Report of the Expert Panel
on the REACCREDITATION
of the University Postgraduate (Doctoral)
Programme in *Biomedicine and Health Sciences* of
The School of Medicine
University of Zagreb

Date of the visit:
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CONTENTS

INTRODUCTION

The Expert Panel appointed by the Agency for Science and Higher Education (ASHE) created this Report on the re-accreditation of the university postgraduate (doctoral) programme in Biomedicine and Health Sciences of The School of Medicine, University of Zagreb on the basis of the Self-Evaluation Report of the programmes, other documentation submitted and a visit to The School of Medicine, 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:

1. Prof. Michael Drinnen, Newcastle University/Freeman Hospital, UK
2. Prof. Albert Selva O'Callaghan, Autonomous University of Barcelona/ Hospital Universitari General Vall d'Hebron, Spain
3. Prof. Gernot Riedel, Aberdeen University, UK
4. Arturo Moncada Torres, doctoral student, KU Leuven, Belgium
5. Dr. Senthil.Kaniyappan, postdoctoral researcher, Max Planck Institute of Metabolism Research and DZNE (German Centre for Neurodegenerative Diseases), Germany
6. Dr. Patrycja Kozik, Group Leader, MRC Laboratory of Molecular Biology, Cambridge Biomedical Campus, Cambridge University, UK
7. Prof. Peter Hylands, King's College London, UK
8. Prof. Gonzalo Herradón, University CEU San Pablo, Spain

9. Marcin Ciszewski, doctoral student, Medical University of Łódź, Poland Prof. Gábor Gerber, Semmelweis University, Hungary
10. Prof. Robert Allaker, Barts and The London School of Medicine and Dentistry, Queen Mary University of London, UK
11. Prof. Pedro Sousa Gomes, University of Porto, Portugal
12. Prof. Daniel W Lambert, University of Sheffield, UK Prof. Zdenek Broukal, Charles University, Czech Republic
13. Nemanja Sarić, doctoral student, King's College London, UK
14. Prof. Suzanne Held, University of Bristol, UK
15. Prof. David Sargan, University of Cambridge, UK
16. Vitalina Drobnytska, doctoral student, University of Greenwich, UK.

The School of Medicine, University of Zagreb was visited by the following Expert Panel members:

- Prof. Michael Drinnan, Newcastle University/Freeman Hospital, UK
- Prof. Albert Selva O'Callaghan, Autonomous University of Barcelona/ Hospital Universitari General Vall d'Hebron, Spain
- Prof. Gernot Riedel, Aberdeen University, UK
- Dr. Patrycja Kozik, Group Leader, MRC Laboratory of Molecular Biology, Cambridge Biomedical Campus, Cambridge University, UK
- Dr. Senthil Kaniyappan, postdoctoral researcher, Max Planck Institute of Metabolism Research and DZNE-German Centre for Neurodegenerative Diseases, Germany
- Arturo Moncada Torres, doctoral student, KU Leuven, Belgium

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

- Davor Jurić, coordinator, ASHE
- Emita Blagdan, coordinator, ASHE
- Marina Matešić, coordinator, ASHE
- Đurđica Dragojević, ASHE, interpreter at the site visit

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

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

The Expert Panel also had a tour of:

- Neurosciences building
- Histology lab

SHORT DESCRIPTION OF THE STUDY PROGRAMME

Name of the study programme contained in the licence:
Postgraduate University Programme in Biomedicine and Health Sciences
Institution providing the programme: University of Zagreb, School of Medicine
Education provider: University of Zagreb, School of Medicine
Place of delivery: The School of Medicine of the University of Zagreb, in cooperation with clinical and outpatient health care institutions and scientific-research institutions with which the School has signed an agreement on cooperation
Scientific area and field: Biomedicine and Health Sciences

Learning outcomes of the study programme *Postgraduate University Programme in Biomedicine and Health Sciences*:
Programme educates scientists/researches, who, over the study programme as a whole, must attain the following specific competences and appropriate, measurable outcomes of their studies, pursuant to 8.2 level of the CROQF (the Croatian Qualifications Framework):
1. to create, design, apply and adopt the process of independent, original scientific-research (competence 1.) The measurable learning outcome at the CROQF level 8.2, related to competence 1: by their own recognisable contribution to research for their doctoral theses, they create new knowledge (completely new, supplementing existing or refuting existing), create new methods, and invent new approaches, instruments or materials which will lead to moving the frontier in the field of the research of the doctorate.
2. to understand systematically the relevant scientific facts, monitor and understand the latest insights in the field of research of the doctorate, systematically to develop and adopt the most up-to-date methods and skills in the field of the science of interest for the Doctorate, and to use the knowledge and skills acquired to resolve complex scientific research problems (competence 2.). The measurable learning outcome at the CROQF level 8.2, related to competence 2: to use advanced, highly specialized knowledge and skills independently, in order to develop new, original ideas, theories, facts and procedures, in the field of scientific interest.
3. to take on, independently, professionally and with academic integrity, professional, ethical and social responsibility when planning and conducting scientific research, as well as after completing the research, which includes taking responsibility for the scientific success and social usefulness of the results of the research from the doctorate (competence 3). The measurable learning outcome at CROQF level 8.2, related to competence 3: to develop personal, professional and ethical authority at a level appropriate for all that is required for publishing the results of research in scientific publications with international reviews, in the field of research of the doctorate.
4. to communicate in a socially acceptable manner with individuals and groups with different convictions and opinions, both within the scientific-academic community and their own profession, and outside it. The measurable learning outcome on CROQF level 8.2: to build their own, acceptable and effective forms and methods of inter-personal communication with

individuals and groups of people in the process of cooperation in planning and implementing research related to the doctoral thesis, review of a doctoral thesis and defence of a doctoral thesis, and in review in the process of publication of scientific papers related to the doctoral thesis.

Number of teachers: 379
Number of supervisors: 685
ECTS: 180 over three study years

Number of students enrolled in the past five years:

Academic year	TOTAL
2011/12	271
2012/13	235
2013/14	261
2014/15	223
2015/16	191

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

It is the overarching opinion of the panel that this programme does not meet all the requirements stipulated by the accreditation council. While we feel that majority of the relevant laws and bylaws have been met, the panel has identified a number of critical issues which the School and the Programme directors should seek to remedy over an extended period. We are weary that this is not achievable overnight, is dependent on some critical internal audits and require creative accounting of, what is acknowledged as, limited resources. A time frame of 3-5 years has been considered as appropriate to implement these changes and it would probably be recommended that another Expert Audit be conducted after 2-3 years to monitor progress, provide support and further advice on the changes that are in progress.

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 letter of expectation for the period up to three (3) years in which period the higher education institution should make the necessary improvements.

ASSESSMENT STRATEGY

The assessment of this programme took into account the detailed reports of the post-graduate University study programmes and was pursuant of the *Act on Quality Assurance in Science and Higher Education*. Special weight was given to the self-nominated study objectives, and how these are contained within best practice as stipulated in the Bologna Seminar on "*Doctoral Programmes for the European Knowledge Society*" (for detail and definitions, see below).

i. *The core component of doctoral training is the advancement of knowledge through original research.* At the same time it is recognised that doctoral training must increasingly meet the needs of an employment market that is wider than academia.
ii. *Embedding in institutional strategies and policies:* universities as institutions need to assume responsibility for ensuring that the doctoral programmes and research training they offer are designed to meet new challenges and include appropriate professional career development opportunities.
iii. *The importance of diversity:* the rich diversity of doctoral programmes in Europe – including joint doctorates – is a strength which has to be underpinned by quality and sound practice.
iv. *Doctoral candidates as early stage researchers:* should be recognized as professionals – with commensurate rights – who make a key contribution to the creation of new knowledge.
v. *The crucial role of supervision and assessment:* in respect of individual doctoral candidates, arrangements for supervision and assessment should be based on a transparent contractual framework of shared responsibilities between doctoral candidates, supervisors and the institution (and where appropriate including other partners).
vi. *Achieving critical mass:* Doctoral programmes should seek to achieve critical mass and should draw on different types of innovative practice being introduced in universities across Europe, bearing in mind that different solutions may be appropriate to different contexts and in particular across larger and smaller European countries. These range from graduate schools in major universities to international, national and regional collaboration between universities.
vii. *Duration:* doctoral programmes should operate within an appropriate time duration (three to four years full-time as a rule).
viii. *The promotion of innovative structures:* to meet the challenge of interdisciplinary training and the development of transferable skills.
ix. *Increasing mobility:* Doctoral programmes should seek to offer geographical as well as interdisciplinary and inter-sectoral mobility and international collaboration within an integrated framework of cooperation between universities and other partners.
x. *Ensuring appropriate funding:* the development of quality doctoral programmes and the successful completion by doctoral candidates requires appropriate and sustainable funding.

- CroQF, level 8.2:

Descriptors of learning outcomes for this level are:
knowledge - creating and evaluating new facts, concepts, procedures, principles and theories in a field of research that extends the frontier of knowledge;

cognitive skills - using advanced, complex, original, highly specialized knowledge, skills, activities and procedures required for developing new knowledge and new methods as well as for integrating different fields;
practical skills - creating, evaluating and performing new proposed specialized activities and new methods, instruments, tools and materials;
social skills - creating and applying new social and generally acceptable forms of communication and cooperation in interaction with individuals and groups of different affiliations and different cultural and ethnical origin;
autonomy - demonstrating personal, professional and ethical authority, managing scientific research activities and a commitment to development of new ideas and/or processes;
responsibility - taking ethical and social responsibility for successful execution of research, socially beneficial results and potential social consequences.

- EU Principles for Innovative Doctoral Training

Research Excellence
Striving for excellent research is fundamental to all doctoral education and from this all other elements flow. Academic standards set via peer review procedures and research environments representing a critical mass are required. The new academic generation should be trained to become creative, critical and autonomous intellectual risk takers, pushing the boundaries of frontier research.

Attractive Institutional Environment
Doctoral candidates should find good working conditions to empower them to become independent researchers taking responsibility at an early stage for the scope, direction and progress of their project. These should include career development opportunities, in line with the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.

Interdisciplinary Research Options
Doctoral training must be embedded in an open research environment and culture to ensure that any appropriate opportunities for cross-fertilisation between disciplines can foster the necessary breadth and interdisciplinary approach.

Exposure to industry and other relevant employment sectors
The term 'industry' is used in the widest sense, including all fields of future workplaces and public engagement, from industry to business, government, NGO's, charities and cultural institutions (e.g. musea). This can include placements during research training; shared funding; involvement of non-academics from relevant industry in informing/delivering teaching and supervision; promoting financial contribution of the relevant industry to doctoral programmes; fostering alumni networks that can support the candidate (for example mentoring schemes) and the programme, and a wide array of people/technology/knowledge transfer activities.

International networking
Doctoral training should provide opportunities for international networking, i.e. through collaborative research, co-tutelle, dual and joint degrees. Mobility should be encouraged, be it through conferences, short research visits and secondments or longer stays abroad.

Transferable skills training
"Transferable skills are skills learned in one context (for example research) that are useful in another (for example future employment whether that is in research, business etc). They enable subject- and research-related skills to be applied and developed effectively. Transferable skills may be acquired through training or through work experience". It is essential to ensure that enough researchers have the skills demanded by the knowledge based economy. Examples include communication, teamwork, entrepreneurship, project management, IPR, ethics, standardisation etc.

Business should also be more involved in curricula development and doctoral training so that skills better match industry needs, building on the work of the University Business Forum and the outcomes of the EUA DOC-CAREERS project.6 There are good examples of interdisciplinary approaches in universities bringing together skills ranging from research to financial and business skills and from creativity and design to intercultural skills.

Quality Assurance
The accountability procedures must be established on the research base of doctoral education and for that reason, they should be developed separately from the quality assurance in the first and second cycle. The goal of quality assurance in doctoral education should be to enhance the quality of the research environment as well as promoting transparent and accountable procedures for topics such as admission, supervision, awarding the doctorate degree and career development. It is important to stress that this is not about the quality assurance of the PhD itself rather the process or life cycle, from recruitment to graduation.

The common approach should provide a framework of reference, whilst preserving flexibility and autonomy for institutions and doctoral candidates.

These guiding principles seek to establish a common benchmark for scope and quality in PhDs across the EU, in order that qualifications have extrinsic value and can be considered transferrable between member countries. Strategic decisions about the programme should always be made in the best interests of patients and healthcare across the EU in general, and the rest of the world if appropriate. This is in keeping with the research priorities of national agencies such as NICE (National Institute for Health and Care Excellence), as well as the major national and international funding bodies (NIH, NIAAA, MRC, …).

ADVANTAGES OF THE STUDY PROGRAMME

1. **Relationship between mentors and students:** A close relationship between mentor and student is widely practised and often arises from early undergraduate teaching. While not without problems in itself, we felt that this approach has considerable merit and is helpful in diffusion of tension and aiding in the progress of the work.
2. **Breadth of the PhD programme (especially Biomedicine):** Since this post-graduate programme supports a high number of students and constitutes a considerable commitment of the school both in terms of number of teachers and supervisors, the inherent breadth of projects and scientific and technological approaches was considered as highly attractive.
3. **Some degree of Internationalisation (eg. FP7 and 2020 awards):** The panel noted the success of research in attracting grant funding through European Framework collaborative approaches. This provides international exposure to students connected with these projects through study visits to and from collaborating laboratories.
4. **Enthusiastic students:** Student satisfaction was high in this programme and there have been a multitude of reasons presented to the panel. It is not possible at this stage to single out a preferred element here.
5. **Embedding in the Croatian society (healthcare):** The Medical School at Zagreb serves a critical role within the Croatian society as a primary health care provider. As such, this specific responsibility found recognition by the panel and was identified as a major driver for the breadth of approaches (see No 2 above).

DISADVANTAGES OF THE STUDY PROGRAMME

1. **Depth of study in PhD research:** Inspection of multiple theses available to review revealed considerable heterogeneity in terms of scientific breadth and analytical depth as compared within and between the post-graduate programmes, but also in relation to other European institutions represented by the panel members.
   Notwithstanding biases arising from the selection of theses provided, a high percentage reported on a single research topic, were compressed to <100 pages, and contained brief Methods and short Result sections. In comparison to the European norm, this is typically more in keeping with a Masters (MPhil or MD) thesis, approximating to no more than two years of full-time research work. In the European context, the panel feel it unlikely that this would be considered an adequate synthesis of a 3-4 year programme of PhD-level work. Of course it is difficult to judge the scientific quality of a thesis written in an unfamiliar language.
2. **Single mentoring:** As a standard, students have only a single PhD mentor/supervisor. We note that in the majority of cases the relationship works well, particularly because the student-mentor relationship is established prior to the student enrolling in the program and this may contribute to the high satisfaction rate of the students. In the context of student support, however, panel members felt it inappropriate and problematic if it comes to issues and problems between students and mentors. A further

concern here is the lack of an appropriate structural framework that will support the student during phases of personal/scientific disagreement with their respective supervisors.

3. **Poor reporting of key outcome statistics and monitoring structures:** Considerable uncertainty exists as to the numbers provided in the report, both for students enrolled, but also for completion rates and progress tracking. This seems to arise from a very loose policy on student progress, which means that students can be 'in the system' for many years and their progress is not appropriately monitored. It is unclear to the panel how or whether failing students would be identified early or picked up in time to prevent them dropping out of the programme.
4. **Completion rate:** Despite poor statistics, we understand that completion rates are low in this programme both compared to other post-graduate programmes examined, but more so when compared to PhD completion rates in other EU member countries. Of particular concern is the lack of monitoring here, as it remains elusive what happens to the students that initially enrol. A conflict between PhD students and mentors, as well as full-time employment as standard for many Croatian students reduces their commitments for post-graduate studies. While these are reported case studies, the panel members cannot ignore that possibility that they are more widespread. In addition, students may stay in the system almost indefinitely, and in some cases it doesn't become apparent that they are failing (again due to lack of monitoring).
5. **Recruitment:** The panel observed that recruitment in this postgraduate programme is from the local student population, 98% from Croatia and about 80% from Zagreb. We imagine the reliance on Croatian language possibly limits international engagement options, eg. for supervisors and examiners. The leadership team made a particularly robust defence of the position and we respect that view, but were disappointed to hear from the Dean that the faculty had little appetite for attracting high-quality students from outside the immediate catchment area or even internationally.
6. **Taught courses:** The panel observed an unusually high number of taught courses especially for 1st year post-graduate students. This is not singled out for this programme, but appears to be a nationwide requirement underlying most if not all post-graduate programmes. Extensive course work for achievement of credits places considerable strain on the system, as it requires an enormous number of teachers, who work long hours in order to accommodate shifts of the full-time employed post-graduate candidates. At the same time, it requires enormous discipline from the students to participate in what constitutes evening courses and amounts to night-time revision. We have carefully analysed the provided course catalogue and have, as confirmed by students, grave concerns of the utility of these courses in terms of relevance for the programme and economics. At the same time, considerable financial support is re-directed towards the teachers and could be freed up in benefit of the post-graduate students and mentors. In practice, year One of the programme is basically made up of taught course work and thus precludes extensive laboratory practice and scientific pursuit. These latter elements, however, are at the forefront of European PhD programmes and are critical objectives underpinning post-graduate education.

EXAMPLES OF GOOD PRACTICE

1. **External teaching and supervisory expertise.** Overall, the panel considered the introduction of appropriate external and international experts for the delivery of specialist aspects of the programme as recommendable and would like to see this implemented also more globally in other post-graduate programmes in Croatia.
2. **Publications as a metric of quality:** Although this point was not without contention, it was accepted that publications should be used as a metric of the quality of the students and the study programme. The panel felt less confident in the use of impact or H-factors as indexes for quality.
3. **Value for money.** The panel found that good value for money was offered by the programme, relative to other PhD programmes across the EU. However, this is achieved in part due to the University's own subsidy of the programme.
4. **PhD day**: Encouraged by the positive experiences of the students, the panel felt that the PhD day was good practice. Again, a wider roll-out is to be encouraged.
5. **Equal status for thesis in English language.** Fostering the internationalisation of the programme, and to establish equity with other HEIs in Europe, the write-up of the thesis in English language has been given equal status. This was a positive outcome. However, the uptake of this opportunity was relatively low, but should actively promoted (for example by the inclusion of overseas supervisors and examiners with the view of strengthening international research collaborations at the same time).

RECOMMENDATIONS FOR THE IMPROVEMENT OF THE STUDY PROGRAMME

1. **Increase of depth of the PhD programme.** For equity with other EU programmes, the panel felt that some individual PhD topics and their pursuit lacked substance and focus. This needs to remedied and our suggestion is that a more hypothesis and laboratory based system is adopted. Coincident is the expectation that a PhD student would be expected to have at least two major sub-themes or lines of enquiry that test different skill-sets of the candidate.
2. **Reduction of taught courses.** In order to deliver on (1), the honing down of taught courses, particularly in year 1 of the PhD, needs to be considered. Clearly, generic skills have to remain central to the early education programme, but more in depth special knowledge relevant to each individual PhD topic should be acquired by self-study or alternative means (presentation at lab meetings; scientific interactions with supervisor; regular study reports; etc). Overall, we promote a more project based approach for the achievement of merit, and a withdrawal of the taught courses based approach of gaining credits. This would further support good supervisory practice requested from a) mentor and b) institution (see below).
3. **Multiple supervisors for each PhD project.** The panel felt very strongly, that the single mentor / supervisor system is outdated and needs to become replaced by a system where

the student has a second supervisor allocated, who is familiar with the research field (not necessarily a specialist in the research field). His function is more a pastoral and supportive one and should be documented by regular meetings with the PhD student in order to help monitoring progress, but also to identify problems early on and diffuse them early. This is particularly important for multidisciplinary projects, where supervisors should come from the co-disciplines, and where more than 2 mentors may be named. We also promote the inclusion of external supervisors (for example when students deliver parts of international collaborations).

4. **Monitoring of student progress.** The panel felt that a more defined framework needs to be developed that monitors and documents the progress of the student by regular reviews. It should include measures of quality and achievement of milestones. At the same time, slow progression and non-achievers need to identified early and contingencies put in place for help to improve the student's prospects for achievements. Yet again, these support structures and their success/failure needs to be monitored and revised. Third party assessors, who can judge the scientific progress of the candidate, may be included in this process.
5. **Length of PhD (part time):** Several panel members strongly suggest the curtailment of the overall study period. On one hand, this would be aided by better monitoring structures and milestone definitions, but also by a more stringent handling of drop-out and re-joining back after years of interruption. That PhDs are achievable in a predefined time frame is clear from the fact that most students complete their study in ~6 years. (For additional changes in support of this, see no. 6).
6. **PhD supports clinical specialisation:** We encountered that most students also fulfil full-time jobs in hospitals or clinical praxis. This 'over'-load may provide a rationale for the elongated time lines of some PhDs and the seemingly high drop-out rates. While all stake-holders of this PhD programme support its existence and even contribute to the running of the programme (through teaching or research facility use), freeing up time of the candidate is inevitable. It must be in the interest of all stake holders to present with the best educated workforce knowledgeable in cutting edge technology, pharmacology etc. This can only be guaranteed if provision of time is made for their candidates to undertake such research as much as they will support the continuous personal development of the doctors once their specialisation has been completed.
7. **Monitoring of PhD programme statistics.** It appeared from our analysis that key metrics for the accurate assessment of the quality of the PhD programme were unreliable and in part lacking. While the panel accepted that the high number of candidates enrolled in the PhD programme place considerable strain on any monitoring system, the recording and regular publication of progress and completion rate is a vital element of the quality control that can be demanded from every PhD programme. Good statistics on PhD outcomes will help to rank the School nationally and internationally, and will, in the longer run, attract high quality students. For example, we note that on an international comparison, high quality Universities/Institutions present with better completion rates, and this is considered an important measure of programme quality https://www.timeshighereducation.com/news/phd-completion-rates-2013/2006040.article.

8. **Entry requirements.** The panel was highly critical of the low competition for admission to the programme. At present, the competition rate is approximately 1:2. Such a low competition at entry may also explain the high drop-out rates and as a corollary lower the quality of candidates. While the panel is weary of the fact that quality of candidates varies between study years, a more stringent selection process and a reduction in the number of PhD students will inevitably improve the quality of the programme. Given the funds available and resources provided, the number admitted students may be reduced by 1/5th.

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*
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).	*YES*
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).	*YES*
4. Student: teacher ratio at the HEI is below 30:1.	*YES*
5. HEI ensures that doctoral theses are public.	*NO*
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.	*YES*
Additional/ recommended conditions of the ASHE Accreditation Council for passing a positive opinion	**YES/NO notes**
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:	*YES*

a) PhD, elected into a scientific title, holds a scientific or a scientific-teaching position and/or has at least two years of postdoctoral research experience; b) active researcher in the scientific area of the programme, as evidenced by publications, participation in scientific conferences and/or projects in the past five years (table 2, Supervisors and candidates); c) confirms feasibility of the draft research plan upon admission of the candidate (or submission of the proposal); d) ensures the conditions (and funding) necessary to implement the candidate's research (in line with the draft research plan) as a research project leader, co-leader, participant, collaborator or in other ways; e) trained for the role before assuming it (through workshops, co-supervisions etc.); f) received a positive opinion of the HEI on previous supervisory work.	
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).	*YES*
7. The supervisor normally does not participate in the assessment committees.	*YES*
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.	*NO*
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.	-

QUALITY ASSESSMENT

1. RESOURCES: TEACHERS, SUPERVISORS, RESEARCH CAPACITIES AND INFRASTRUCTURE	*Improvements are necessary* **(IN)** *High Level of Quality* **(HQ)**
1.1. HEI is distinguished by its scientific/ artistic achievements in the discipline in which the doctoral study programme is delivered.	**HQ:** The report outlines the academic credentials of the faculty since 1954. This Medical School was the first in Croatia and is now easily the largest; we understand it accounts for the majority of all health science academic output in Croatia. While this is an impressive record we note of course that it is easily the largest institute in Croatia, and that there is some scope for improvement by metrics assessing individual excellence. For example, the quality of the publications of both the candidates but more so the supervisors in general) can be improved. The average journal impact factor run on 1.3, which is low, and the average H-index of the teaching staff is 8.3 based on an average of 25 papers per staff member. These statistics is far below European standards and suggests that the output is not reaching the international audience it deserves.
1.2. The number and workload of teachers involved in the study programme ensure quality doctoral education.	**HQ:** The panel found the quality satisfactory. What scored negative was the poor management of resources with for instance 2 students per class. Such examples highly question the relevance of these courses and careful scrutiny implementing efficiency measures (minimum 5 students per class at any given time) is required.
1.3. The teachers are highly qualified researchers who actively engage with the topics they teach, providing a quality doctoral programme.	**IN:** The research records of the teachers are highly variable. A few (eg. Prof Slobodan Vukičević) are exceptional, and the panel recognised the body of international work as expressed clearly in the report. Nevertheless there is a huge faculty of 379 teachers where the majority have quite weak research records. It would also seem that the majority are delivering only a few sessions (2600 hours from 379 teachers).

	We note that apart from the research heavy mentors / teachers, there is a considerable amount of weaker research groups, which may not deliver on quality in research and education for the PhD candidates. These may significantly contribute to low impact publications and the School needs to re-evaluate the involvement of all levels of research quality in this programme.
1.4. The number of supervisors and their qualifications provide for quality in producing the doctoral thesis.	**IN:** The programme is broadly compliant with good practice, with 685 supervisors, of whom two thirds are active. There is a healthy ratio of 1.8 (or maybe 3, not clear from the documents) doctorands per supervisor. We note some exceptions, for example: Prof Predrag Sikirić has 30 students listed, with 11 graduating in the past 5 years. While this capacity for work is applauded, it seems unsustainable. The panel feel that best practice would be to have two supervisors for each student, and we have recommended this accordingly.
1.5. The HEI has developed methods of assessing the qualifications and competencies of teachers and supervisors.	**IN:** While there are indirect measures of mentor quality - for example, publication record - this does not necessarily assess the competency of the individual in mentoring. The School does not always adhere to its own pre-set rules, and the quality of mentoring may have some bearing on the poor completion rates. Notably the research records of mentors are significantly better than the teaching faculty as a whole, though about a quarter didn't meet the institution's own criterion of 5 papers in the past 5 years. In addition, mentors who do not have their own research funding (either from the programme or from any agencies), may not take on new students until increased research output and research quality (measured as impact factor publication and /or project research income). Establishment of such a rule would also help in setting up guidelines for the monitoring of research and training qualities of mentors and teachers, which are widely undefined and non-systematic at present.

1.6. The HEI has access to high-quality resources for research, as required by the programme discipline.	**IN:** The panel profoundly examined these issues and was surprised about the lack of access to some important publications, eg. ScienceDirect. In addition, facilities in terms of instruments are also not sufficient unless collaborations are established with other institutes where the required facilities are available. While this was explained in terms of lack of financial resources, it is clearly to the detriment of quality of the work that can be delivered by the candidates and is substandard in any European comparison.
2. INTERNAL QUALITY ASSURANCE OF THE PROGRAMME	
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.	**HQ:** The leadership team described a strong history of delivering doctoral-level training, and have shown national leadership in this area. The report set down the reasons for establishing the programme which evolved from an M-level course, and included an analysis of social, academic and economic needs of the community.
2.2. The programme is aligned with the HEI research mission and vision, i.e. research strategy.	**IN:** Research strategy doc was provided for review; *2016-2020 Science Development Strategy of the School of Medicine University of Zagreb.* We note in particular the challenges for Croatian students in completing their PhD studies given the many conflicting priorities in healthcare. In this context, the mission *to improve medical practice, education and research* with the emphasis on practice seems appropriate. There was an undertone during the discussions that the PhD programme was largely used in practice to serve the needs of the local medical profession. A more global role of this programme in terms of Croatia as a nation and also internationally would go a long way to enhance the standing of the educational system of Croatia.
2.3. The HEI systematically monitors the success of the programmes through periodic reviews, and implements improvements.	**IN:** The overall monitoring practices were fragmented and in need of an overhaul with stricter timelines and better defined proxies that objectively measure programme and candidate success. For instance, stakeholders described a fairly ad-hoc route for feedback, largely because they were in many cases also

	the faculty. A formal monitoring and feedback process was not seen. Although the School has established a body/committee that monitors the progress of the programmes, it remained unclear to the panel who belongs to this body, what exact procedures are in place to monitor the Programme and its members, and how and what actions are taken (and implemented) in case of unsatisfactory performance. Some key statistics - for example, on completion rates and times - were simply unavailable. When the leadership team of the School was challenged, it was deemed that such statistics are difficult or impossible to obtain because students could leave and re-join the programme. This in itself constitutes poor practice as entry and exit needs to be documented and catalogued by the University for each programme. Our own institutions across the EU are obliged to provide these statistics for National Higher Education agencies on a regular basis and the success of students and their timely progress is a proxy for the success of the PhD programme of the Schools and Institutions. In addition, we were unable to make much sense of statistics that were presented. In some cases, they appeared to contradict each other.
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.	**IN:** The panel identified very clear shortfalls in the way supervisors are assessed and their performance is monitored. There is no clear system in place for monitoring the performance of supervisors. The so-called 'direct' measures of impact factor don't necessarily relate to good supervision. What is missing is a more objective measurement of the trajectory of each individual student in connection with his/her mentor and how they perform over time. In addition, there appears to be no regular questionnaires delivered from the PhD students that quality assess their own supervisor. See also 1.5 above. However, we noted the following: Candidates were overwhelmingly positive about the programme, and unable to make substantial recommendations for improvement (in terms of supervision). A close relationship between supervisor and student often is due to a long historical bond from

	undergraduate times and needs to be considered with some caution. Similarly, cases of change of supervisor seem to have happened in the past but were more anecdotal and details about procedures that were implemented in these cases remain elusive. Alumni were more critical and a particular comment related to the value (or lack) of clinical research. There was no consensus among the group on this point.
2.5. HEI assures academic integrity and freedom.	**HQ:** This issue was not discussed in depth. The University has guidelines on integrity and ethics, and we are pleased to see this is part of the curriculum. We are led to believe that the University does not employ systematic methods of plagiarism detection, and this might be considered for the future.
2.6. The process of developing and defending the thesis proposal is transparent and objective, and includes a public presentation.	**HQ:** Documentation regarding the procedures of production and evaluation of doctoral thesis proposal was provided. A committee with at least one external member is responsible for the evaluation of the thesis proposal. Documentation regarding a detailed proposal defence protocol was provided for review.
2.7. Thesis assessment results from a scientifically sound assessment of an independent committee.	**IN:** Documentation describing the thesis development, structure, and defence was provided for review. The panel had the opportunity to review a selection of theses produced from the programme. Comments on the overall quality of theses are provided at the top of the document.
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.	**IN:** The panel had the opportunity to review a selection of programme documentation. Upon scrutiny, numerous issues were identified (see above and below in respective sections). Especially the lack of consistency in data evaluation, in maintaining statistics and providing coherent table structures was noted negatively.
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	**HQ:** The panel was made aware of the major cost centres which are broadly the same as for any other Higher Education Institution in Europe. We did not gain insight, however, how the funds are distributed. Nevertheless we acknowledge that the fees for

supported, so that doctoral education can be completed successfully).	the programme are subsidised, and offer good value for money for students. According to the report and as the programme team explained in person, the fees do not cover the basic costs of tuition. This is important, since the majority of students are self-funded.
2.10. Tuition fees are determined on the basis of transparent criteria (and real costs of studying).	**HQ:** See previous response.
3. **SUPPORT TO DOCTORAL CANDIDATES AND THEIR PROGRESSION**	
3.1. The HEI establishes admission quotas with respect to its teaching and supervision capacities.	**IN:** Although the overall student to mentor ratio is below threshold, the selection procedure as a whole needs improvement. ● At present, the candidate directly approaches the supervisor before admission and discusses the available project. This impacts on other students seeking to work with the same supervisor; the supervisor implements criteria for selection of student. These are not formulated and monitored. We strongly recommend that available PhD positions should be openly advertised and application of every potential candidate should be encouraged. Upon an interview by a committee (which should include the potential supervisors, but also external faculty), a selection is made on quality rather than personal bias. The committee decides on candidate selection. ● The students (medical doctors) select a random supervisor rather than the subject in which they are interested in. This will reduce the quality of the PhD. The School and the PhD programme is responsible for providing a wide selection of topics so to attract diverse candidates. Some research topics may not be offered every year. ● The quality of the supervisors has to be evaluated before they accept mentoring a PhD student, as some mentors do not have a funding or facilities to conduct research. (see also above about structures in place for supervisor and student monitoring).
3.2. The HEI establishes admission quotas on the basis of scientific/ artistic,	**IN:**

cultural, social, economic and other needs.	In practice, the panel noted that admission quotas are set differently. They run counter to the guidelines for admission. ● Admission quotas are defined by the number of available mentors and the pre-set threshold of less than 2 students per supervisor at any given time. ● The competition rate to get admission is 1:2 which is really low and this will reduce the quality of the PhD. ● The selection is based on heritage of the candidate and there is a strong bias for locally living students to be favoured over a broad national coverage. ● There is no mechanism in place to attract international candidates from EU partner cities of nations.
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.	**IN:** Candidate selection followed different rules to the ones provided as guidelines. ● Admission quotas did not take into account available funding. ● Very few students engage in research project that provides them with adequate resources for their studies. If some support is in place, it usually comes from hospitals or EU collaborative projects (Framework 7, Horizon 2020). However, such projects constitute the minority. Very little funding appears to be available for clinical or cutting edge studies owing to their high costs. They are actively discouraged. ● The majority of students are self-funded. Given the overall lack of financial support from the HEI (and clinics), the available resources will not amount to extensive and properly powered studies in these cases (which may explain low impact publications on one hand, but also the slow progression of candidates).
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.	**HQ:** Overall, structures seem to be in place for the appropriate monitoring of student progress and resource management. A critical internal review might help to make these structures more coherent and tighten loop holes. ● It is indeed the case that the committee monitors the progress of the PhD students from admission to graduation. However, these processes are not very reliable and we suspect are not regularly updated (therefore lots of uncertainties / controversies of the data). This can be improved. (see also section 2.10)

	● Most of the part time students are not allowed to spend enough time on their PhD, as they are employed as full time doctors in hospitals. This reduces the quality of the PhD and frequently leads to drop-out or interruptions. ● The students are unable to use the facilities of their own hospital for their research activities. It should be the aim of the PhD programme that communal use of facilities in all participating Institutions is guaranteed. In addition, hospitals should provide ample research time (30-40%) for the candidates, possibly mitigated by a lowering of employment times.
3.5. The HEI ensures that interested, talented and highly motivated candidates are recruited internationally.	**IN:** The panel did not identify clear efforts of the HEI to recruit internationally. We noted that there are very few international students due to European collaborations, but the principle recruitment of PhD candidates is from a pool of local residents. These are selected on a one-on-one basis depending on previous experience between the students and the (potential) supervisors. ● *The HEI openly admitted little/no interest in attracting international candidates*. The explicit statement voiced was the selective recruitment of local students that will develop their professional careers in Croatia. It is aimed mainly towards overcoming the shortage of clinical doctors in Croatia; it at the same time diminishes the attraction of the program to an international audience and the positive impact in terms of scientific innovation and ideology. ● On a positive note, the program does invite international speakers and lecturers frequently, which are unreservedly valued by the students.
3.6. The selection process is public and based on choosing the best applicants.	**IN:** Calls are indeed open. However, the selection procedure does not appear to be competitive. A student and a mentor discuss the project and submit the application for admission and they are selected. It appears that the selection is on the basis of first come first serve. Proper selection committee should be appointed to interview all the students and then assign the supervisors on the basis of the student's subject of interest (see above).
3.7. The HEI ensures that the selection procedure is transparent and in line	**HQ:**

with published criteria, and that there is a transparent complaints procedure.	The selection procedure is transparent and the list of accepted candidates is made public. Rejected candidates can get feedback on their application (including comments and guidelines on possible improvements for further applications) on request.
3.8. There is a possibility to recognize applicants' and candidates' prior learning.	**HQ:** According to University regulations this is compliant.
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.	**IN:** The panel established that both students and supervisors sign and receive a copy of a document describing their rights and obligations (Annex 3.9.1). However, students do not give this proper attention and see it only as part of the paperwork for their enrolment in the programme. Student and supervisor should go through these documents (again) during their first meeting. Some students were completely ignorant of the context of the document.
3.10. There are institutional support mechanisms for candidates' successful progression.	**IN:** Though there are some informal mechanisms in place to monitor the progress of the students, the panel remained in the dark as to the regularity of these processes, the initiation process and their use, which effective procedures are applied to assess student progress, any formal follow-up and feedback to the candidate, or putative mechanism for rescuing failing students. It appears that all mechanisms are activated ad hoc upon request of the students only, which has the potential to lead to bad time/resource management. It is the overarching opinion of the panel that a more formal and structured evaluation plan needs to be developed so that regular meetings and progress monitoring is initiated automatically and follow-up mechanisms are in place (i.e., have specific milestones been met). The self-evaluation report was notably lacking and the panel could not establish mechanisms in place for the arrangements for pastoral care of failing students. Conceivably, this may be one root cause of the relatively poor completion rates. (See also section 3.4) The panel noted the PhD day as an excellent element in the curriculum to foster interaction between candidates and to support the improvement of PhD university wide.

	However, students expects to improve the present situation by having orientation programmes (ie, introduction to the program, facility, lab rotation etc), which are yet to be established. Active support to improve time management and free up finance was requested by the alumni and would be achievable through a reduction of coursework and taught courses especially in year 1 (see above for a review of course relevance). Raising the overall profile of the PhD programme through the involvement of international committee members for thesis was another positive remark towards the panel, so that both supervisor and student progress are carefully monitored and evaluated.
4. **PROGRAMME AND OUTCOMES**	***Improvement is necessary*** **(IN) /** ***High Quality*** **(HQ)**
4.1. The content and quality of the doctoral programme are aligned with internationally recognized standards.	**IN:** ● The overall body of research required for the PhD in this programme seems less extensive compared to international standards. While this may be explained by time and financial limitations, it clearly puts Croatian standards at a lower level in a European ranking. ● Candidates do acquire some transferable skills through courses and their research work (statistics, data analysis skills). This may be expanded at the cost of other taught course work, which is less viable economically. ● Admission procedures are unclear and need considerable improvement and become more transparent. It appears that many students have already worked in the laboratory before becoming enrolled in the PhD programme and it is difficult for students from "outside" to enter the system. ● Programme duration is comparable to European programmes. However, in contrast to the European system, the first year is dominated by the courses which effectively reduces the time spent on research The panel acknowledges challenges faced by the faculty. Nevertheless, we have some concern that these points contribute to an overall reduction in the depth and/or breadth of original research that can be produced in a 3-year timescale.

	We would encourage that a proportion of PhD theses are reviewed by international examiners. This will help increase the programme quality in the context of other HEIs across the EU.
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.	**IN:** We were encouraged by the range of compulsory and optional course content available, but in some cases there seemed to be an unduly high teaching resource. The panel noted this with concern and established a considerable strain on students. Moreover, the panel noted with some concern that the teaching load for staff members is considerable and too heavy, and curtailing hours and providing more focus would notably increase the time and hence quality of the research work. Given the resource constraints, we wondered whether quite so much didactic teaching was necessary. Overall, the taught courses had clearly defined outcomes, but the ethic requirements were not always presented and/or justified.
4.3. Programme learning outcomes are logically and clearly connected with teaching contents, as well as the contents included in supervision and research.	**HQ:** Overall, the taught courses had clearly defined outcomes but see previous response.
4.4. The doctoral programme ensures the achievement of learning outcomes and competencies aligned with the level 8.2 of the CroQF.	**IN:** The panel assessed whether the research outcome is equivalent in the context of EU requirements and self-formulated aims. This was based on: ● Sample theses provided. They appeared light in terms of data presentation and only contained short results sections; ● Sample publications provided. These appeared of mixed quality from high to low impact and from substantial review of literature to brief communication of results. ● No examples of seminar papers, conferences presentations were provided. It follows that the quality of PhD's is broad, with high and low performers. There is clearly the potential to improve the overall quality of the programme, and it is the suggestion of the panel, that stronger competition at entry to pre-select high performing students and an audit of the quality of work from mentors / supervisors would be worthwhile in this

	context. This was unfortunately not possible during our audit, but should be conducted regularly through a School intern review.
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.	**HQ:** The panel only superficially assessed this point. It was noted that the quality of teaching is perceived as satisfactory (see also section 4.7). Some alumni commented that the statistics courses were ex-cathedra and there were not enough practicals.
4.6. The programme enables acquisition of general (transferable) skills.	**HQ:** Soft and transferable skills are part of the elective courses of students. However, the PhD programme should specify more clearly between courses, which are considered vital and should be identified as core courses (e.g., Ethics in Research, Writing Skills), and optional courses.
4.7. Teaching content is adapted to the needs of current and future research and candidates' training (individual course plans, generic skills etc.).	**IN:** The panel was concerned about two issues: • The overall requirement to fill up credits through taught courses; there is a considerable overload of taught courses in year 1 and the time slots often do not map with work commitments of candidates. This needs to be reviewed. As for the courses themselves, methods for training seem to be appropriate. • There was some suggestion that the programme existed primarily to support the needs of medical staff in Croatia, who require a PhD to take the most senior positions. While we understand the desire to invest in their future clinical leaders, we were disappointed to hear from higher management that the School had little appetite for attracting high-quality candidates from elsewhere. It may be worthwhile for the School to reconsider this position in the long run as the climbing up of league tables requires international standards and international competition.
4.8. The programme ensures quality through international connections and teacher and candidate mobility.	**IN:** The panel noted this as an area for considerable improvement (see also 4.7) based on: • There are few international collaborations that underpin the quality of research conducted in this institution, and supporting education and training of PhD candidates. This needs to be set up at a broader scale and become an

	integral part of the PhD programme (external assessors, examiners, …) • Very few PhD theses were written in English. This should become an optional feature and students voting for this option should be positively rewarded for this choice (for example with a 'doctorus europaeus' etc.) • The PhD programme should encourage research visits to European countries (up to 1 month) without repercussions for the position at hospitals of the candidates. These study / research visits have become an integral part of European PhD programmes and are strong motivators for high quality research.