



**Report  
of the Expert Panel  
on the REACCREDITATION  
of the University Postgraduate (Doctoral) Programme**

***Biotechnology and Bioprocess Engineering, Food Technology and  
Nutrition Science***

**Faculty of Food Technology and Biotechnology, University of Zagreb**

**Date of the visit:**  
*June 6<sup>th</sup>, 2016*

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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 Biotechnology and Bioprocess Engineering, Food Technology and Nutrition Science on the basis of the Self-Evaluation Report of the Programme, other documentation submitted and a visit to the Faculty of Food Technology and Biotechnology, 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 for the Cluster of Biotechnology:

- Professor Hans Thordal-Christensen, Department of Plant and Environmental Sciences, University of Copenhagen, Kingdom of Denmark, President of the Expert Panel,
- Dr. sc. Vesna Miličič, Biotehnoška fakulteta, Univerza v Ljubljani, Republic of Slovenia,
- Professor Marketta Sipi, Faculty of Agriculture and Forestry, University of Helsinki, Republic of Finland,
- Professor Jürgen Pretzsch, Dresden University of Technology, Federal Republic of Germany,
- Professor Susanne Knøchel, Faculty of Science University of Copenhagen, Kingdom of Denmark,
- Professor Claes Niklasson, Chalmers University of Technology, Sweden,

- Professor Colette Fagan, University of Reading, United Kingdom of Great Britain and Northern Ireland,
- Hynek Roubík, doctoral candidate, Faculty of Tropical AgriSciences, Czech University of Life Sciences Prague, Czech Republic,
- Prateek Mahalwar, doctoral candidate, Max Planck Institute for Developmental Biology, Tuebingen, Federal Republic of Germany,
- M. Sc. Kathirvel Alagesan, doctoral candidate, Max Planck Institute of Colloids and Interfaces, Federal Republic of Germany.

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

- Professor Colette Fagan, University of Reading, United Kingdom,
- Professor Susanne Knøchel, Faculty of Science University of Copenhagen, Kingdom of Denmark,
- Professor Claes Niklasson, Chalmers University of Technology, Sweden,
- M. Sc. Kathirvel Alagesan, doctoral candidate, Max Planck Institute of Colloids and Interfaces, Federal Republic of Germany.

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

- Frano Pavić, coordinator, ASHE,
- Lida Lamza, 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 (Dean, Vice Deans),
- Head of PhD programme,
- Doctoral candidates,
- Supervisors,
- Alumni and External stakeholders.

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

## ***SHORT DESCRIPTION OF THE STUDY PROGRAMME***

Name of the study programme contained in the licence: Biotechnology and Bioprocess Engineering, Food Technology and Nutrition Science

Institution providing the programme: University of Zagreb

Education provider(s): Faculty of Food Technology and Biotechnology, University of Zagreb

Place of delivery: Zagreb

Scientific area and field: Biotechnical Sciences; fields: Biotechnology, Food Technology, Nutrition Science and Interdisciplinary Biotechnical Sciences

Learning outcomes of the study programme:

Upon the study completion, a PhD candidate shall be able to:

1. Demonstrate systematic knowledge in the field of science covered by the study curriculum and master research skills and methodology of relevance for this field of science:
  - a) As for the field of Biotechnology: systematic understanding and mastering of science research skills and Biochemical Engineering techniques, managerial skills needed for biotechnological processes management (Bioprocess Engineering), as well as skills falling within the Genetic Engineering, Industrial Microorganisms' Physiology and Microbial Ecology domains.
  - b) As for the field of Food Technology: systematic understanding and mastering of science research skills and Food Process Engineering techniques, technological processes employed with food production, food quality control and food safety.
  - c) As for the field of Nutrition Science: systematic understanding and mastering of science research skills and Nutrition Science techniques, food biochemistry, biochemical changes taking place within the food and human nutrition status.
2. Contribute to the dissemination of the existent knowledge by virtue of implementation of the research process through the preparation of an experimental part of his/her PhD thesis falling into the field of: 4.04 Biotechnology, 4.05 Food Technology, 4.06 Nutrition Science, or 4.07 Interdisciplinary Biotechnical Sciences.
3. Publish original results of the implemented research in internationally recognised journals in form of original contribution.
4. Exercise criticism in analysis, validate and implement a synthesised corpus of novel and complex ideas emerging in the field of interest for the science research carried out to the effect of preparing a PhD thesis.
5. Communicate with peers, broader scientific community and broader social community about the field of his/her expertise embraced by the domain tackled by the PhD research.
6. Promote the development of novel techniques, ideas and approaches based on experience gained during own science research carried out to the effect of preparing a PhD thesis.
7. Develop high-quality generic and transfer skills necessary for delivering opinion statements on and reaching conclusions about issues that imply scientific and ethical integrity

Number of doctoral candidates: 92

Number of teachers: 92

Number of supervisors: 40 (92 potential)

## ***SUMMARY***

The Expert Panel visited the Faculty of Food Technology and Biotechnology, University of Zagreb for a full day on the 6<sup>th</sup> of June 2016, and had time to talk to management, the head of the PhD programme, students and supervisors/mentors within the programme and alumni. All members of the Panel also read carefully all of the documents provided by the Croatian Agency for Science and Higher Education. The Panel was met with great hospitality and professionalism during their visit, which significantly helped in the evaluation of the programme. There is an ambition and expectation of being an elite institution in a Croatian context and a recognized university faculty in an international context. Overall, the impression of the PhD programme is positive: the supervisors are supporting/supervising the PhD students with enthusiasm and ambition; the students entering the programme must be considered as talented and very hardworking early-stage of career researchers; and many researchers in the Faculty have strong and varied competencies in relevant and important research areas.

The research is a mixture of applied science and some more basic technology projects. In general, the journals used for publishing are appropriate for the research area, but publications in some higher impact journals would strengthen the international visibility. Both the management and the research staff are aware of this important quality metric. The Expert Panel also observed that the publication and citation rate per year is increasing rapidly, which does bode well for the future research potential of the Faculty. The supervisors seem to be well qualified in terms of publications within their applied area of research.

The laboratory facilities and equipment must be generally considered of good quality, although there is a need to update in some areas. Strategic planning on how to fund updating and extension of key research equipment is necessary, whether through national or international programs.

The Panel considered the students recruited to the programme to be highly motivated and qualified. They are mainly recruited nationally, but from all parts of Croatia. The programme seems to be organized in a clear and transparent manner, with high quality and clear aims and goals. However, the structure could be improved by greater flexibility in compulsory courses, and greater coverage of research ethics for all students. Additionally, external assessment procedure for the final quality assurance of the final thesis can be improved in terms of publications, and by incorporating international external assessors. It is recognized that this involves both language and financial issues.

The existing cooperation with society and industry is good, but can be further developed.

As a general conclusion considering the PhD programme at the Faculty of Food Technology and Biotechnology of the University of Zagreb, it must be stated that the PhD programme is of high to very high standard, ambitious and, in many ways, a very successful programme. As with similar programmes all over the world, there are challenges to be met and there are also opportunities to develop the programme in a positive way. Internationalization is the key to the ambition to close the gap to the higher ranking institutions in Europe. For this, the Faculty needs to have

long term ambition, and seek to improve in publications in high impact journals, increase international exchange of students and teachers/researchers, and strengthen the research funding from external resources.

### ***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: (leave what is recommended, delete the rest):

**issue a confirmation on compliance for performing parts of activities.**

### ***RECOMMENDATIONS FOR THE IMPROVEMENT OF THE STUDY PROGRAMME***

#### 1. Internationalization:

- Facilitate greater incentives for publishing in highly ranked international journals and participating in international collaborations.
- Increase the number of international students and mentors/co-mentors.
- Create a more international study environment in terms of ease of availability of all documents, regulations, etc. in English.
- Incorporate greater input from international research society into the PhD quality assurance process through acquiring their input on research plans and final thesis quality.
- Accepted publications in peer-reviewed journals should be included as an appendix or integrated in the PhD thesis.
- Create incentives and reduce barriers for PhD students and postdoctoral researcher studying and working abroad to be reintegrated back into Croatian universities.

#### 2. Quality assurance:

- The thesis defence procedure can be strengthened by input from the international research community through the addition of international external examiners in thesis assessment. In addition, plagiarism checks should be carried out on thesis, but this would require the thesis to be submitted in English.
- Strive for publications in high impact peer reviewed journals.

#### 3. Course content:

- More courses taught in English (projects, and so on) should strengthen the internationalization allowing foreign students to follow the programme.

- Research ethics should be included in compulsory courses early in the programme, for example in an introductory course to ensure all students regardless of background have a strong understanding of key challenges in this area.

### ***ADVANTAGES OF THE STUDY PROGRAMME***

1. A very close cooperation between candidates and the supervisors results in excellent team work, with a strong emphasis on building individual competence.
2. Strong support from University, Faculty management and Head of PhD programme.
3. Transparent and quality assured contract (expectations, obligations for every part) on what is required from each partner, i.e. faculty, head of programme, management, and candidates.
4. Recruitment of excellent students nationally.

### ***DISADVANTAGES OF THE STUDY PROGRAMME***

1. Limited opportunities for international collaboration, including broader recruitment of international students and academics.
2. Limited scope and delayed access to international journals through available library resources.
3. Some laboratory equipment and facilities requires upgrading or replacing.
4. Lack of formalised training in research ethics.

### ***EXAMPLES OF GOOD PRACTICE***

1. Transparent application procedures of the PhD programme, with appropriate quality assurance.
2. Positive, ambitious and high quality faculty members who continuously assess the progress of their PhD students.
3. The range of available laboratory facilities within the Faculty.
4. A range of university workshops offered in areas such as commercialisation, preparation of publications, etc.

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

<b>Minimal legal conditions:</b>	<b>YES/NO notes</b>
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.	<b>YES</b>
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).	<b>YES</b>
HEI employs a sufficient number of researchers, as defined by Article 7 of the Ordinance on Conditions for Issuing Licence for Scientific Activity, Conditions for Re-Accreditation of Scientific Organisations and Content of Licence (OG 83/2010).	<b>YES</b>
3. 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).	<b>YES</b>
4. Student: teacher ratio at the HEI is below 30:1.	<b>YES</b>
5. HEI ensures that doctoral theses are public.	<b>YES</b>
6. 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.	<b>YES</b>
<b>Additional/ recommended conditions of the ASHE Accreditation Council for passing a positive opinion</b>	<b>YES/NO notes</b>
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.	<b>YES</b>
2. In the most recent reaccreditation, HEI had the standard Scientific and Professional Activity marked as at least "partly implemented" (3).	<b>YES</b>
3. The doctoral programme is aligned with the HEI's research strategy.	<b>YES</b>
4. The candidate : supervisor ratio at the HEI is not above 3:1.	<b>YES</b>
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); 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; e) trained for the role before assuming it (through workshops, co-supervisions etc.);	<b>YES</b>

f) received a positive opinion of the HEI on previous supervisory work.	
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 (table 1, Teachers).	<b>YES</b>
7. The supervisor normally does not participate in the assessment committees.	<b>YES</b>
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.	<b>YES</b>
9. For joint programmes and doctoral schools (at the university level): 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; at least 80% of courses are delivered by teachers employed at HEIs within the consortium.	<b>N. A.</b>

## QUALITY ASSESSMENT

	<b>QUALITY ASSESSMENT AND THE EXPLANATION OF THE EXPERT PANEL</b>
<b>1. RESOURCES: TEACHERS, SUPERVISORS, RESEARCH CAPACITIES AND INFRASTRUCTURE</b>	
1.1. HEI is distinguished by its scientific/ artistic achievements in the discipline in which the doctoral study programme is delivered.	<p><b>High level of quality</b></p> <p>A Web of Science search of publications affiliated with the Faculty of Food Technology revealed that 181 paper were published between 2011 and 2016. Although the average publication rate per teacher is not high, the publication and citation rate per year is increasing rapidly. Many publications are in internationally recognised journal. Members of the faculty are involved in the organisation of national &amp; international meetings.</p>
1.2. The number and workload of teachers involved in the study programme ensure quality doctoral education.	<p><b>High level of quality</b></p> <p>More than 50% of the programme is delivered by its own faculty. Management stated that they monitored the workload and discussed it with staff.</p>
1.3. The teachers are highly qualified researchers who actively engage with the topics they teach, providing a quality doctoral programme.	<p><b>High level of quality</b></p> <p>There is a requirement of mentors to publish at least 3 papers in 5 year. Papers are published in recognised international journals. Web of Science shows an acceptable number of papers per supervisor per year during the period 2011-2016.</p>
1.4. The number of supervisors and their qualifications provide for quality in producing the doctoral thesis.	<p><b>High level of quality</b></p> <p>The programme has a sufficient number of supervisors (with candidate: supervisor* ratio below 3:1) with a number of quality publications relevant for the programme area and field. The involvement of a co-supervisor is possible where needed.</p>
1.5. The HEI has developed methods of assessing the qualifications and competencies of teachers and supervisors.	<p><b>High level of quality</b></p> <p>The programme has established formal mechanisms of assessing and monitoring the qualifications and competencies of supervisors, based on the requirement of mentors to have published at least 3 papers in recognised international journals within 5 year in a relevant field. According to the SER, all first-time supervisors are now</p>

	required to follow a training workshop.
1.6. The HEI has access to high-quality resources for research, as required by the programme discipline.	<p><b>Improvements are necessary</b></p> <p>There is a limitation in available literature resources, primarily as access to recently published (post-2012) journal articles. Furthermore, the number of journal titles available has been reduced over the last few years. Although various non-conventional ways are being explored to overcome this serious problem, it is very important to have reliable access to updated scientific literature. The Ministry needs to consider this as an area for improvement.</p> <p>Although the area of Faculty's interest covers a very important part of the Croatian economy (according to the strategy papers), there has been limited opportunity to buy modern equipment. There is a need to both update the existing and purchase new research equipment in several areas. The Panel recommends that the Faculty and the Ministry develop a strategy to ensure that state-of-the-art equipment is available in key strategic research areas.</p>
<b>2. INTERNAL QUALITY ASSURANCE OF THE PROGRAMME</b>	
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><b>High level of quality</b></p> <p>The PhD programme recently underwent a thorough analysis which included social, academic and economic needs of the community. This has led to a restructuring which should lead to higher quality and better use of resources.</p>
2.2. The programme is aligned with the HEI research mission and vision, i.e. research strategy.	<p><b>High level of quality</b></p> <p>The documents provided did not allow the Panel to assess more specific strategic research goals in detail. The English summary provided had focus on more international visibility, more EU funding, more interaction with the industry and society, as well as integration of research and teaching, but did not point out specific key research areas.</p> <p>We observed that the Faculty has recently established an industrial advisory board in order to create stronger interaction with the food industry.</p> <p>According to the documents provided, the programme with its research lines must be considered in alignment with the overall strategy.</p>

<p>2.3. The HEI systematically monitors the success of the programmes through periodic reviews, and implements improvements.</p>	<p><b>High level of quality</b></p> <p>A University review of the programme has taken place. As an example, the Faculty has merged and revised the programme based on the results of previous reviews.</p> <p>There is a systematic and continuous monitoring and analysis of research productivity of supervisors and candidates.</p> <p>There seems to be very few dropouts. However, it seems generally difficult to collect exact data on finalisation of the PhD students since they may study for extended periods in parallel with other tasks in or outside the University. It is recognized and mentioned in the SER that associate PhDs may find it difficult to fulfil their commitments at the workplace and at the same time progress in the PhD programme.</p> <p>There are formalised feedback systems in place for students and mentors regarding progress, the support provided by the HEI, or reasons to drop out.</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><b>High level of quality</b></p> <p>Students have the option to change supervisor and topic. All relevant forms related to monitoring and progression of the PhD study can be found on-line:</p> <p><a href="http://www.unizg.hr/istrazivanje/doktorski-studiji/doktorski-studiji/obraci-dr-sc-dr-art/scientific-areas-dr-sc/">http://www.unizg.hr/istrazivanje/doktorski-studiji/doktorski-studiji/obraci-dr-sc-dr-art/scientific-areas-dr-sc/</a>.</p>
<p>2.5. HEI assures academic integrity and freedom.</p>	<p><b>High level of quality</b></p> <p>The Faculty has procedures that assure academic integrity and freedom of research. The University has adopted a Code of Ethics which should be familiar to faculty members and passed on to PhD students. It was, however, the impression of the Panel that alumni and students had no formal introduction to research ethics.</p> <p>If plagiarism checking software has not been introduced, which was unclear to the Panel, it is recommended that it is introduced where possible.</p>
<p>2.6. The process of developing and defending the thesis proposal is transparent and objective, and includes a public presentation.</p>	<p><b>High level of quality</b></p> <p>According to the Committee for the implementation of the procedure of reaccreditation of university postgraduate doctoral study, the Faculty does have all these forms, templates and procedures written down through very detailed University procedures, and in this aspect they surely comply.</p>

<p>2.7. Thesis assessment results from a scientifically sound assessment of an independent committee.</p>	<p><b>Improvements are necessary</b></p> <p>The Faculty has in place procedure for defending the doctoral thesis. The Faculty also provided templates for thesis preparation on the above mentioned website. The procedure was summarised in the SER. For defence of the thesis, an internal pre-approval is first conducted before a final evaluation committee is appointed. The mentor is not part of the final evaluation committee, which can consist of 3 or 5 members where one has to be outside the “frame of education”/Faculty. The Panel suggests that the independence of the evaluation panel could be further strengthened with a majority coming from outside Faculty. Due to language and financial barriers there have been limited opportunities for international members of the committees. It is a further barrier to internationalisation that defences given in English require translation by a certified translator who has to be paid for by the PhD applicant.</p> <p>Candidates are required to have at least one publication in a peer-reviewed journal prior to submitting their thesis. Students did have the opportunity to submit their thesis in different formats and one example was given of a thesis where the papers were integrated in the thesis.</p>
<p>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>	<p><b>High level of quality</b></p> <p>The Faculty publishes all necessary information on the study programme, admissions, delivery and conditions for progression and completion on its website.</p>
<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>	<p><b>Improvements are necessary</b></p> <p>It was stated that 30% of tuition goes into the development of Faculty activities and 70% goes into equipment maintenance, service and overheads. The Faculty furthermore has a specified “price list” of the various services such as application, evaluation of proposal, defence etc.</p> <p>Few PhD students seem to have dedicated money for experimental work due to specific project funding by Croatian Science Foundation or EU. For the majority of the PhD students and their research projects, it was not quite clear to the Panel how the funds for their research projects are distributed and how priorities are determined at the</p>

	<p>operational level.</p> <p>It should be noted that lack of funds to carry out basic day to day activities was not identified as a major problem among the students interviewed and the issue of funding is also part of the pre-appraisal of the topic chosen. It is, however, recommended that the Faculty provides more transparent criteria for how it financially supports experimental research activity.</p>
<p>2.10. Tuition fees are determined on the basis of transparent criteria (and real costs of studying).</p>	<p><b>Improvements are necessary</b></p> <p>The Faculty predominately determines the level of tuition fees on the basis of market competitiveness and they benchmark themselves against other programmes. There seems to be no obvious correlation between tuition fee and the actual cost of carrying out the research.</p>
<p><b>3. SUPPORT TO DOCTORAL CANDIDATES AND THEIR PROGRESSION</b></p>	
<p>3.1. The HEI establishes admission quotas with respect to its teaching and supervision capacities.</p>	<p><b>High level of quality</b></p> <p>The HEI/programme offers a high quality admission policy considering the following: The number of available supervisors and their teaching workload is well within the limits of the existing legal thresholds. Total teaching load of lecturers engaged in the PhD studies is appropriate and amounts to 300 - 400 norm hours (Table 1 in the Self-Evaluation Report). The (potential) mentor/PhD ratio seen across the faculty is 1:1. The Board in charge of PhD studies monitors the workload and successfulness of the mentor, and keeps track on the number of entrants into PhD studies and the number of PhD candidates who have successfully defended their PhD theses.</p>
<p>3.2. The HEI establishes admission quotas on the basis of scientific/ artistic, cultural, social, economic and other needs.</p>	<p><b>High level of quality</b></p> <p>It appears that all most every single PhD graduate is employed either in academic positions or industrial positions both in Croatia and abroad. It was mentioned that large parts of the food industry do not yet apply for employees with a PhD, but the growing complexity of food processing will make it necessary to have better educated staff.</p>

<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>	<p><b>High level of quality</b></p> <p>The admitted candidates research is funded either by the Faculty, by various research projects or by the associate PhDs and their companies or institutions. The faculty members constantly apply for different sources nationally and internationally for external funding of projects means. The number of accepted candidates for the PhD programs is fitting considering the financial situation at the Faculty. Panel recommends that more emphasis should be given to European cooperation projects with EU framework for future research cooperation.</p>
<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>	<p><b>High level of quality</b></p> <p>Upon admission of the PhD candidate, the programme coordinator assumes the role of study counsellor for the PhD student. After admittance, the PhD research topic is approved, and mentor is appointed based upon the qualification and area of expertise. A mentor for PhD research is assigned to the PhD candidate in agreement with the student by the Board in charge of PhD studies. The entire admittance process is overseen by both the Faculty Council and the Board. It should also be noted that entire process is transparent. The overall ratio of potential mentors and PhD students is 1:1 which is very reasonable in terms of capacity.</p>
<p>3.5. The HEI ensures that interested, talented and highly motivated candidates are recruited internationally.</p>	<p><b>High level of quality</b></p> <p>The call for the PhD programme is made public both in the media and in the Faculty and University site at least a month before the start of the programme. As a criterion for admission, it is mandatory that the student's grade is not less than 3.51 in undergraduate studies and not less than 3.71 in graduate studies. The official language policy including the financial requirements for e.g. translation of defence must be regarded as a barrier to international recruitment.</p>
<p>3.6. The selection process is public and based on choosing the best applicants.</p>	<p><b>High level of quality</b></p> <p>See 3.5. In addition, a potential student is admitted to the PhD program after careful evaluation of their graduate studies, interest in research, publication, reference letter. Furthermore, all shortlisted candidates are interviewed before being accepted into the program.</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><b>High level of quality</b></p> <p>Applicants are informed about the outcome of their application in writing.  Applicants who were not qualified for the programme can appeal against the decision within 15 days.  Entire selection process is transparent where at the end of the selection process, the names of the candidates selected for the programme, their qualifications and the names of their referees is made public.</p>
<p>3.8. There is a possibility to recognize applicants' and candidates' prior learning.</p>	<p><b>High level of quality</b></p> <p>The HEI has established a quality procedure (e.g. has an ordinance) of recognizing prior learning and achievements relevant for the doctoral programme, e.g. recognition of ECTS from a master or another doctoral programme (began, or completed), publications etc., as well as non-formal and informal learning. The procedure is launched upon applicant's request, and based on clear criteria/procedures.  See 3.10 (ECTS credit points for conference and publications).</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><b>High level of quality</b></p> <p>During PhD theses preparation, in addition to mentor's guidance, baseline guidance is made available for the students to familiarise about various support available for them.  On entering the PhD programme, a contract is being signed, and interviews with the students show that this contract process is transparent and that are satisfied with all aspects of it.  In addition, accepted candidates are very well informed about their rights and obligations. For example: 1) progress made during the PhD studies is monitored by mandatory annual report submitted by the student to the Faculty Council. Furthermore, PhD student is obligated to publish their research work in peer reviewed Journal. 2) PhD student is allowed to change the topic and or mentor once.  There is also an option that in case of any ambiguous issues or request arising for a student can be communicated to the Board in charge and resolved.</p>
<p>3.10. There are institutional support mechanisms for candidates' successful progression.</p>	<p><b>High level of quality</b></p> <p>Students are obliged to publish in scientific journals and their progress is being monitored in annual reports.</p>

	<p>Students are encouraged to participate and attend international conferences. Based upon the records provided and the interview with the faculty &amp; students, it is noted that on an average each PhD students attend at least one conference per year.</p> <p>Based upon the records, a total of 42 research fellows (PhD candidates) are co-funded by several research projects coordinated by the FFTB. In addition, some PhD candidates are employed within the private sector.</p>
<p><b>4. PROGRAMME AND OUTCOMES</b></p>	
<p>4.1. The content and quality of the doctoral programme are aligned with internationally recognized standards.</p>	<p><b>High level of quality</b></p> <p>The quality is assessed on the basis of the programme as it is delivered to the Panel.</p> <p>The programme provides for at least three years of independent research experience with a publication covering original work in a journal with impact factor higher than 0.5 as a minimum requirement for submission of a thesis for evaluation. There are elective courses, so the teaching part can be based on the needs of the candidates' research and enable them to acquire generic (transferable) skills and international experience.</p> <p>The methods and procedures of the programme are generally comparable to internationally recognized standards. However, the format of the theses in terms of language (mainly Croatian) and the composition of the thesis evaluation board (only 1 in 3 or 5 required to be outside faculty) does not ensure an international component in the evaluation procedure. The Panel recognizes that these issues may have to be resolved at higher than Faculty levels.</p>
<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>	<p><b>High level of quality</b></p> <p>The Expert Panel found that specific research competences and technical competences are aligned with recognized standards. There has been less emphasis on several soft skills and although some of these skills may be acquired in the process, the different backgrounds and working situation of the candidates (university, private sector etc.) may call for a more formalized training in areas such as ethical science issues, project management etc. for different groups of candidates. It is very positive that targeted workshops are now being available at the University level.</p>

<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>	<p><b>High level of quality</b></p> <p>SER and interviews with candidates (and alumni) clarified that learning outcomes are generally clearly connected with individual courses, supervisory work and research.</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><b>High level of quality</b></p> <p>The programme has accurate and transparent procedures for quality assurance. The initial choice of topic has to be defended and progress reports are obligatory. It was not possible for the Panel to assess the general quality of the theses per se, since these are mainly written in Croatian. The five theses presented in English were of good to very good standard. The work in these was partly or mainly conducted in international collaboration settings. The average output of publications indicate that the learning outcome and competences are aligned with the expectations for independent planning, execution and writing up of scientific work.</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><b>High level of quality</b></p> <p>The teaching methods are mainly based on laboratory work and discussions with the mentor. Supervision of candidates working outside the Faculty is mainly done through emails and specific counselling days. The PhD candidates have opportunities to present seminar papers in many of the courses offered. A previous, more formalized system with monthly presentations to strengthen public speaking and presentation skills have ceased to function. According to the SER, a number of workshops offered by the University are now open to PhD students based on application; these workshops cover presentation, networking, paper publishing and other soft skills.</p>
<p>4.6. The programme enables acquisition of general (transferable) skills.</p>	<p><b>Improvements are necessary</b></p> <p>It was observed that there is limited compulsory training of non-subject specific research skills, in particular research ethics including plagiarism, fraud and the increasing number of non-serious journals. It is recognized that students are entering with different backgrounds in terms of academic and industrial experience. Hence while their needs differ it is important that all PhD students in general have reflected on science ethics. It is recommended that all students go through an</p>

	introduction in this area, unless the students already possess a thorough understanding of the topic.
4.7. Teaching content is adapted to the needs of current and future research and candidates' training (individual course plans, generic skills etc.).	<p><b>Improvements are necessary</b></p> <p>The challenges faced in this area result from the variation in background knowledge of the PhD students. While it was clear the some have benefited from the required courses, those that already had a solid undergraduate background in the area felt they did not see the benefit of attendance at certain courses.</p> <p>It is recommended to review compulsory course offerings based on student feedback and to offer greater flexibility to students with demonstrated strength in those areas.</p>
4.8. The programme ensures quality through international connections and teacher and candidate mobility.	<p><b>Improvements are necessary</b></p> <p>The management strongly supports research staff mobility and also the students in obtaining international experience within the economic constraints. A number of students either had or planned to spend part of their programme abroad. In addition, a number of theses were available which demonstrated student mobility. In recent years, the Erasmus program has enabled many to have stays in other European laboratories, and the projects funded by Croatian Science Foundation often include funding for external visits. The Faculty has had some international collaboration, but there is still very limited opportunity to attract long term international staff and to have researchers coming for a limited time.</p>

## **\* 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.