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INTRODUCTION

The Expert Panel appointed by the Agency for Science and Higher Education (ASHE) created this Report on the Re-accreditation of the University Postgraduate (Doctoral) Programme in *Biology* on the basis of the Self-Evaluation Report of the Programme, other documentation submitted and a visit to the Faculty of Science, University of Zagreb.

The Agency for Science and Higher Education (ASHE), a public body listed in EQAR (European Quality Assurance Register for Higher Education) and a full member of ENQA (European Association for Quality Assurance in Higher Education), re-accredits higher education institutions (hereinafter: HEIs) and their study programmes in line with the Act on Quality Assurance in Science and Higher Education (Official Gazette 45/09) and the Ordinance on the Content of a Licence and Conditions for Issuing a Licence for Performing Higher Education Activity, Carrying out a Study Programme and Re-Accreditation of Higher Education Institutions (OG 24/10). In this procedure parts of activities of higher education institutions and university postgraduate study programmes are re-accredited.

Expert Panel is appointed by the Agency's Accreditation Council, an independent expert body, to carry out independent evaluation of post-graduate university study programmes.

The Report contains the following elements:

- Short description of the study programme
- The recommendation of the Expert Panel to the Agency's Accreditation Council
- Recommendations for institutional improvement and measures to be implemented in the following period (and checked within a follow-up procedure)
- A brief analysis of the institutional advantages and disadvantages
- A list of good practices found at the institution
- Conclusions on compliance with the prescribed conditions of delivery of a study programme
- Conclusions on compliance with the criteria for quality assessment.

Members of the Expert Panel:

- Mark Davies, Professor, Faculty of Health Sciences and Wellbeing, Sunderland University, United Kingdom of Great Britain and Northern Ireland
- R. J. Pieters, Chair of Chemical Biology of Multivalent Systems, Utrecht University, Netherlands
- Fabian Cerda, Max Planck Institute of Biochemistry, Germany
- Marianne Holmer, Professor, Head of Department of Biology, Syddansk Universitet, Denmark
- Isabel Sá Nogueira, Associate Professor, Head of Laboratory, Faculdade de Ciências e Tecnologia Universidade NOVA de Lisboa, Portugal
- Inger Elisabeth Måren, Associate Professor, Department of Biological Sciences, University of Bergen, Norway
- Peter Bennett, Reader in Biodiversity and Evolutionary Ecology, University of Kent, United Kingdom of Great Britain and Northern Ireland
- Domagoj Vugić, doctoral student, Institut Curie, France

- Maalte Braack, Director of Mathematical Seminar, Christian-Albrechts-Universität, Kiel, Germany
- Barbara Drinovec Drnovšek, Professor, Fakulteta za matematiko in fiziko, Univerza v Ljubljani, Slovenia
- Sebastian Eterovic, doctoral student, Mathematical Institute, University of Oxford, United Kingdom of Great Britain and Northern Ireland
- Donald Bruce Dingwell, Department for Earth and Environmental Sciences Chair of Mineralogy and Petrology, Ludwig-Maximilians-Universität München, Germany
- Giovanni B. Andreozzi, Coordinator of the PhD programme in Earth Sciences, Sapienza Universita di Roma, Italia
- Ponfa Roy Bitrus, doctoral student, Department of Geology and Petroleum Geology, University of Aberdeen, United Kingdom of Great Britain and Northern Ireland
- Anders Omstedt, Professor Emeritus, Department of Marine Sciences, The Faculty of Science, University of Gothenburg, Sweden
- Rafael Laso Perez, doctoral student, Max Planck Institute for Marine Microbiology, Germany
- Kai-Olaf Hinrichsen, Professor, Technische Universitat Munchen, Germany
- Alexandra Pinto, Associate Professor, Director of PhD programme in Chemical and Biological Engineering, Universidade de Porto, Portugal
- Mohamed Hussien, doctoral student, Faculty of Chemistry and Pharmacy, L. M. Universitat Munchen, Germany
- Mikael Rinne, Associate Professor, Aalto University, Finland
- Anders Omstedt, Professor Emeritus, Department of Marine Sciences, The Faculty of Science, University of Gothenburg, Sweden.

The higher education institution was visited by the following Expert Panel members:

- Marianne Holmer, Professor, Head of Department of Biology, Syddansk Universitet, Denmark
- Isabel Sá Nogueira, Associate Professor, Head of Laboratory, Faculdade de Ciências e Tecnologia Universidade NOVA de Lisboa, Portugal
- Peter Bennett, Durrell Institute of Conservation and Ecology, University of Kent, Canterbury, UK
- Inger E. Måren, Associate Professor, Ecological and Environmental Change Research Group, Department of Biological Sciences, University of Bergen (UiB), Norway
- Domagoj Vugić, doctoral student, Institut Curie, France.

In the analysis of the documentation, site visit and writing of the report the Panel was supported by:

- Josip Hrgović, coordinator, ASHE
- Goran Briški, interpreter at the site visit, ASHE

During the visit to the Institution the Expert Panel held meetings with the representatives of the following groups:

• Management

- Study programme coordinators
- Doctoral candidates
- Teachers and supervisors
- External stakeholders
- Alumni

The Expert Panel also had a tour of the library, IT rooms, student register desk and the classrooms.

SHORT DESCRIPTION OF THE STUDY PROGRAMMEME

Name of the study programme contained in the licence: Postgraduate interdisciplinary university study programme in Biology Institution delivering the programme: University of Zagreb Institution providing the programme: Faculty of Science, University of Zagreb Place of delivery: Zagreb Scientific area and field: Natural Sciences: Biology

Number of doctoral candidates: 198

Number of HEI funded doctoral candidates (instructors at this or another HEI or institute): 52 Number of self-funded doctoral and employer-funded candidates: 142 Number of inactive doctoral candidates (failure to enrol the academic year on regular basis but still entitled to pursue the study programme): 4

Number of teachers: 90 Number of supervisors: 125 Number of doctoral candidates to whom a supervisor was officially appointed: 129 The candidate : supervisor ratio: 1 : 1

Teaching/research ratio: 39 : 141 ECTS (1:3.6)

Learning outcomes of the study programme:

- 1. Knowledge and Reasoning
 - 1.1. Knowledge of the field of the research interest
 - 1.2. Interpretation of contemporary biological knowledge on the factual and conceptual level in accordance with the most recent scientific knowledge and in correlation with related scientific disciplines (mathematics, physics, chemistry, geology)
 - 1.3. Understanding and capacity of adequate use of experimental design methods, bioinformatics tools and databases in the field of research
- 2. Comprehension Skills
 - 2.1. Implementation of acquired knowledge into the definition of a scientific problem and selection of the research methods
 - 2.2. Capacity of interpretation, relation and evaluation of one own research results and their critical evaluation in comparison with the available reference works
 - 2.3. Capacity of performing complex experiments and procedures in research
- 3. Psychomotor Skills
 - 3.1. Capacity for adequate and critical use of research techniques and methods of own area of research and capacity for their adjustment to the specific needs
 - 3.2. Capacity for organisation and performance of field research
 - 3.3. Capacity of development of new models for the interpretation of experimental results
- 4. Social Skills

4.1. To defend hypotheses, methods, attitudes, results and conclusions of own research

- 4.2. Writing and reporting skills, capacity of presentation of results of own and others' research in scientific form and required format, whether in oral or in written form
- 4.3. Knowledge of ethics principles, rights and obligations governing human and professional relationships among the teachers, researchers, students and administration staff forming part of the research and education community.
- 5. Independence
 - 5.1. Qualification for participation in a research team activities and adjustment to the work environment requirements
 - 5.2. Independence in the following of new knowledge in the field of biology and evaluation of its scientific reach
 - 5.3. Capacity of independent resolution of most steps in the process of publication of a research paper and in the communication with the journals' editorial boards
- 6. Responsibility
 - 6.1. Knowledge of highest ethics standards of responsible research performance and publication
 - 6.2. Practicing the ethics principles as set out in the international and national laws and regulations about subject safety; subject protection and protection/care of experimental animals
 - 6.3. Responsible use and interpretation of the research results of scientific/professional analyses through public appearances and through media

RECOMMENDATION BY THE EXPERT PANEL TO THE ASHE'S ACCREDITATION COUNCIL

Upon the completion of the re-accreditation procedure and the examination of the materials submitted (Self-Evaluation Report etc.), the visit to the higher education institution and interviews with HEI members in accordance with the visit protocol, the Expert Panel renders its opinion in which it recommends to the Accreditation Council of the Agency the following: - issue a confirmation on compliance for performing parts of activities (renew the licence)

RECOMMENDATIONS FOR THE IMPROVEMENT OF THE STUDY PROGRAMMEME

- 1. The Department is recommended to improve the guidelines for the obligations and rights of the students and supervisors and make them available on a common web-site for harmonisation and transparency.
- 2. The Department and the University are recommended to revise the rules for submission of the PhD thesis to promote theses written in English and consisting of publications and manuscripts aimed at international journals. The requirements for an English thesis at present (incl. the Scandinavian model) seems to be much higher compared to a thesis in Croatian.
- 3. The Department and the University are recommended to change the composition of the thesis committee to a majority of external members, preferably with a minimum of one international member
- 4. The Department is recommended to offer an obligatory course in PhD supervision for all supervisors.
- 5. The Department is recommended to encourage the PhD supervisors to become more international by promoting sabbaticals and international collaborations.

ADVANTAGES OF THE STUDY PROGRAMMEME

- 1. The students and the supervisors are pleased with the structure and content of programme. The programme is well designed with a balanced distribution of the tasks in the programme, including classes, teaching load and time for research. The work load is well distributed over the PhD period. There is very good interaction between supervisors and students, as the supervisors are available for the students in (1:1) meetings and through email communication.
- 2. There is a good student to supervisor ratio, meaning that there is an upper limit for the number of PhD students per supervisor (5:1), but all supervisors are below this ratio and most have 1-2 students, which ensures time for supervision.
- 3. Teaching load on the PhD students has been reduced over the years in response to a previous evaluation of the Department. The students teach 150 hours annually and the students and supervisors find teaching at this level appropriate. The students use more time for preparation of teaching in the first year, but benefit from the teaching as part of their training to become a researcher.
- 4. The programme is characterised by a high completion rate compared to national standard most likely due to many of the initiatives taken during the past year (focus on recruitment, organisation of the programme, etc.).
- 5. There seems to be a balance in gender among the PhD students consisting of both male and female students.

6. The laboratory facilities are suitable for the work providing space to do laboratory experiments and advanced analysis. The students have their own working desks and own computers. They have access to the most important on-line resources to complete a PhD thesis.

DISADVANTAGES OF THE STUDY PROGRAMME

- 1. There seems to be some confusion among the PhD students as to procedures for PhD studies. Guidelines exist, but are not available on a common website and there is a lack of transparency, e.g. concerning the final reporting. Information can be improved by providing clear guidelines for students and supervisors on a shared web-site.
- 2. The PhD programme has a focus on courses, in particular on learning methods and techniques relevant for the PhD project. These courses only have few students and as such they seem more like supervision. Less emphasis is on the development of academic skills such as critical thinking and exposure to multidisciplinary research by participating in larger classes and scientific discussions in the research groups on state-of-the-art research.
- 3. The available courses focus on biology and methods, whereas training in soft skills such as new IT resources and pedagogical training is lacking in the programme.
- 4. The supervisors have been offered a course for new supervisors once, some years ago, and that was very beneficial. Such a course should be offered on a regular basis, e.g. annually, to train new supervisors. This course should include skills in pedagogy.
- 5. The PhD programme is lacking international components, such as recruitment of international students and of international researchers among the supervisors or co-supervisors.
- 6. There is only one external member in the committee, whereas most other countries have a majority of externals on the committee.
- 7. The thesis can be submitted either in Croatian or in English. If the thesis is submitted in English, this requires extra work by filling forms in both Croatian and English.
- 8. The PhD students struggle to find relevant jobs after completion of their thesis. By providing closer link with the society during the studies, the HEI could provide the students with more skills and a network to improve their employability after obtaining a PhD degree.
- 9. There are no incentives in the programme to produce high quality research in the form of publications in high ranking journals, as the focus is on number rather than quality of publications.

EXAMPLES OF GOOD PRACTICE

- 1. The students have good opportunities to internationalize during their studies, as there is funding available for covering the cost of conferences and visits abroad.
- 2. The research groups encourage internal collaboration to share resources and promote multidisciplinary research.
- 3. There is a requirement of a minimum of one publication in international recognised journals as part of the thesis.
- 4. There are proactive initiatives to ensure a low student to supervisor ratio.
- 5. The PhD programme is designed to ensure a sound balance between classes, teaching and research.

COMPLIANCE WITH THE PRESCRIBED CONDITIONS FOR THE DELIVERY OF A STUDY PROGRAMMEME

Minimal legal conditions:	
1. Higher education institution (HEI) is listed in the Register of Scientific	YES.
Organisations in the scientific area of the programme, and has a positive	
reaccreditation decision on performing higher education activities and scientific	
activity.	
2. HEI delivers programmes in the two cycles leading to the doctoral	YES.
programme in the same area and field/fields and employs a sufficient number of	
teachers as defined by Art. 6 of the Ordinance (OG $24/10$).	
3. HEI employs a sufficient number of researchers, as defined by Art. 7 of the	YES.
Ordinance (OG 83/2010).	
4. At least 50% of teaching as expressed in norm-hours is delivered by teachers	YES (56
employed at the HEI (full-time, elected into scientific-teaching titles).	%).
5. Student: teacher ratio at the HEI is below 1:30.	YES.
6. HEI ensures that doctoral theses are public.	YES but
	with
	obstacles*.
*There are 151 theses uploaded on the DABAR since 2012., but not all are publical	lly available:
54 are entirely public and open access;	
57 is entirely unavailable (a special written request must be placed to the author)	;
27 theses are available through authorised access (PMF staff and students)	
13 temporarily unavailable (there is a date set when they will be publically available	ole).
7. HEI launches the procedure of revoking the academic title if it is determined	YES.
that it has been attained contrary to the conditions stipulated for its attainment,	
by severe violation of the studying rules or based on a doctoral thesis	
(dissertation) that has proved to be a plagiarism or a forgery according to	
provisions of the statute or other enactments.	
Additional/ recommended conditions of the ASHE Accreditation Council	
for passing a positive opinion	
1. HEI (or HEIs in joint programmes) has at least five teachers appointed to	YES
scientific-teaching titles in the field, or fields relevant for the programme	
involved in its delivery.	
2. In the most recent reaccreditation, HEI had the standard Scientific and	YES.
Professional Activity marked as at least "partly implemented" (3).	
3. The doctoral programme is aligned with the HEI's research strategy.	YES
4. The candidate : supervisor ratio at the HEI is not above 1:3.	YES.
5. All supervisors meet the following conditions:	YES*
a) PhD, elected into a scientific title, holds a scientific or a scientific-teaching	
position and/or has at least two years of postdoctoral research experience;	
b) active researcher in the scientific area of the programme, as evidenced by	
publications, participation in scientific conferences and/or projects in the past	
five years (table 2, Supervisors and candidates);	
c) confirms feasibility of the draft research plan upon admission of the	

candidate (or submission of the proposal);

d) ensures the conditions (and funding) necessary to implement the candidate's research (in line with the draft research plan) as a research project leader, coleader, participant, collaborator or in other ways;

e) trained for the role before assuming it (through workshops, co-supervisions etc.);

f) received a positive opinion of the HEI on previous supervisory work.

*a) YES. All supervisors at the Doctoral Programme in Biology are at the scientific or scientificteaching positions. As exception, based on the research activity, the supervision may be entrusted to employees at other positions with the scientific title of Scientific Associate or higher.

b) YES. All supervisors and teachers are active researchers in their fields.

c) YES. The obligatory part of the selection process is the research plan. The thesis proposal is submitted on a special form, with a detailed description of the hypothesis, methodology and plan of research, expected scientific contribution, and selected reference works. The process involves the appointment of the supervisor.

d) YES. As a rule, the supervisor of the research project (as leader or participant) provides funding for the tuition fee, attendance at scientific workshops and conferences, and visits to international institutions.

e) As the Rector's Conference requirements include the supervision in evaluation of the review papers, most supervisors at the Doctoral Programme have acquired the competencies of supervising the review papers on lower levels.

f) YES. A special committee evaluates the thesis proposal and the supervisor's competences. The supervisor's competences (based on his/her research work) are one of the requirements for the acceptance of the thesis proposal. Further, the supervision is specially assessed at

HEI as one of the requirements for the progress (e.g. successful supervision of the candidates, published scientific paper jointly with a candidate).

6. All teachers meet the following conditions:		
a) holds a scientific or a scientific-teaching position;		
b) active researcher, recognized in the field relevant for the course.		
*a) YES. All teachers hold the title of Assistant Professor or higher.		
b) YES. According to the provided tables, the teachers are active researchers in their fields.		

7. The supervisor normally does not participate in the assessment committees.YES8. The programme ensures that all candidates spend at least three years doing
independent research (while studying, individually, within or outside courses),YES*

which includes writing the thesis, publishing, participating in international conferences, field work, attending courses relevant for research etc.
 * YES, the fundamental activity of the Programme is the research project, which results in

participation in scientific conferences, publications and writing of the thesis.

QUALITY ASSESSMENT

1.	RESOURCES: TEACHERS, SUPERVISORS, RESEARCH CAPACITIES AND INFRASTRUCTURE	
		Improvements are necessary
	I. HEI is distinguished by its scientific/ artistic achievements in the discipline in which the doctoral study programme is delivered.	The information in the Self-Evaluation Report (SER) gives three different analyses of the research outputs of the staff involved in supervising doctoral research. This is confusing, but the most meaningful figure is for supervisors who are employees of the Faculty of Science who published an average of 8 papers each in the 6-year period 2012-17 (with an average of 5 citations per paper). This figure is improved when external co-supervisors and other teaching staff are included (90 staff, average of 12.6 papers over 6 years with 11 citations each).
		Recommendation: The Department is advised to implement an incentive-based scheme to significantly increase the number of publications in high-impact international journals by Faculty staff.
1.1.		The Panel also regarded the relatively low level of internationalisation of the research community in the Department to be a significant weakness. This was evident in areas such as international staff and PhD student recruitment, research collaboration, attendance and hosting of major conferences, inviting scientists from abroad to give master classes for students, and opportunities for staff development such as international research visits and sabbatical leave.
		Recommendation: The Department is advised to promote opportunities to engage in international collaborative research. This would help to exploit international opportunities for major EU grant funding to support high quality research in Croatia.
		Recommendation: A proactive approach to internationalisation of the Department's research community is highly recommended. This should include actively seeking to recruit international staff and PhD students, research collaborators, attendance and hosting of major international conferences, inviting scientists from abroad to give master

	classes for students and seminars, and enhancing opportunities for staff development such as international research visits and sabbatical leave.
1.2. The number and workload of teachers involved in the study programme ensure quality doctoral education.	High level of quality Teachers are content with their teaching loads. More than 55% of teaching is delivered by Faculty of Science teachers, with an average of 320 norm hours per year.
	Improvements are necessary
1.3. The teachers are highly qualified researchers who actively engage with the topics they teach, providing a quality doctoral programme.	The Panel regards the Faculty employees to have a relatively modest level of research output (1.3 outputs per year) compared to European norms, especially when many of these papers are not published in high-impact factor international journals (a significant proportion are book chapters). No H-index information for individual staff was provided in the SER, but the relatively low productivity and citations of Faculty staff involved in doctoral research is evidenced in the SER appendices. Not only is the overall H-index of 19 across all outputs (2012-17) modest, there is a strong bias in the distribution of citations. Only 47 papers have 10 citations or more, 177 have 1-9 citations, and 98 outputs have no citations). The Panel expected a stronger performance in terms of research outputs, especially as the Department has attracted competitive funding for their work, including 11 projects funded by the Croatian Science Foundation (CSF). Contrary to European norms, there was no evidence that the publication record of staff was used in their appointment, or in annual performance or promotion procedures.
	Recommendation: The Faculty is recommended to focus more on publication in high-impact international journals, and should seek to engage more in major collaborative grant opportunities and conferences.
	High level of quality
1.4. The number of supervisors and their qualifications provide for quality in producing the doctoral thesis.	Supervisors are well-qualified to supervise research and some are highly experienced with a successful track-record of PhD completions. However, much of their research projects are at the national rather than international level.
	Between 2012 and 2017, there were 155 supervisors in the Doctoral Programme in Biology who supervised 260 students. The average supervisor-candidate ratio for this period was 1:1.7. Currently, the average supervisor workload is 1 student and this

	was tested by the Panel who asked the large number of supervisors they met to explain the number of students they supervise. An example of good practice was seen in Department limiting the maximum number of students per supervisor to 5.
	The Faculty has transparent criteria for selecting supervisors: 1. from the rank of Assistant Professor above; 2. a leader or a member of a research project or active researcher in the field in which the doctoral thesis is done; 3. be scientifically active in the international research community; 4. have published at least 5 scientific papers in the last 5 years in the field of research in which the doctoral thesis is done.
	Improvements are necessary
1.5. The HEI has developed methods of assessing the qualifications and competencies of teachers and	The Department has no procedure in place for applying the Faculty's criteria (listed above) in appointing PhD supervisors. There is also no internal mechanism for reviewing the quality of PhD supervision on a regular basis by senior independent academics.
supervisors.	Recommendation: The Department should devise and implement a review procedure for appointing supervisors and assure the quality of research training they provide to students on a regular basis.
	High level of quality
1.6. The HEI has access to high- quality resources for research, as required by the programme discipline.	The resources available for PhD research training are of high quality. The Panel was only able to tour one laboratory and did not view library or IT facilities. However, it asked the supervisors and students about their access to these essential facilities and their answers indicated that they were content with them. Examples of good practice include a dedicated desk and computer for every PhD student along with access to a fund for attending conferences.
2. INTERNAL QUALITY ASSURANCE OF THE PROGRAMMEME	
2.1. The HEI has established and	Improvements are necessary
accepted effective procedures for proposing, approving and delivering doctoral education. The procedures include identification of scientific/ artistic, cultural, social and economic needs.	The doctoral study programme is proposed, approved and delivered within the quality system which includes a number of procedures implemented by University of Zagreb. The License for the Programme was issued by the Croatian Ministry of Science, Education and Sports on April 30 th 2008, based on the relevant legal provisions and the opinion obtained from the National Higher

		Education Council. However, there is some confusion on what is required to deliver for a PhD.
		Recommendation: The Department is encouraged to improve the guidelines for the obligations and rights of the students and supervisors and make them available for harmonisation and transparency.
		High level of quality
2.2.	The programme is aligned with the HEI research mission and vision, i.e. research strategy.	Besides University and Faculty general strategic documents, the programme is aligned with the Development Strategy of the Faculty of Science at the University of Zagreb, 2015-2020 and the Faculty of Science strategic goals in research and teaching are defined in the Strategic Programme of Scientific Research 2018-2022.
		The key strategic goal is a higher positioning of the institution on the international arena, through systematic incentives for excellence in research, where the doctoral study programmes have a special role.
		Improvements are necessary
2.3.	The HEI systematically monitors the success of the programmes through periodic reviews and implements	Within the preparation procedure for the doctoral study enrolment and prior to the start of a new academic year, the Doctoral Study Council considers the study programme. The procedure includes the introduction of new courses and teachers in accordance with actual research projects.
	improvements.	In Objective 5 of the Strategy (mentioned under 2.2), (to increase the connection between the education process and the research results) special emphasis is given to the organisation of doctoral study programmes and better connections between different professions. These connections are, however, not apparent and should be strengthened.
		Improvements are necessary
2.4.	HEI continuously monitors supervisors' performance and has mechanisms for evaluating supervisors, and, if necessary, changing them and mediating between the supervisors and the candidates.	Supervisors are assessed during the procedure for the doctoral thesis acceptance, through the supervisor's scientific papers in the area of the suggested doctoral thesis. The Doctoral Council monitors the work of both the supervisor and the doctoral candidate through annual supervisor's report. However, monitoring and quality assessments of the supervisors should take on a more formal form, and be systematically carried out across all sub-disciplines of the programme (see 1.5.).

		High level of quality
		Academic integrity and scientific research freedom at the Faculty is ensured by applying the Code of Ethics and Regulations on Doctoral Study at the University of Zagreb. These documents regulate plagiarism rules and sanctions, collegiality, relations to students, falsification, conflict of interest and so on.
2.5.	HEI assures academic integrity and freedom.	 During their studies, students sign several declarations aimed to prevent plagiarism: 1) Declaration of Originality – signed for the scientific papers subject to evaluation. 2) Declaration of Originality of Doctoral Thesis – declaring under material and criminal liability the thesis is their work of authorship, made fully independently with the references made to sources from other authors and documents. 3) Declaration of Deposit and Publication of Evaluated Thesis – allowing permanent deposit and public availability of their thesis after its defence.
		High level of quality
2.6.	The process of developing and defending the thesis proposal is transparent and objective, and includes a public presentation.	The doctoral thesis proposal is submitted upon enrolment in the 2nd year of the Doctoral Study Programme at the prescribed University forms. For the topic to be acceptable in the field of biology, it must respond a fundamental scientific question and the work on the thesis must include experimental biological methods. The Council of the Biology Department elects the members of the committee for the assessment of the proposal, which is at the same time the committee for the presentation of Seminar II.
		Improvements are necessary
	2.7. Thesis assessment results from a scientifically sound assessment of an independent	The Programme has developed procedures for developing and defending the doctoral thesis.
2.7.		It also encourages participation of external or international examiners in the thesis defence committee. The recommendation is to aim for having a majority of external examiners (with minimum one international) on the thesis defence committee.
	commutee.	The programme encourages the candidate to have at least one publication in an international peer reviewed journal (three under the Scandinavian model).
		The University might wish to revisit the Scandinavian model of doctoral assessment to ensure parity with the conventional model.

		Recommendation: There should be more information made available to the students (on-line) on thesis guidelines, thesis format and soft-skills expected of them.
2.8.	The HEI publishes all necessary information on the study programme, admissions, delivery and conditions for progression and completion, in accessible outlets and media.	High level of quality All information is available at the website of the Faculty of Science and the Department of Biology: https://www.pmf.unizg.hr/biol/ured_za_doktorski_studij.
		High level of quality
2.9.	Funds collected for the needs of doctoral education are distributed transparently and in a way that ensures sustainability and further development of doctoral education (ensures that	Funds of the doctoral programmes are the Faculty's own funds. They are allocated according to the Ordinance of the University of Zagreb Faculty of Science on the criteria and the method of use funds. The financial support to the doctoral candidates is provided indirectly, by exemptions from the payment of full or parts of the tuition fee.
	out and supported, so that doctoral education can be completed successfully).	well as participation of doctoral candidates employed at the Faculty of Science in scientific workshops and conferences (also international ones) in form of co-funding (participation fee, accommodation, travelling expenses) and provides the necessary equipment, such as computers, lab facilities and a work place.
		High level of quality
2.10	Tuition fees are determined on the basis of transparent criteria (and real costs of studying).	According to the Ordinance on Doctoral Study Programmes, the tuition amount is determined by the Faculty Council at the proposal of the Postgraduate Study Programmes Council. More information is available at: <u>Call for Applications for</u>
		Admission at Postgraduate University (Doctoral) Programmes.
3.	SUPPORT TO DOCTORAL CANDIDATES AND THEIR PROGRESSION	
21	The HFL establishes admission	High level of quality
3.1.	quotas with respect to its teaching and supervision capacities.	Admission quotas were recently revised by the HEI following recommendations from the previous evaluation and reduced to 32 students per year. Teacher's workload is balanced. The current ratio teacher candidate is 1:2, and the average supervisor workload is 1 student per supervisor.

	Improvements are necessary
3.2. The HEI establishes admission quotas on the basis of scientific/ artistic, cultural, social, economic and other needs.	Admission quotas for Programme in Biology are established in accordance with the research capacities of the Biology Department. As most students are already employed, the admission quota is not based on the employment/ unemployment criteria. Most of the candidates are junior researchers employed at the University or its collaborating institutions (above 50%) and the remaining candidates are employees in the public or private sector. The completion rate of the programme is approximately 80%. To the knowledge of the Panel, there are very limited research opportunities with industries, limited knowledge transfer and no intellectual property outputs, and no innovative companies established by former PhD students.
	Recommendation: The Department and University should make an effort to link academia to industry in order to find new opportunities and develop an alumni database to track successful PhD students.
3.3. The HEI establishes the	High level of quality
admission quotas taking into account the funding available t the candidates, that is, on the basis of the absorption potentials of research projects	Most PhD students are financed by research projects and the Faculty, because they are employed as junior researchers at the Faculty of Science. The tuition fees of the PhD students employed outside the Faculty are paid by the companies that they work for.
or other sources of funding.	PhD students are generally satisfied with their financial situation.
3.4. The HEI should pay attention t	High level of quality
the number of candidates admitted as to provide each with an advisor (a potential supervisor). From the point of admission to the end of doctor education, efforts are invested so that each candidate has a sustainable research plan and able to complete doctoral research successfully.	The implementation of the doctoral study programme is monitored by the Committee of the Doctoral Study Programme and by the Council of the Biology Department. Both Faculty bodies ensure that immediately upon the admission each student is provided with an advisor/potential supervisor. The advisor is responsible for introducing the study programme to the candidate and presents the candidates' obligations until the moment of the supervisor's appointment. Advisors are obligated to deliver periodical reporting on the progress of the students. The programme completion rate is high (nearly 80%).
3.5. The HEI ensures that	Improvements are necessary
motivated candidates are recruited internationally.	Admission to the doctoral study programme is carried out based on a public call for applications published in the daily press and at the Faculty website once in each academic year. The advertised call

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	 contains the admission criteria, the documents required, tuition fee specifications, and the selection criteria. To our knowledge, there are no international recruitment strategies. Most of the documents are not available in English, although the programme from the teacher's perspective are ready to be taught in English. Recommendation: To recruit interested, talented and highly motivated candidates, at the national and international level, research proposals with potential supervisors should be introduced to the procedure of recruitment.
	Improvements are necessary
3.6. The selection process is public and based on choosing the best applicants.	The criteria of evaluation of applicants include their grade point average earned during their graduate study level, interest expressed in scientific research, published papers, teacher/former supervisor and potential supervisor recommendations, and a proposed project. Applicant interviews are an integral part of the process and are conducted by the Committee of the Doctoral Study Programme.
	Although the requirements for admission are clearly defined in the call for applications for admission at Doctoral Programme, they are not available in English.
	There is no competition. To our knowledge, the vast majority of the candidates that apply are admitted.
	High level of quality
3.7. The HEI ensures that the selection procedure is transparent and in line with	According to the Self-Evaluation Report, the Department and University ensures that the selection is transparent and that applicants have a right to complain.
published criteria, and that there is a transparent complaints procedure.	Applicants whose applications are rejected may examine the documents and the explanation why they do not fulfil the criteria for the admission.
	Most denied applicants do not fulfil the formal criteria for the admission and there were no complaints about the procedure.
	High level of quality
3.8. There is a possibility to recognize applicants' and candidates' prior learning.	The Department has established a procedure of recognizing prior learning and achievements relevant for the doctoral programme, such as, recognition of ECTS from a MSc programme or another PhD programme, workshops, methodology courses in the field of

	Biology, computing and statistical methods, specific skills required for field research, etc.
	Improvements are necessary
	PhD candidates/students may get familiar with their rights and obligations, primarily through the website of the PhD programme.
3.9. Candidates' rights and obligations are defined in relevant HEI regulations and a contract on studying that	PhD students who are employed at the Faculty do not enter into a Study Programme Contract given that the rights and obligations of both parties are regulated by Employment Contracts. All other PhD students enter into a Study Programme Contract with the Faculty.
support to the candidates.	Recommendation: The Department and University should provide more clarity concerning this issue, perhaps at the website of the programme or in an introductory lecture addressing the candidates' rights and obligations, since some students complained about lack of guidance through certain procedures.
	High level of quality
3.10. There are institutional support mechanisms for candidates' successful progression.	The PhD students who are employees of the Biology Department have support from the research projects and the University incentives. This includes ensuring conditions for scientific research (computer equipment) and funding their attendance at scientific workshops and conferences by the Biology Department. Incentives for the candidates' elective activities is also provided through the funding of their attendance at the conferences or publication of scientific papers.
4. PROGRAMMEME AND OUTCOMES	
	Improvements are necessary
4.1. The content and quality of the doctoral programme are	Overall, the doctoral programme in Biology follow the internationally recognised standards, but there are some aspects, which can be improved.
aligned with internationally recognized standards.	to the programme can be improved by providing more information in English on the web site, and by allowing supervisors to become more international by supporting their mobility throughout their entire career.
	Recommendation: Submission of the thesis in English should be promoted to encourage the students to engage more in the

		international community through collaboration.
		The HEI should consider revising the thesis committee to accommodate more external members, including a minimum of one international member. This will encourage submission of the thesis in English.
4.2.	Programme learning outcomes, as well as the learning outcomes of modules and subject units, are aligned with the level 8.2 of the CroQF. They clearly describe the competencies the candidates will develop during the doctoral programme, including the ethical requirements of doing research.	High level of quality The study programme ensures that the learning outcomes are aligned with level 8.2. of the CroQF by offering courses introducing the students to the frontiers of knowledge, new methodology and highly specialised knowledge. The close interaction with supervisors and involvement in research at the Department allows the students to develop their personal, professional and ethical authority and to manage scientific research activities. The student is encouraged to take ethical and social responsibility by working independently with own research questions in collaboration with the supervisor and eventually in a research group.
		High level of quality
4.3.	Programme learning outcomes are logically and clearly connected with teaching contents, as well as the contents included in supervision and research.	The study programme is well designed providing the students with the necessary skills in a logical order, initiated with basic information and training in methods during the first year and expanding the skills in the second year. The academics skills are taught by being an active participant in the research group. The student is involved in all parts of the scientific process, from the first ideas to the final product in the form of publications. The students benefit from the low student to supervisor ratio to allow very personal training in the academic skills towards becoming an independent researcher.
4.4.	The doctoral programme	High level of quality
	learning outcomes and competencies aligned with the level 8.2 of the CroQF.	The students publish on average more than one publication from their thesis, which is above the required level (1 publication).
		High level of quality
4.5.	Teaching methods (and ECTS, if applicable) are appropriate for level 8.2 of the CroQF and assure achievement of clearly defined learning outcomes.	The teaching is research-based, and all elements of the teaching has been assigned ECTS points for transparency. This provides a good overview of the contents of the study programme, the efforts expected for each activity as well as the learning outcomes. All skills mentioned above are covered and thus ensures that the student will get a minimum of learning. Further, the students are allowed to take more points in their own interest.

	Improvements are necessary
4.6. The programme enables acquisition of general (transferable) skills.	The students are encouraged to participate in conferences and summer schools nationally and internationally and there is funding available (upon application) to support such activities. The students seem to be active in this respect and participate in several conferences and summer schools during their PhD study. Despite the fact that there are many elective courses, the students requested new courses in e.g. IT-resources and further training in soft skills, such as pedagogical training and project management may also be useful.
	High level of quality
4.7. Teaching content is adapted to the needs of current and future research and candidates' training (individual course plans, generic skills etc.).	The study programme is well designed providing the students with 2 obligatory courses in basic skills and biostatistics, as well as a large variety of elective courses focusing on relevant biological topics and methods. The students benefit from the 1:1 contact with the supervisor which ensures training to become an independent researcher and development of skills as a researcher by working directly with the supervisor. Enhanced collaboration between departments and with international researchers could expand the current knowledge available and promote collaboration on national and international level and secure further research training.
	Improvements are necessary
4.8. The programme ensures quality through international connections and teacher and candidate mobility.	Although the students have the opportunity to go abroad and earn ECTS by this activity, only few choose to do so (10%). At the same time, their supervisors only have the opportunity to go on sabbaticals during their early stage career and late in their career and it requires that colleagues take over and fulfil the teaching requirements while they are away. This prevents supervisors from developing international networks of benefit for the PhD students to work in an international environment. (see 1.1). Furthermore, that recruitment of international students in the programme is very low (~1 per year), and the students do not interact with other international students during their studies. Overall, this prevents the Faculty from becoming more international and affects the internationalisation of the PhD students. More opportunity should be provided for the staff to develop international collaboration and students should be encouraged further, e.g. by making a stay abroad obligatory in their

One way to increase international connections as well as to
internationalize the thesis is to expand the thesis committee with
an international member, which will require that the thesis is
submitted in English.

* NOTE: RECOMMENDATIONS OF THE EXPERT PANEL TO THE ASHE'S ACCREDITATION COUNCIL AND QUALITY LABEL

The role of the Expert Panel in the re-accreditation of doctoral study programmes is manifold. The Expert Panel or part of the Expert Panel visiting a higher education institution drafts a report on the basis of a self-evaluation report, the accompanying relevant documentation, and a site visit to HEI. The draft report is adopted by all members of the Cluster Expert Panel, while the president of the Cluster Expert Panel is responsible for coordinating the assessment levels.

The report contains an assessment on whether a doctoral study programme delivered at a higher education institution complies with the prescribed laws and by-laws, as well as any additional/recommended requirements defined by the Agency's Accreditation Council, and whether a higher education institution can obtain a positive, i.e. satisfactory quality assessment according to the criteria set out in this document. Moreover, the Expert Panel must make recommendations for quality improvement.

Based on the assessment of all these elements, the Expert Panel may propose to the Accreditation Council of the Agency to issue either a confirmation on compliance, a letter of expectation for the period up to three (3) years in which period the higher education institution should eliminate the identified deficiencies, or to deny the license.

If the Expert Panel has assessed that a doctoral study programme delivered by a higher education institution does not meet legal and other requirements or that the quality of a study programme is not ensured (i.e. that HEI does not meet additional requirements or recommendations made by the Accreditation Council, or has a very poor quality assessment), they should propose to the Accreditation Council to deny the license.

If the Expert Panel considers that the relevant laws and bylaws have been met by a higher education institution, but that certain elements mentioned above do not meet the quality requirements, while they consider that the identified shortcomings can be corrected within a time frame of three years, they should issue a letter of expectation.

If the Expert Panel considers that all legal and additional/recommended requirements have been met and the quality assessment is satisfactory, i.e. that a study programme fulfils the learning outcomes appropriately defined for that level and scientific area, they may propose the issuance of a certificate and have a HEI commit to quality improvement and reporting to the Agency during the follow-up period.

Finally, if the Expert Panel has, in accordance with the criteria mentioned above, proposed issuing the certificate of compliance and assessed that, in addition to meeting the minimum quality requirements

- i.e. the qualification framework level - for a study programme, the programme should be identified as a doctoral programme of a 'high level of quality', the Expert Panel may propose to the Agency's Accreditation Council that such a doctoral study programme be awarded the 'high quality label'. Thus the Agency, with the consent of the Accreditation Council, grants a higher education institution the right to use the label for their academic and promotional purposes.

The 'high quality label' cannot be proposed or awarded to a programme or a higher education institution that does not comply with the requirements laid down by the laws and bylaws mentioned in this document, and any additional requirements recommended by the Accreditation Council. Moreover, the quality assessment awarded to a study programme should reflect a high level of quality inasmuch that at least half of the sub-criteria in each of the quality assessment criteria are assessed as being of high quality. The Accreditation Council of the Agency issues a final opinion on the label awarded. The content and form of the quality labels shall be prescribed by the Agency in a relevant general act.

The Accreditation Council of the Agency discusses the final report with all recommendations and suggestions, and issues their opinion on the report. Based on a prior opinion of the Accreditation Council, the Agency issues an Accreditation Recommendation to the minister responsible for science and higher education, and upon receipt of the minister's final decision on the outcome of the procedure, awards the 'high quality label" to a higher education institution.