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Annex No. 12 to the MU Directive on Habilitation Procedures and Professor Appointment Procedures

HABILITATION BOARD DECISION ON THE NOMINATION FOR APPOINTMENT TO ASSOCIATE PROFESSOR

Masaryk University	
Faculty	Faculty of Informatics
Procedure field	Informatics
Applicant	Matej Lexa, Doctor of Philosophy
Applicant's home unit, institution	Faculty of Informatics, Masaryk University
Habilitation thesis	Algorithmic approaches to biological sequence analysis generate new tools for the study of genome structure and function

Board members

Chair	prof. RNDr. Michal Kozubek, Ph.D., *Faculty of Informatics MU*
Members	prof. Mgr. Jiří Damborský, Dr., *Faculty of Science MU*
	Univ.-Prof. Dr. Arndt von Haeseler, *University of Vienna, Austria*
	prof. Ing. Jan Holub, Ph.D., *Faculty of Information Technology, CTU in Prague*
	doc. Mgr. Tomáš Vinař, PhD., *Faculty of Mathematics, Physics and Informatics, CU Bratislava*

Evaluation of the applicant's scholarly/artistic qualifications

The applicant's research is devoted to the interdisciplinary field of bioinformatics that interconnects computer science and biology. He finished his MSc (1995) and PhD (1999) in Plant Biology at the University of Illinois at Champaign-Urbana, USA. In 1998, he joined the Faculty of Science of Masaryk University. 2002-2004 he stayed at the University of Padova, attending to the software development related to bioinformatics. In 2004, he returned to Masaryk University but changed the faculty to the Faculty of Informatics to focus more on the computer science part of the interdisciplinary bioinformatics research.

According to the submitted habilitation materials, he has authored or co-authored 36 original research articles listed in the WoS database, 1 book, 5 book chapters and 20 articles in conference proceedings (both national and international often organized by IEEE), which complement his main contributions published in high-quality scientific journals. He has repeatedly published as the main author in top-tier (Q1) journals, especially in Bioinformatics - a leading journal in the field. The number of citations (as of October 2022) was 660 in WoS (619 without self-citations). The number of citations per year has a growing tendency. The candidate has also authored or co-authored 14 software packages and 6 successful research

project proposals (out of them 1 as PI and 5 as co-PI). He has been involved in the organization of 14 conferences (both national and international).

In comparison to the minimal criteria set by the Faculty of Informatics of Masaryk University (15 papers in international databases, 5 high-quality papers and 40 citations without self-citations), it can be concluded that the candidate exceeds the required values by a wide margin.

Conclusion: The applicant's scholarly/artistic capabilities **meet** the requirements expected of applicants participating in a habilitation procedure in the field of Informatics.

Evaluation of the applicant's pedagogical experience

The applicant's pedagogical activity is broad and includes courses at the Bachelor, Master, and Doctoral levels taught at the University of Illinois at Champaign-Urbana (1992-97), Masaryk University (since 2005) and Brno University of Technology (since 2009). Most courses have been related to bioinformatics. The courses consist of both lectures (7 items) and class exercises / laboratory courses (3 items), as well as a seminar (1 item). The applicant also prepared 5 textbooks / teaching aids on the topic (all available online).

He supervised 40 successfully defended Bachelor theses, 20 successfully defended Master theses, and one successfully defended PhD thesis (Vojtěch Bystrý, 2016). He has been an examiner in state examination boards (Bachelor and Master levels, 2005-2016) and doctoral committee (2010-2022) at the Faculty of Informatics of Masaryk University.

In comparison to the minimal criteria set by the Faculty of Informatics of Masaryk University (at least 3 years of teaching experience) and comparing the above-mentioned values (of the number of taught years and courses, number of defended theses, etc.) to the other candidates, it can be concluded that the candidate exceeds the average values by a wide margin.

Conclusion: The applicant's pedagogical capabilities **meet** the requirements expected of applicants participating in a habilitation procedure in the field of Informatics.

Habilitation thesis evaluation

The habilitation thesis is entitled "Algorithmic approaches to biological sequence analysis generate new tools for the study of genome structure and function" and consists of a short research overview (31 pages without references) followed by 6 selected publications. The research overview is further divided into a general introduction (4 pages) followed by an introduction to the topics of each of the 6 papers, and concluded by a very short conclusion section (1 paragraph).

Three external reviewers were appointed by the habilitation committee. All of them agree that the applicant fulfils the requirements expected of a habilitation thesis in the field of Informatics, although two reviewers point out the unusual thesis structure and very short general introduction and conclusion. The major observations of the reviewers are as follows:

Prof. Peter F. Stadler, Institute for Informatics, University Leipzig, Germany

"The material included shows that the Matej Lexa has successfully addressed key issues in modern bioinformatics. His work focusses on the analysis of DNA sequences with the aim of identifying functional subsequences, and on the design of efficient algorithms for such tasks in conjunction with the implementation of practically usable tools.
Overall, the six contributions show-cased in the thesis outline a coherent research agenda that aims at the efficient use of string-algorithms in genomics. While the algorithms themselves are neither particularly surprising nor difficult, they are well-tailored towards the intended applications. Matej Lexa has made contributions that are scientifically sound, timely, useful to the bioinformatics community, and rather well cited.
The habilitation thesis is significantly different from those I have seen as a reviewer from other countries, with a very short general introduction and almost autobiographic snippets accompanying the individual chapters. I assume that this format follows the customs at Masaryk University. In any case, the scientific content of Matej Lexa's work is, in my opinion, clearly sufficient to fulfil the requirements expected of a habilitation thesis in the research area of bioinformatics."

Prof. Daniel Svozil, Department of Informatics and Chemistry, University of Chemistry and Technology, Prague

"The author's contributions to the field are demonstrated through six attached publications, each with its own chapter and commentary. I particularly appreciate not only the high-quality English, but above all the very readable chapters that charmingly guide us through the author's entire scientific career. The attached publications provide further details on the author's work and its application to pressing or interesting biological problems at the time. The developed methods are state-of-the-art and seem correctly implemented. The evaluation of the novel approaches is of high quality. The tools were tested against known data and compared to existing tools.
Overall, the thesis demonstrates Dr. Lexa's expertise in various research fields and bioinformatics approaches for DNA sequence analysis. Dr. Lexa is definitely a mature researcher, with a solid research agenda. He is very successful in his results, especially, in making the whole line of research starting with the primary idea and finishing with a standalone software that implements it."

Assist. Prof. Sarah Berkemer, Department of Computer Science, Ecole Polytechnique, France

"By presenting work from six different publications, the thesis shows Dr. Lexa's ability to work in a highly interdisciplinary field and provide useful new insights as well as accessible software tools for the research community.
I want to mention a few points of Dr. Lexa's habilitation thesis that significantly differ from other habilitation theses I have seen before.

- In most of the papers in the thesis, Matej Lexa is the first author, and only once he took the role as last author. To me, a habilitation reflects seniority in research, thus I would have expected more last and less first authorships.
- The conclusion is really short, I would have expected more future perspectives. A habilitation opens the possibility to become full professor or PI, thus I would have expected to read about Dr. Lexa's future plans and research projects that he plans to do in his next career steps."

Although there are some critical remarks in the reviews, the committee does not consider them as detrimental for the habilitation procedure.

Conclusion: The applicant's habilitation thesis **meets** the requirements expected of habilitation theses in the field of Informatics.

Secret ballot results

Number of board members	5
Number of votes cast	5
Number of votes in favour	5

Board decision

Based on the outcome of the secret vote and following an evaluation of the applicant's scholarly or artistic qualifications, pedagogical experience and habilitation thesis, the board hereby submits a proposal to the scientific board of the Faculty of Informatics of Masaryk University to

[X] appoint the applicant associate professor of Informatics.

[ ] terminate the procedure.

Date: May 2, 2023

Michal Kozubek

Jiří Damborský

Arndt von Haeseler

Jan Holub

Tomáš Vinař .....
signature