



**REPORT
OF THE EXPERT PANEL
ON THE REACCREDITATION
OF THE UNIVERSITY POSTGRADUATE (DOCTORAL)
PROGRAMME**

CHEMICAL ENGINEERING AND APPLIED CHEMISTRY

**FACULTY OF CHEMICAL ENGINEERING AND TECHNOLOGY
UNIVERSITY OF ZAGREB**

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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 *Chemical Engineering and Applied Chemistry* on the basis of the Self-Evaluation Report of the Programme, other documentation submitted and a visit to the Faculty of Chemical Engineering and Technology of the 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:

- President of the Expert Panel Mark Davies, Faculty of Health Sciences and Wellbeing, Sunderland University, UK,
- Matthias Senge, Chair of Organic Chemistry, Trinity College Dublin, Ireland,
- R. J. Pieters, Chair of Chemical Biology of Multivalent Systems, Utrecht University, Netherlands,
- Fabian Cerda, Max Planck Institute of Biochemistry, Germany,
- Marianne Holmer, Head of Department of Biology, Syddansk Universitet, Denmark,
- Isabel Sa Nogueira, Head of Laboratory, Faculdade de Ciências e Tecnologia Universidade Nova de Lisboa, Portugal,
- Inger Elisabeth Maren, Department of Biological Sciences, University of Bergen, Norway,
- Peter Bennett, Reader in Biodiversity and Evolutionary Ecology, University of Kent, UK,
- Domagoj Vugić, doctoral student, Institut Curie, France,
- Maalte Braack, Director of Mathematical Seminar, Christian-Albrechts-Universität, Kiel, Germany,
- Barbara Drinovec Drnovšek, Univerza v Ljubljani, Slovenia,

- Sebastian Eterovic, doctoral student, Mathematical Institute, University of Oxford, UK,
- Donald Bruce Dingwell, Chair of Mineralogy and Petrology, Ludwig-Maximilians-Universität München, Germany,
- Giovanni B. Andreozzi, Coordinator of the Ph.D. programme in Earth Sciences, Sapienza Università di Roma, Italia,
- Ponfa Roy Bitrus, doctoral student, Department of Geology and Petroleum Geology, University of Aberdeen, UK,
- Anders Omstedt, 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, Technical University of Munich, Germany,
- Alexandra Pinto, Director of PhD programme in Chemical and Biological Engineering, Universidade de Porto, Portugal,
- Mohamed Hussien, doctoral student, Faculty of Chemistry and Pharmacy, L. M. Universität München, Germany,
- Mikael Rinne, Aalto University, Finland,

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

- Kai-Olaf Hinrichsen, Professor, Technical University of Munich, Germany –moderator,
- 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. Universität München, Germany.

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

- Mia Đikić, coordinator, ASHE,
- Ivana Rončević, interpreter at the site visit and translator of the Report, 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.

The Expert Panel also had a tour of the research labs in two buildings.

SHORT DESCRIPTION OF THE STUDY PROGRAMME

Name of the study programme contained in the licence: Chemical Engineering and Applied Chemistry

Institution delivering the programme: Faculty of the Chemical Engineering and Technology of the University of Zagreb

Institution providing the degree: University of Zagreb

Place of delivery: Zagreb

Scientific area and field: Technical Sciences (Chemical Engineering), Natural Sciences (Chemistry)

Number of doctoral candidates: 50

Number of teachers: 66

Number of supervisors: 21 (officially appointed to 15 candidates who have submitted their applications for doctoral dissertation topics).

Ratio of doctoral students to supervisors: 97: 145 (0, 67:1) – including the former programmes of the study Chemical Engineering and Engineering Chemistry.

Taught / research ratio: 36 / 144 ECTS

Taught component: 36 ECTS: 30 in mandatory and 6 ECTS in optional courses.

Research component: 144-150 ECTS: 120 for research, writing and defending the thesis, 5 for public defense of the topic and up to 25 ECTS in various other research activities.

Learning outcomes of the study programme:

1. To systematise knowledge, skills and competences for the respective field and academic area of the programme of the study.
2. To evaluate the skills and methods for experimental and theoretical research relating to the respective field and academic area of the programme of the study.
3. To design a real research process, including all the respective professional and scholarly aspects.
4. To conduct large-scale scientific research extending the frontiers of technology and knowledge.
5. To publicise segments of the original scientific research in refereed international publications or patent offices.
6. To develop a plan of research and a required resources in international context.
7. To communicate with their peers, the larger international scholarly community and with society in general about their ideas or the field of their scholarly and professional interest.
8. To promote, within academic and professional context, technological, social or cultural advancement in a knowledge-based society.

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) and **label it as 'high quality'**

RECOMMENDATIONS FOR THE IMPROVEMENT OF THE STUDY PROGRAMME

1. This programme appears to be very broad and fragmented, covering several fields (branches) of chemistry. Applied chemistry can contain a number of disciplines (it is not clearly defined) as can also be seen in the compulsory courses that pertain to polymers, organic chemistry of the heterocycles, waste water processing, environmental issues, chemistry of the surfaces, etc. We recommend focusing and clustering.
2. Chemical engineering and applied chemistry are in fact not connected. The Faculty is recommended to merge courses (clustering) and to offer research-oriented courses on a PhD level.
3. The Faculty is recommended to request PhD theses written in English (including an introduction in Croatian).

ADVANTAGES OF THE STUDY PROGRAMME

1. Excellent ratio between doctoral candidates and supervisors, particularly professors.
2. High reputation, not only in Croatia.
3. Good networking and good contacts with the industry.
4. Good employment rate.

DISADVANTAGES OF THE STUDY PROGRAMME

1. Dislocation of the departments within three buildings at different locations in the city.
2. Old teaching and research laboratory facilities, which are used to their maximal capacity.
3. Not enough financial support from the government (based on the economic situation in Croatia).
4. Too many courses are listed at PhD level, and not taught due to the small number of PhD students (see recommendations further in report).

EXAMPLES OF GOOD PRACTICE

1. Good monitoring and follow-up of graduate students' career, maintaining contacts with them on mutual benefit, active alumni.
2. Good interaction with the industry sector.
3. Very active interaction between doctoral candidates, professors and students.

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

Minimal legal conditions:	YES/NO notes
1. Higher education institution (HEI) is listed in the Register of Scientific Organisations in the scientific area of the programme, and has a positive reaccreditation decision on performing higher education activities and scientific activity.	YES
2. HEI delivers programmes in the two cycles leading to the doctoral programme, i.e., first two cycles in the same area and field/fields (for interdisciplinary programmes), and employs a sufficient number of teachers as defined by Article 6 of 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).	YES
3. HEI employs a sufficient number of researchers, as defined by Article 7 of the the Ordinance on Conditions for Issuing Licence for Scientific Activity, Conditions for Re-Accreditation of Scientific Organisations and Content of Licence (OG 83/2010).	YES
4. At least 50% of teaching as expressed in norm-hours is delivered by teachers employed at the HEI (full-time, elected into scientific-teaching titles).	YES
5. Student: teacher ratio at the HEI is below 1:30.	YES
6. HEI ensures that doctoral theses are public.	YES*
* The PhD programme is new. There was only one recently defended doctoral thesis at the time of the site visit.	
7. HEI launches the procedure of revoking the academic title if it is determined 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.	YES
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 scientific-teaching titles in the field, or fields relevant for the programme involved in its delivery.	YES
2. In the most recent reaccreditation, HEI had the standard Scientific and Professional Activity marked as at least "partly implemented" (3).	YES
3. The doctoral programme is aligned with the HEI's research strategy.	YES
4. The candidate : supervisor ratio at the HEI is not above 3:1.	YES
5. All supervisors meet the following conditions: 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);	a) YES b) YES c) YES

<p>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, co-leader, participant, collaborator or in other ways;</p> <p>e) trained for the role before assuming it (through workshops, co-supervisions etc.);</p> <p>f) received a positive opinion of the HEI on previous supervisory work.</p>	<p>d) YES</p> <p>e) YES</p> <p>f) YES</p>
<p>6. All teachers meet the following conditions:</p> <p>a) holds a scientific or a scientific-teaching position;</p> <p>b) active researcher, recognized in the field relevant for the course (table 1, Teachers).</p>	<p>a) YES</p> <p>b) YES</p>
<p>7. The supervisor normally does not participate in the assessment committees.</p>	<p>YES</p>
<p>8. The programme ensures that all candidates spend at least three years doing independent research (while studying, individually, within or outside courses), which includes writing the thesis, publishing, participating in international conferences, field work, attending courses relevant for research etc.</p>	<p>YES</p>
<p>9. For joint programmes and doctoral schools (at the university level):</p> <p>cooperation between HEIs is based on adequate contracts; joint programmes are delivered in cooperation with accredited HEIs; the HEI delivers the programme within a doctoral school in line with the regulations and ensures good coordination aimed at supporting the candidates;</p> <p>at least 80% of courses are delivered by teachers employed at HEIs within the consortium.</p>	<p>N/A</p>

QUALITY ASSESSMENT

<p>1. RESOURCES: TEACHERS, SUPERVISORS, RESEARCH CAPACITIES AND INFRASTRUCTURE</p>	
<p>1.1. HEI is distinguished by its scientific/artistic achievements in the discipline in which the doctoral study programme is delivered.</p>	<p>High level of quality</p> <p>The self-evaluation report states that by the end of 2013 there were 34 projects funded by the Ministry of Science, Education and Sports. The Faculty can list 14 projects in total approved by the Croatian Science Foundation, 9 of which projects are still active. The Faculty successfully obtains the funds, the so-called short-term research grants awarded by the University of Zagreb with 15 to 18 mini-projects approved annually from 2013 to 2016.</p> <p>Active projects:</p> <ul style="list-style-type: none"> • 1 project from Horizon 2020, • 1 research fellowship from Marie Skłodowska-Curie line, • 2 projects from COST line, • 6 active CEEPUS networks and a large number of bilateral projects. <p>In the last five years (2012-2016) the Faculty employees published 432 and 467 papers cited in the WoS and Scopus databases, 2 books issued by a foreign publisher, 6 Croatian books, 79 papers in the category of national journals with international peer review according to the CROSB database (partially overlapping with the Scopus database), 23 refereed book chapters, etc. In the same period, doctoral students published 212 doctoral dissertation related papers in the WoS database, another 94 doctoral dissertation unrelated papers cited in the WoS database that is 220 doctoral dissertation related papers cited in the Scopus database and 106 doctoral dissertation unrelated papers cited in the Scopus database. In the same five-year period, mentors in the previous doctoral programmes of studies published 634 and 668 papers cited in the WoS and Scopus databases.</p> <p>The number of new (active) national and international projects is relatively small, (1 EU project and some national projects). Partly this seems to be a consequence of the economic situation and the governmental policy that does not support the funding of EU projects. The Faculty is suggested to apply for more EU projects and to use all chan-</p>

	<p>nels to increase the number of funded projects. The Faculty has an adequate number of peer-reviewed scientific publications and is internationally visible (e.g. in Organic Synthesis).</p> <p>The Faculty is suggested to request PhD theses written in English (including an introduction in Croatian), ideally publication-based theses (including two to three articles in peer-reviewed international journals).</p>
<p>1.2.The number and workload of teachers involved in the study programme ensure quality doctoral education.</p>	<p>Improvements are necessary</p> <p>The self-evaluation report states that there are 66 teachers currently participating in the programme, 15 of whom are external associates. The Faculty executes more than 50% of the curriculum (fully employed and elected to academic ranks). In the academic year 2016/2017 the teaching workload amounts to 1.39, a workload that includes the instruction in doctoral programmes.</p> <p>The Faculty employs a sufficient number of qualified full-time teachers to ensure the quality and continuity of the PhD programme. The teachers are mainly involved in undergraduate and graduate teaching and offer the PhD courses on request. Due to the large number of courses and the low number of total doctoral students the programme may benefit from restructuring. The Faculty may wish to merge courses (clustering) and to offer research-oriented courses on a PhD level.</p>
<p>1.3.The teachers are highly qualified researchers who actively engage with the topics they teach, providing a quality doctoral programme.</p>	<p>High level of quality</p> <p>Evaluation is based on Table 1 of the self-evaluation report and on international visibility.</p> <p>The institution employs a sufficient number of qualified full-time teachers to ensure the quality and continuity of teaching all study programmes. The Faculty also hired teachers who completed their education in a foreign country or did a long-term research stay abroad. Based on the research projects and collaborations the Faculty has an adequate number of peer-reviewed scientific publications.</p>
<p>1.4.The number of supervisors and their qualifications provide for quality in producing the doctoral thesis.</p>	<p>High level of quality</p> <p>The self-evaluation reports that the first doctoral dissertation topics in the programme have only recently been approved. The mentors appointed were selected from the</p>

	<p>ranks of teachers involved in the programme. On the former programme (Chemical Engineering and Engineering Chemistry) during the 2012-2016 there were 86 doctoral dissertations defended – the total mentor/doctoral student ratio was 97:145 (0.67:1). For training of new mentors, the Faculty used the workshops organised at the University.</p> <p>The institution employs a sufficient number of qualified full-time teachers to ensure the quality and continuity of teaching this PhD study programme and to perform research. The Faculty also hires teachers who obtained their education in a foreign country or did a long-term research stay abroad.</p>
<p>1.5.The HEI has developed methods of assessing the qualifications and competencies of teachers and supervisors.</p>	<p>High level of quality</p> <p>The self-evaluation reports that the promotion system consists of election to research and academic ranks. For this procedure, the national criteria for teachers in the field of natural sciences are applied. For teachers in the field of technical sciences internal criteria are applied, which exceed the national criteria. They have the Annual Self-evaluation Report of the Faculty.</p> <p>Based on the re-accreditation of the Faculty (cf. reaccreditation report from April 2015) The Faculty provides for high quality research by implementing efficient mechanisms for rewarding and sanctioning staff, promotion into leadership positions and other policies based on excellence, quality research and its impact on society.</p>
<p>1.6.The HEI has access to high-quality resources for research, as required by the programme discipline.</p>	<p>Improvements are necessary</p> <p>The self-evaluation reports that due to the economic crisis, the level of funding for the Faculty has been gradually reduced since 2008. As a result, in the context of major equipment, only two instruments were purchased – XRD Shimadzu 6000 X-ray diffractometer and Tescan Vega III Easyprobe scanning electron microscope. The Faculty has also applied to calls for infrastructure projects pipeline, to the European Regional Development Fund 2014 – 2020, CEEPUS, Erasmus+, Erasmus Mundus, scientific projects of the HRZZ, the project from Horizon 2020 line, and bilateral projects to help extend the infrastructure base available for scientific and research work. The more recent periodicals are largely available online through contracts on the</p>

	<p>national level. Using its own funds, the Faculty purchases three Croatian and four foreign periodicals over the BIC.</p> <p>Based on the discussion with the Management Board, supervisors and PhD students the online access to journals is getting more and more difficult. The Faculty is suggested to find ways for getting easier access to journals. The access to the laboratory equipment is provided.</p>
<p>2. INTERNAL QUALITY ASSURANCE OF THE PROGRAMME</p>	
<p>2.1. The HEI has established and accepted effective procedures for proposing, approving and delivering doctoral education. The procedures include identification of scientific/ artistic, cultural, social and economic needs.</p>	<p>High level of quality (Note: stakeholders are in favour, which is very positive, also for the students)</p> <p>The self-evaluation reports that the Faculty is a component of the University of Zagreb and fully adopts the University's regulations concerning initiation of new programmes. The Faculty has adopted the principle of integrating and consolidating doctoral programmes on a university level which may lead to the establishment of the University Doctoral School. The Faculty has no intention to initiate new doctoral programmes of study in the near future.</p> <p>Based on the discussions with the PhD students, the supervisors, the management and, in particular, based on a very positive feedback from all stakeholders, the task was fully implemented.</p>
<p>2.2. The programme is aligned with the HEI research mission and vision, i.e. research strategy.</p>	<p>High level of quality</p> <p>The self-evaluation reports that the mission and vision of the Faculty are determined under the Faculty Development Strategy. The mission of the Faculty is to promote chemical engineering, applied chemistry, materials engineering and environmental protection engineering as scientific disciplines by establishing links between science and technology and economy, industry and public activities, with the aim of achieving sustainable development, increasing the general level of innovation in the society, accelerating knowledge transfer, that is creating and promoting entrepreneurship. The vision of the Faculty is to become recognised in the Central European region as a venue of "good vibrations", a focal point of partnership-and cooperation-based gathering at the international, national and local level, though developing innovative and improving current chemical processes and products.</p>

	<p>The students who complete their undergraduate, graduate and postgraduate programmes at the Faculty will be sought as excellent and broadly educated human resources competent in finding efficient problem solutions within their scope of activity. The public at large will recognise the Faculty as an institution showing corporate social responsibility.</p>
<p>2.3. The HEI systematically monitors the success of the programmes through periodic reviews, and implements improvements.</p>	<p>High level of quality</p> <p>Based on the discussion with the PhD students, the supervisors and the management, the task is fully implemented. It has to be noted that the programme started in 2015 and by the time of the submission of the self-evaluation report only one PhD student has finished in the new programme. Hence, it is difficult to judge on the success of the programme.</p>
<p>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.</p>	<p>High level of quality</p> <p>The self-evaluation reports that the Faculty monitors the work of both the supervisor and the doctoral candidate through annual supervisor's report. The system of public access to doctoral dissertations has been introduced (the Repository of Doctoral Dissertations) in case there are no impediments encountered to the protection of intellectual property or data confidentiality.</p> <p>Based on the feedback from the PhD students, the supervisor and the management, the task is fully implemented.</p>
<p>2.5. HEI assures academic integrity and freedom.</p>	<p>Improvements are necessary</p> <p>The self-evaluation reports that ethical issues are regulated on the university level. In rare cases there have been instances in which the Faculty requested the opinion from the Ethical Council of the University. Also the opinion from the competent Ethics Committee of the School of Medicine of the University of Zagreb is acquired when the scientific investigations within the doctoral programme involve experiments on human tissue.</p> <p>Still, the panel finds this task is not completely implemented. Plagiarism needs to be addressed seriously, and software for testing should be available at the University level.</p>
<p>2.6. The process of developing and defending the thesis proposal is transparent and objective, and includes a public presentation.</p>	<p>High level of quality</p> <p>The self-evaluation reports that the Faculty Council appoints the Commission for Doctoral Dissertation Topic</p>

	<p>Evaluation. The defence is public and announced in line with the regulations on the Faculty's noticeboards and website. After approvals at all verification levels, the topic is approved by the University Senate. All the relevant documentation is made public and available on the Faculty's and the University's websites.</p> <p>The panel finds that the process of developing and defending the thesis proposal is transparent and objective, and includes a public presentation. Therefore, the task is fully implemented.</p> <p>Recommendation for future improvements: The Faculty is suggested to have an international examiner in the public defence.</p>
<p>2.7. Thesis assessment results from a scientifically sound assessment of an independent committee.</p>	<p>High level of quality (with a recommendation to increase thesis writing in English)</p> <p>The self-evaluation reports that the thesis assessment defence includes assessment committee (with at least one member from outside the university) and that it is public. Doctoral student shall have a minimum of one internationally refereed scientific paper published or approved for publication prior to doctoral dissertation defence, which is thematically relevant for their PhD research. The Decision of the Faculty Council includes a supplementary, more rigorous requirement according to which the paper shall be published in a journal cited in the tertiary database of Web of Science (WoS), except in the journals CABEQ (Chemical and Biochemical Engineering Quarterly) and <i>Kemija u industriji</i>. The first of two excluded journals is the official journal of the Faculty and the second one is edited by a member of the Faculty staff. SER states that doctoral dissertations defended in the period from 2011 to 2015 match with 212 papers in WoS, or 220 papers in Scopus. This accounts for 2.56 papers per doctoral dissertation. A doctoral thesis can be written in the form of a scientific monograph or it can be a scientific work based on a number of articles.</p> <p>Based on the discussion with the PhD students, the supervisor and the management, the panel finds this task to be fully implemented.</p> <p>The Faculty is recommended to request PhD theses written in English (including an introduction in Croatian). This can be introduced by the Faculty Council and implemented by</p>

	the Programme Manager.
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.	<p>High level of quality</p> <p>The self-evaluation reports that the Faculty integrates the most important information about the programme of study on its website, in a special directory which concerns the doctoral programme. In addition, the call for enrolment is published. The task is fully implemented.</p>
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 candidates' research is carried out and supported, so that doctoral education can be completed successfully).	<p>High level of quality</p> <p>The self-evaluation reports that 2% of tuition fees are allocated to the University Fund, and 38% of funds are allocated to the Fund for Improvement of the Faculty's Activities, used to finance the procurement of equipment, books and journals, publication of calls, training of employees, capital investments and investment maintenance. 60% of tuition fees are allocated to the Faculty's Fund, used to finance project reviews, grants for employees, students' programmes, etc. SER further states that the costs can be easily linked with ensuring maintenance and improvement of doctoral education even if enhancing the general level of the institution, due to the fact that the students of the doctoral programme are largely employed by the Faculty.</p> <p>The Faculty does not pay the fee for the instructions carried out in the framework of the doctoral programme to its employees or to external associates, nor does it remunerate mentoring.</p> <p>Based on the discussion with the PhD students, the supervisor and the management, the panel finds this task to be fully implemented. Since the tuition fee is decided by the Faculty Council it is in line with the strategy of the Faculty.</p>
2.10. Tuition fees are determined on the basis of transparent criteria (and real costs of studying).	<p>High level of quality</p> <p>The Decision on Determination of Tuition Fees and Costs of Studying in Doctoral Programmes is adopted by the Faculty Council for every academic year. It seems to be transparent since the students are part of the Faculty Council. The tuition fees (HRK 5000 per semester, with a 50% reduction when employed by the faculty as a TA or on an internal project) are low compared to other programmes. Compared to the real cost of studying (personal wages, costs related to use research facilities and consumables)</p>

	the tuition fee is relatively low.
3. SUPPORT TO DOCTORAL CANDIDATES AND THEIR PROGRESSION	
3.1. The HEI establishes admission quotas with respect to its teaching and supervision capacities.	<p>High level of quality (with a recommendation to increase the number of funded projects)</p> <p>The doctoral programme currently involves 66 teachers, 15 of whom are external associates. All of them are potential mentors. Based on positive experiences to the date, the Faculty and the candidates also count on participation of mentors from other research institutions. The number of potential mentors can thus be estimated to be 100 in total. The Report about Periodical Internal Evaluation of Doctoral Programmes of Study foresees the enrolment of a maximum of 40 candidates annually. Still, the Faculty does not enrol more than 15 candidates. The panel suggests increasing the number of PhD candidates through applying for more funding projects.</p>
3.2. The HEI establishes admission quotas on the basis of scientific/ artistic, cultural, social, economic and other needs.	<p>High level of quality</p> <p>Based on stakeholder`s feedback, the panel assess this as high quality. Namely, all the external stakeholders expressed a strong need for PhD graduates during the interviews.</p>
3.3. The HEI establishes the admission quotas taking into account the funding available to the candidates, that is, on the basis of the absorption potentials of research projects or other sources of funding.	<p>High level of quality</p> <p>There are no self-funded projects. The current admission quotas are in line with the available funding.</p>
3.4. The HEI should pay attention to the number of candidates admitted as to provide each with an advisor (a potential supervisor). From the point of admission to the end of doctoral education, efforts are invested so that each candidate has a sustainable research plan and is able to complete doctoral research successfully.	<p>High level of quality</p> <p>Due to the fact that the Faculty enables a high level of support (daily meeting, discussion of results, adjusting of research plans), the panel assess this as high quality.</p> <p>The candidates are working together like a small group with a constructive discussion every day. They are meeting the potential supervisors regularly once a month to discuss the results and they are adjusting the research plan regularly every semester.</p>

<p>3.5. The HEI ensures that interested, talented and highly motivated candidates are recruited internationally.</p>	<p>High level of quality</p> <p>Job openings are advertised in the Croatian language in daily newspapers and in the Official Gazette (Official Journal of the Republic of Croatia), and at the same time in the English language on the web portal Euraxess, in the statutory period of 30 days.</p>
<p>3.6. The selection process is public and based on choosing the best applicants.</p>	<p>High level of quality</p> <p>In the entry interview future doctoral candidates are required to present a clear idea of the field of their future research, to indicate the location where the experimental part of their research could be carried out, to list available equipment and if possible, to nominate their potential mentor.</p>
<p>3.7. The HEI ensures that the selection procedure is transparent and in line with published criteria, and that there is a transparent complaints procedure.</p>	<p>High level of quality</p> <p>Until now there have been no appeals against the decisions. The selection is clear and the applicants have the right to complain. The rejected candidates received negative decisions concerning their enrolment applications with explanation, based on strong reasons to refuse their applications such as unfounded topics or unqualified applicants.</p>
<p>3.8. There is a possibility to recognize applicants' and candidates' prior learning.</p>	<p>High level of quality</p> <p>There is a possibility of recognizing prior learning at the Faculty. The request for the recognition of prior learning along with the necessary documentation needs to be formally submitted by the candidate and is subsequently reviewed by the Council of the Doctoral Programme that determines whether or not the allocation of ECTS points is warranted.</p>
<p>3.9. Candidates' rights and obligations are defined in relevant HEI regulations and a contract on studying that provides for a high level of supervisory and institutional support to the candidates.</p>	<p>High level of quality</p> <p>Based on the feedback of students the panel assess this as high quality.</p> <p>All the candidates are informed on all of their rights and obligations upon admission and they sign that they were informed.</p>
<p>3.10. There are institutional support mechanisms for candidates' successful progression.</p>	<p>Improvements are necessary</p> <p>Based on the number of projects, the panel finds improve-</p>

	<p>ments are necessary in this aspect. There should be a clear decision by the management on how to improve this.</p> <p>The funding from the University is not sufficient to cover all the publication fees and attending international conferences for all the candidates. Therefore, some of the candidates are facing difficulties to share their work with the scientific world.</p> <p>The Faculty is encouraged to plan how to increase applications for more project funding, publishing papers in open-access international journals and attending more international conferences for candidates.</p>
4. PROGRAMME AND OUTCOMES	
4.1. The content and quality of the doctoral programme are aligned with internationally recognized standards.	<p>Improvements are necessary</p> <p>The programme offers too large a number of courses considering the low number of total doctoral students involved, resulting in a significant number of cases in a one-to-one based course. The programme is very broad and fragmented and needs to be restructured. It is recommended to merge courses (clustering) and to offer research-oriented courses on a PhD level, nowadays a common practice in internationally high-standard doctoral programmes.</p>
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.	<p>High level of quality (with a recommendation to reinforce ethical issues in conducting research)</p> <p>Overall, learning outcomes for the programme are clearly designed in accordance with the level 8.2. of the Croatian Qualifications Framework (CroQF) describing the competences and skills to be developed by the doctoral candidates. These involve scientific and technological development of new knowledge, integrating multidisciplinary fields, and also include personal, social and professional aspects R&D activities. With improvements of some ethical issues of quality assurance, the panel assess this as high quality.</p>
4.3. Programme learning outcomes are logically and clearly connected with teaching contents, as well as the contents included in supervision and research.	<p>High level of quality (with a recommendation to update courses with topics on most recent research)</p> <p>The self-evaluation report states that doctoral students select compulsory and elective courses during enrolment, based on a previous agreement with the counsellor or men-</p>

	<p>tor, and with assistance of a Programme Manager and Vice Dean for Science and International Cooperation, to suit them best. In this way, all learning outcomes at the level of the curriculum are interwoven and consistent.</p> <p>Based on the self-evaluation report and on the discussion with PhD students, there is a clear connection between the teaching contents, supervision and research within the programme and the programme learning outcomes.</p> <p>The Faculty is recommended to include topics on new trends of science in the course contents, when performing the course clustering.</p>
<p>4.4. The doctoral programme ensures the achievement of learning outcomes and competencies aligned with the level 8.2 of the CroQF.</p>	<p>Improvements are necessary</p> <p>SER states that the programme is structured and organized to enable the achievement of the clearly defined learning outcomes appropriate for the level of 8.2. of the CroQF. However, as there is only one example of thesis coming out of this programme and it is written in Croatian, it is difficult to evaluate its intrinsic quality and to what extent the dissertation directly links to any of the eight learning outcomes. The achievement and the evaluation of learning outcomes at this level should be internationalized.</p> <p>The recommendation in criterion 2.7 is also applicable here. The inclusion of more courses or workshops on ethical issues is recommended.</p>
<p>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.</p>	<p>High level of quality</p> <p>Topics and teaching methods are, according to the feedback of the PhD students, delivered at an advanced level and not a mere repetition of master or undergraduate courses. The programme presents a good harmonization between learning outcomes (aligned with level 8.2 of the CroQF) and ECTS structure.</p> <p>Based on the self-evaluation report, the feedback from the PhD students and the supervisors, the task is fully implemented.</p>
<p>4.6. The programme enables acquisition of general (transferable) skills.</p>	<p>High level of quality</p> <p>The project of Modernising Doctoral Education through Implementation of the Croatian Qualifications Framework</p>

	<p>(MODOC)47 implemented by the University, and co-funded by the European Union, helped in developing workshops in which doctoral students were able to acquire generic competences. The Faculty informed its doctoral students about them and some of the students completed the training successfully. The Council of the Doctoral Programme of Study recognised the workshops as a basis for acquisition of ECTS credits.</p> <p>Based on the self-evaluation report, on the feedback from the PhD students and from the stakeholders who gave a strong positive opinion on the generic skills acquired, the task is fully implemented. The Faculty offers courses on transferable skills attended by the PhD candidates.</p>
<p>4.7. Teaching content is adapted to the needs of current and future research and candidates' training (individual course plans, generic skills etc.).</p>	<p>High level of quality</p> <p>SER states that usually up to 20 students are enrolled per year, each of them able to select their portfolio of compulsory and elective courses. Teachers commonly seek to find a topic from their course closest to the field of the future research of the doctoral student and to achieve desired learning outcomes through individual work with the doctoral student, in the form of seminars and consultations.</p> <p>Based on the self-evaluation report, on the feedback from the PhD students and supervisors, the task is fully accomplished.</p>
<p>4.8. The programme ensures quality through international connections and teacher and candidate mobility.</p>	<p>Improvements are necessary</p> <p>This task is not fully implemented. Two major procedures are recommended to the Faculty to increase the level of internationalisation:</p> <ul style="list-style-type: none"> i) To apply for more EU projects and to use all channels to increase the number of funded projects; and ii) To request PhD theses written in English (including an introduction in Croatian).

*** 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.

