursement, financial support	18,619.34	28,403.09
	- severance pay, bonuses, Christmas bonuses and gifts for children	97,750.00	23,000.00
	-physical examination	8,000.00	-
	- undergraduate and graduate study fees	272,620.00	364,568.00
	- financial support for PhD students	-	157,629.78
2.	INCOME FROM OTHER PUBLIC BUDGETS	20,000.00	75,272.38
2.1.	Income and support from the local government (city, county etc.)	-	-
2.2.	Income and support from other subjects (such as the National Science Foundation)	-	-
2.3.	Other types of income (specify)	20,000.00	75,272.38
	- income from the University funds	20,000.00	54,200.00
	- other unmentioned incomes under special regulations - professional training	-	21,072.38
3.	INTEREST INCOME	2,350.94	1,957.13
	- interest on deposit savings	2,350.94	1,957.13
4.	INCOME FROM DEPARTMENT'S ACTIVITIES	440,580.00	502,460.00
4.1.	Tuition fees - postgraduate specialist study programme	-	-
4.2.	Tuition fees - postgraduate doctoral study programme	-	-
4.3.	Research projects	-	-
4.4.	Professional projects	440,580.00	502,460.00
4.5.	Rental income	-	-
4.6.	Other types of income (specify)	-	-
		-	-
5.	INCOME ACCORDING TO SPECIAL REGULATIONS	450,414.15	410,922.19
5.1.	Tuition fees - undergraduate, graduate, professional studies	369,722.62	341,608.87
5.2.	Additional test of special knowledge, skills and abilities (if carried out in addition to the state graduation exam)	-	-
5.3.	Enrolment fees	80,691.53	69,313.32
5.4.	Publishing	-	-
5.5.	Charges for students' applications, certificates, diplomas, students' books, etc.	-	-
5.6.	Other types of income (specify)	-	-

		-	-
6.	OTHER (UNMENTIONED) INCOME (specify)	9,490.25	-
	- income from refund claims	943.25	-
	- income from the sale of equipment	3,750.00	-
	-donations of companies	4,797.00	-
<b>A</b>	<b>TOTAL OPERATING INCOME</b>	<b>922,835.34</b>	<b>990,611.70</b>

		<b>N-2 calendar year 2012</b>	<b>N-1 calendar year 2013</b>
	EXPENDITURE	10,558,471.67	10,982,242.61
1.	COSTS FOR EMPLOYEES	8,694,443.56	9,041,330.25
1.1	Employees' salaries	8,045,440.58	8,358,391.46
1.2.	External employment for teaching purposes	468,932.21	343,488.56
1.3.	Total (specify)	180,070.77	339,450.23
	- jubilee awards	36,863.43	5,254.36
	-gifts for children	48,338.00	52,000.00
	- sickness benefit reimbursement, disability and death	18,619.34	30,066.09
	- holiday bonus	76,250.00	-
	- other expenditure – special monetary awards	-	94,500.00
	- compensation for PhD dissertation expenditure	-	157,629.78
2.	EXPENDITURE FOR MATERIAL AND ENERGY	513,974.75	450,657.89
2.1.	Office supplies and other material expenditure	63,841.12	53,165.06
2.2.	Laboratory material	76,858.67	127,400.05
2.3.	Energy	262,717.06	196,937.29
2.4.	Material and parts for current and investment maintenance	78,637.80	50,864.12
2.5.	Small inventory	28,996.85	22,291.37
2.6.	Other expenditure (specify)	2,923.25	-
	- wastage, breakage and failure of materials	943.25	-
	- official and work uniform	1,980.00	-
3.	EXPENDITURE FOR SERVICES	484,978.22	563,821.08
3.1.	Phone, mail, transport	93,749.44	62,420.71
3.2.	Current and investment maintenance	26,771.00	43,065.89
3.3.	Promotion and information	5,216.00	960.00
3.4.	Utilities	41,191.49	46,610.80
3.5.	Lease, rent	44,898.84	77,751.08
3.6.	Intellectual and personal services (contracts, fees)	192,309.48	269,072.26

3.7.	Computer services	4,176.55	2,405.34
3.8.	Other expenditure (specify)	76,665.42	61,535.00
	- obligatory and preventive physical examinations of employees	8,827.88	1,605.82
	- graphic and printing services	15,150.31	22,962.50
	- vehicle registration	1,986.75	1,994.72
	- cleaning, laundry, etc.	4,767.75	-
	- safe-keeping of property and persons	17,978.20	15,622.80
	-other unmentioned services	27,954.53	19,349.16
4.	EXPENDITURE FOR NONFINANCIAL ASSETS	86,720.94	272,125.02
4.1.	Business facilities	-	-
4.2.	Computers	4,415.25	38,865.00
4.3.	Laboratory equipment	40,795.69	27,586.19
4.4.	Office equipment	.	2,499.95
4.5.	Communication equipment	21,010.00	-
4.6.	Other equipment	16,600.00	10,807.50
4.7.	Literature	-	9,346.61
4.8.	Investments in plants, machinery and other equipment	-	15,575.00
4.9.	Additional investments in buildings	-	
4.10.	Other expenditure (specify)	3,900.00	167,444.77
	- investment in computer programmes	3,900.00	2,680.69
	- cars	-	82,644.00
	- all terrain vehicles	-	82,120.08
5.	REIMBURSEMENT FOR EMPLOYEES	663,915.68	474,244.19
5.1.	Official travel expenditure	277,717.38	155,844.19
5.2.	Professional training	19,624.50	7,850.00
5.3.	Other expenditure (specify) including commuting costs - commuting costs	366,573.80	310,550.00
6.	OTHER UNMENTIONED BUSINESS EXPENDITURE	114,438.62	180,064.18
6.1.	Insurance premiums	11,059.88	7,966.19
6.2.	Representation allowances	12,733.07	20,892.39
6.3.	Membership fees	575.06	200.00
6.4.	Banking and payment services	12,431.88	5,774.42
6.5.	Interests	521.88	90.85
6.6.	Other expenditure	77,116.85	145,140.33
	- reimbursement for official travel expenditure for part-time associates	2,552.70	700.00
	- reimbursement of other costs	-	21,072.38
	- charges and fees	2,680.05	4,525.88
	- protocol expenditure	1,375.00	1,767.90

	- expenditure for the University Development Fund	22,822.88	28,949.75
	- other expenditure	8,986.22	51,118.11
	-scholarships and tuition	20,000.00	11,000.00
	- current donations	14,500.00	10,800.00
	- damage compensation	4,200.00	-
	-negative exchange rate differences	-	206.31
	-capital donations	-	15,000.00
B	TOTAL EXPENDITURE	1,777,307.27	1,668,787.34
C	Balance brought forward from previous year	519,439.73	634,660.22
	Surplus from previous years	519,439.73	634,660.22
	TOTAL 31/12 (A-B+C)	10,991,190.56	11,344,777.81

## 7.O. PRIORITY OF THE DEPARTMENT IN THE CASE OF ANY INCREASE IN BUDGET FUNDING

Specify your priorities in the case of any increase in the budget funding of your institution.

In the case of increased budget funding of the Department of Biology in Osijek, priority would be to improve the learning environment for students and improve the conditions for students and employees for their research work which implies the continuation of equipping and modernization of the teaching laboratories and research laboratories, and upgrading of IT equipment. In addition, in the case opportunities should arise for new employment, the Department would employ the appropriate number of staff that we lack: teaching/research assistants, professional associates, laboratory assistants, and administrative staff for the Assistant Secretary and the Head of the Quality Assurance Office. The teachers and associates would be provided with continuous training to acquire the necessary skills and experience, and to improve the learning and teaching process. In doing so, the emphasis would be on the efficient application of IT in the teaching process, but it would also include incentives for the preparation and publishing of textbooks and other teaching aids. The optimal number of recently published literature for students would also be provided. It would be invested in improving the field courses as well, but also in improving the working and living conditions in the teaching station (Biological Station in Sunger).



## 7.P. SATISFACTION WITH THE PRESENT SITUATION AND POSSIBLE IMPROVEMENTS

Specify to what extent you are satisfied with the present situation and propose possible improvements

The conditions for the research and teaching activities have improved significantly after moving to the new location in 2011. When relocating to the new building, the classrooms, teaching laboratories, teachers' offices and laboratories were equipped mostly with new furniture and audio-visual equipment. Although the lecture rooms and teaching laboratories are used extensively, they correspond to the number of students and courses can be well maintained. We are extremely pleased for having some additional conveniences such as the kitchenette for the employees and the students, suites for visiting lecturers and researchers, as well as the changing rooms (toilets and showers) for PE.

However, as the Department of Biology is an institution that is in constant development, there is room for improvement. Most of the perceived problems of the Department derive from the lack of space, e.g. no library at the premises, inadequate space of the Students Administration Office, the lack of storage space for vehicles and field equipment, the lack of quality storage space for chemicals. The increase of the quality of research, thus indirectly the work with students by providing greater opportunities for them to participate in scientific research, could be achieved by expanding the space that is used for research, by establishing our own areas and facilities for research and by recruiting a number of professional associates and laboratory technicians. Furthermore, although the equipment is at a satisfactory level (both in terms of teaching and research), the existing equipment could be modernized, or new equipment could be purchased. To improve the work, it is necessary to regularly renew IT equipment in the computer lab. Taking the current financial situation in Croatia into account, as well as forecasts for the future, it is necessary to increase the financial revenues of the Department, and the opportunity to do this is to make project proposals towards the EU funds and programmes, and the continuation and improvement of cooperation with local government and the business sector.

## 8. Annex

### 8.1. DECISION ON THE APPOINTMENT OF THE SELF-EVALUATION COMMITTEE

SVEUČILIŠTE JOSIPA JURJA STROSSMAYERA U OSIJEKU  
**ODJEL ZA BIOLOGIJU**  
 Osijek, Cara Hadrijana 8/A

KLASA: 602-04/14-03/14  
 URBROJ: 2158-60-60-10-14-01  
 Osijek, 27. studenog 2014. godine

Na temelju članka 44. točka 8. Pravilnika Odjela za biologiju, Vijeće Odjela je na II. sjednici održanoj dana 27. studenog 2014. godine pod 3. točkom dnevnog reda donijelo sljedeću:

#### **ODLUKU**

#### **o imenovanju povjerenstava za izradu samoanalize**

#### **I. Za obavljanje poslova samoanalize osnivaju se Povjerenstva za sljedeća poglavlja**

##### **1. Upravljanje visokim učilištima i osiguravanje kvalitete**

- doc.dr.sc. Ljiljana Krstin - voditelj
- Željka Lončarić
- dr.sc. Irena Labak
- dr.sc. Tanja Žuna Pfeiffer
- Ana Vuković (student)

##### **2. Studijski programi**

- prof.dr.sc. Elizabeta Has Schön - voditelj
- doc.dr.sc. Ljiljana Krstin – voditelj (ishodi učenja)
- doc.dr.sc. Valentina Pavić
- Željka Lončarić
- Ana Amić
- dr.sc. Lidija Begović
- Vedrana Aračić
- Izeta Petrijevcćanin

##### **3. Studenti**

- doc.dr.sc. Mirta Sudarić Bogojević - voditelj
- doc.dr.sc. Sandra Ečimović
- Aleksandra Kočić
- dr.sc. Mirna Velki
- Zora Vrkić, dipl.iur
- Ivan Pletikosić
- Valentina Jović (student)

##### **4. Nastavnici**

- prof.dr.sc. Elizabeta Has Schön - voditelj
- dr.sc. Nataša Turić
- dr.sc. Rosemary Vuković
- dr.sc. Vesna Peršić
- dr.sc. Selma Mlinarić
- Kristina Mandić

**5. Znanstvena i stručna djelatnost**

- doc.dr.sc. Ivna Štolfa - voditelj
- doc.dr.sc. Davorka Hackenberger-Kutuzović
- doc.dr.sc. Filip Stević
- doc.dr.sc. Dubravka Čerba
- dr.sc. Dubravka Špoljarić
- dr.sc. Jasenka Antunović
- dr.sc. Goran Vignjević
- izv.prof.dr.sc. Enrih Merdić
- prof.dr.sc. Vera Cesar-Lepeduš
- izv.prof.dr.sc. Stjepan Krčmar
- izv.prof.dr.sc. Janja Horvatić
- izv.prof.dr.sc. Branimir Hackenberger-Kutuzović

**6. Mobilnost i međunarodna suradnja**

- doc.dr.sc. Filip Stević - voditelj
- doc.dr.sc. Melita Mihaljević
- dr.sc. Mirna Velki
- doc.dr.sc. Alma Mikuška
- dr.sc. Nataša Turić
- dr.sc. Olga Jovanović
- dr.sc. Zorana Katanić

**7. Resursi**

- doc.dr.sc. Davorka Hackenberger-Kutuzović - voditelj
- doc.dr.sc. Goran Palijan
- Martina Varga
- Zora Vrkić
- Vesna Radman-Meić
- Mirjana Rusmirović
- Ljilja Radman
- Mario Dunić
- Ilija Pavić
- Sabina Obranić
- Kristina Mandić
- Vedrana Aračić

**II. Organizacijom poslova unutar povjerenstva upravlja voditelj.**

**III. Svi poslovi moraju biti dovršeni do 22. siječnja 2014. godine.**



Pročelnik Odjela za biologiju

izv. prof. dr. sc. Enrih Merdić

Dostaviti:

1. Povjerenstvima
2. Pismohrana Odjela za biologiju

## 8.2. DECISION ON THE ADOPTION OF THE SELF-EVALUATION OF THE DEPARTMENT OF BIOLOGY

SVEUČILIŠTE JOSIPA JURJA STROSSMAYERA U OSIJEKU  
**ODJEL ZA BIOLOGIJU**  
Osijek, Cara Hadrijana 8/A

KLASA: 602-04/15-03/01  
URBROJ: 2158-60-60-10-15-01  
Osijek, 22. siječnja 2015. godine

Na temelju članka 44. Pravilnika Odjela za biologiju, Vijeće Odjela za biologiju je na IV. sjednici u akademskoj 2014./2015. godini, održanoj dana 22. siječnja 2015. godine pod 2. točkom dnevnog reda donijelo sljedeću:

**ODLUKU**  
**o usvajanju**  
**Samoanalize Odjela za biologiju**

**I**

Usvaja se Samoanaliza Odjela za biologiju, izrađena u okviru postupka reakreditacije visokih učilišta u akademskoj 2014./2015. godini, na hrvatskom i engleskom jeziku.

**II**

Samoanaliza Odjela za biologiju sastavni je dio ove Odluke.

**III**

Samoanaliza Odjela za biologiju dostavlja se Agenciji za znanost i visoko obrazovanje.

Pročelnik Odjela za biologiju



izv. prof. dr. sc. Enrih Merdić

Dostaviti:

- ① Agencija za znanost i visoko obrazovanje
2. Pismohrana Odjela za biologiju