STATEMENT REPORT

of a competition for the academic position "Associate Professor" Professional field: 4.5. Mathematics (probability and statistics) For the needs of Sofia University "St. Kliment Ohridski", Faculty of Mathematics and Informatics (FMI-SU), Competition announced in State Gazette no. 5 / 17.01.2025 and on the websites of FMI and Sofia University

This statement report has been prepared by Associate Professor Dean Palejev, Ph.D., Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, professional field: 4.5. Mathematics (probability and statistics), as a member of the scientific jury of the competition according to Order No. PД-38-156/17.03.2025 of the Rector of the Sofia University "St. Kliment Ohridski".

The documents of the **only candidate**: Chief Assistant Professor Denitsa Grigorova, Ph.D., FMI-SU were submitted in time for participation in the announced competition.

I. General description of the submitted documents

1. Details of the application

The documents submitted by the candidate Chief Assistant Professor Denitsa Grigorova, Ph.D. in accordance with the competition comply with the requirements of the Act on the Development of the Academic Staff in the Republic of Bulgaria (ADASRB), the Rules for Implementation of the ADAS in the Republic of Bulgaria (RIADAS in the RB) and the Rules on the Terms and Requirements for Acquisition of Scientific Degrees and Occupation of Academic Positions at Sofia University.

For participation in the competition the candidate Chief Assistant Professor Denitsa Grigorova, Ph.D. has presented a list of total 10 titles, including 9 publications in Bulgarian and foreign scientific journals and scientific forums, and one software product. In addition, a list of 22 citations was presented. The report for fulfilling the minimal national requirements includes 8 articles (3 in group B and 5 in group Γ) and 9 citations. Eight other documents were presented (2 official notes and certificates from the employer, 3 award certificates and 3 documents for memberships in scientific organizations).

2. Short CV of the applicant

Chief Assistant Professor Denitsa Grigorova, Ph.D. obtained a Bachelor's degree in Applied Mathematics in 2007. Later, in 2009, earned she graduated from the Master's program in Probability and Statistics. In 2014, she defended a Ph.D. thesis in the field of Statistics, with a dissertation on EM algorithms on probit models with random effects. All degrees were obtained at FMI-SU. She has worked part-time assistant professor, assistant professor, and currently as a chief assistant professor at FMI-SU. In 2011, she has been an Erasmus student at the University of Sheffield, United Kingdom. During the period 2018–2020, she has been a postdoctoral researcher at Bocconi University, Italy. From 2020 to 2023, she has held a Recognized Researcher (R2) position at GATE Institute, SU.

3. General characteristics of the applicant's scientific work and achievements

As with most specialists in the field of probability and statistics, the research work of Chief Assistant Professor Denitsa Grigorova, Ph.D. includes both theoretical and applied contributions. The theoretical publications submitted for the competition are related to the topic of her dissertation - EM algorithms. The applied articles are focused on the statistical analysis of biomedical data. Based on the documents submitted by the applicant for participation in the competition, I can confidently and clearly state that:

a) the scientific works meet the minimum national requirements (under Art. 2b, para. 2 and 3 of ADASRB*) and respectively the additional requirements of Sofia University 'St. Kliment Ohridski' for holding the academic position of "Associate Professor" in the scientific field and professional field of the competition;

b) the scientific papers submitted by the candidate do not repeat those of previous procedures for acquiring a scientific title and academic position, because a sufficiently long period has passed between the previous procedures and the publication of the articles;

c) there is no legally proven plagiarism in the scientific papers submitted at the competition.

4. Characteristics and evaluation of the candidate's teaching experience

Chief Assistant Professor Denitsa Grigorova, Ph.D. has worked as a teaching assistant and later as a lecturer of various courses, and in her application materials for the competition, she has provided a summary of her total teaching and classroom workload by academic year and semester from FMI-SU for the past five academic years. I do not have direct impressions of her teaching activity.

5. Detailed analysis of the scientific and applied achievements of the candidate contained in the materials submitted for participation in the competition

Out of the articles submitted for participation in the competition, 8 have an impact factor (two in Q1, two in Q2, three in Q3, and one in Q4). A total of 22 citations are presented, 9 of which are included in the report for meeting the minimum national requirements. It should be noted that the points in

categories $\mathbf{5}$, \mathbf{B} , and $\mathbf{\Gamma}$ significantly exceed the minimum requirements. In addition to the publications and citations included in the competition documentation, Chief Assistant Professor Denitsa Grigorova, Ph.D. is also a co-author of other articles published after the previous competition and has received other citations during the same period. The theoretical developments included in the list submitted for the competition are related to the topic of her dissertation - EM (Expectation Maximization) algorithms. Since its publication by Dempster et al. in 1977, this method has established itself as an important and widely used tool for data modeling, because it provides an efficient approach for parameter estimation in statistical models with latent variables or incomplete data. In her work, Chief Assistant Professor Denitsa Grigorova, Ph.D. uses this methodology to obtain maximum likelihood estimates of the parameters of correlated probit models for biomedical data from longitudinal studies. In one of the articles, an ordered categorical variable with five levels and an approximately continuous variable are modeled; in the other article, two ordered categorical variables are modeled. One of these articles is single-authored, and considering that the second is co-authored with her academic advisor and is a thematic continuation of her dissertation work, it can reasonably be assumed that Chief Assistant Professor Denitsa Grigorova, Ph.D. played a leading role in it. A continuation of the same topic is her co-authorship of an R software package.

In collaborative work with researchers in biomedical fields, the role of the statistician is to propose appropriate methods for data analysis, perform the analysis, interpret the results, and describe them for the purposes of subsequent publications. The contribution of Chief Assistant Professor Denitsa Grigorova, Ph.D. to the applied publications is exactly of this nature. In the various articles, she has used methodology appropriate to the task at hand and to the formal or informal requirements of the respective field. What makes a very positive impression is the fact that the applied publications are co-authored with different teams conducting biomedical studies related to various diseases (cognitive disorders, hematology, ophthalmology) or working in different areas of scientific research (public health, genetics). In these publications, she has used a variety of methods - statistical tests, confidence intervals, different types of regression, clustering, etc. This undoubtedly demonstrates the breadth of knowledge and skills in the field of statistics, the ability to quickly grasp the specifics of biomedical data related to various diseases, as well as engagement with important societal issues.

The submitted citations show that the articles of Chief Assistant Professor Denitsa Grigorova, Ph.D. are cited by authors from various fields of scientific research and from different countries. This clearly confirms their relevance and their impact on the work of other researchers.

6. Critical notes and recommendations

I have no critical remarks. I would recommend that Chief Assistant Professor Denitsa Grigorova, Ph.D. deepen her knowledge of machine learning, as in many cases such methods lead to optimal results in the analysis of data with complex interrelationships between variables, as well as in multidimensional data where standard assumptions do not hold.

7. Personal impression of the applicant

I have worked together with Chief Assistant Professor Denitsa Grigorova, Ph.D., and as a result of our joint work, we are co-authors of two published scientific articles, which are not included in the list of publications for the competition, as well as one article that, at the time of preparing this statement, is under review. My personal impressions based on our collaboration are very positive, both in terms of her knowledge in the field and her attitude towards work. I would particularly like to highlight her willingness to develop her knowledge, as she readily takes on new tasks and provides support to her colleagues when needed.

8. Conclusion on the application

Having become acquainted with the documents and scientific papers presented in the competition and on the basis of the analysis of their importance and the scientific and applied contributions contained therein, **I confirm** that the scientific achievements meet the requirements of the ADAS in the Republic of Bulgaria, the Rules for its Implementation and the corresponding Rules of the Sofia University "St. Kliment Ohridski" (FMI-SU) for the occupation by the candidate of the academic position "Associate Professor" in the scientific field and professional field of the competition. In particular, the applicant meets the minimal national requirements in the professional field and no plagiarism has been detected in the scientific papers submitted for the competition.

I give my positive opinion to the application.

II. GENERAL CONCLUSION

On the basis of the above said, **I strongly recommend** to the Scientific Jury of the competition to propose to the competent body of choice of the Faculty of Mathematics and Informatics at Sofia University "St. Kliment Ohridski" to select Chief Assistant Professor Denitsa Grigorova, Ph.D., for the academic position "Associate Professor" in Professional field: 4.5 Mathematics, Scientific specialty: Probability and Statistics.

May 2, 2025

Signature:

Associate Professor Dean Palejev, Ph.D.