from prof. Eugenia Assenova Stoimenova, IMI-BAS

Professional direction 4.5 Mathematics f

or competition of academic position of 'Professor' for the needs of Dept Informatics at NBU

in Professional direction 4.5 Mathematics (Mathematical statistics and Psychometry) announced in SG No. 28/02.04.2024 г.,

with candidate Associate Professor Dimitar Atanasov

Evaluation of the scientific works of Assoc. Prof. Dr Dimitar Atanasov

The candidate Assoc. Prof. Dr. Dimitar Vladislavov Atanasov obtained a master's degree in "mathematics" from the FMI of SU "St. Cl. Ohridski" in 1999. In 2007, he defended his thesis on the topic "Robust methods for scaling and point estimation" in the scientific specialty "Probability Theory and Mathematical Statistics" with a diploma from VAK.

He worked as an assistant and senior assistant in FMI of SU in the period 1999-2008. From 2008 to the present, Dr. Dimitar Atanasov is a lecturer at NBU, having successively held the position of "senior assistant", "chief assistant", since 2010, and in 2013 he was elected as an associate professor at the Department of Informatics. He has a short-term specialization at the Max Plank Institute for Demographic Research in 2001.

I. Assessment of compliance with the minimum national requirements and the requirements of the New Bulgarian University

For participation in the competition for the academic position of "Professor" the candidate Assoc. Prof. Dr. Dimitar Atanasov submitted documents that comply with the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the corresponding specific requirements of the NBU for this position. It is clear from the presented reference that Associate Professor Dr. Dimitar Atanasov has fulfilled the minimum national requirements for scientific and teaching activities for the field of higher education 4.5. Mathematics defined by the Statutes for application of LADAS, as well as the requirements of the Ordinance on Academic Staff Development of NBU (NRAS) and Annex 2. Minimum National and NBU Requirements, which must be met by candidates for obtaining a scientific degree and for holding the academic position of "Professor".

The table shows the exact number of points according to the minimum requirements of the National Bank of Ukraine's National Bank of Ukraine and the NBU and the corresponding performance of the candidate.

The table shows the exact number of points according to the minimum requirements of ZRASRB and NRAS of NBU and the respective performance of the candidate

Group of indicators		minimum requirements	Declared by Dr Atanasov
A	Indicator 1	50	**50**
B	Indicator 2	0	**0**
C	Indicators 3 and 4	100	**120**
D	Sum of indicators 5 to 10	200	**267**
E	Indicator 11	100	**704**
F	Sum of indicators from 12 to 20	100	**280**
G	Sum of indicators from 21 to 33	70	**85**
H	Sum of indicators from 34 to 40	70	**100**
I	Sum of indicators from 41 to the end	70	**110**

It can be seen that the points on all indicators exceed the minimum number of points, and on some groups of indicators they significantly exceed them. I don't have notes to adjust the metric points.

II. Research (creative) activity and results

The scientific interests of the candidate and his published scientific papers can be defined in four main subfields of mathematical statistics and psychometrics. The first sub-field includes the development, improvement and research of psychometric methods in the field of assessment of individual abilities and knowledge. The second sub-area includes the development of statistical methods for the estimation of parameters of branching stochastic processes and the study of the properties of such estimates. It is of particular interest to evaluate the possibility of applying the estimates for the parameters in real populations. The third sub-field is aimed at the application of various statistical methods in applied research. In recent years, they have mainly been in the field of psychometrics and the application of mathematical and statistical methods in the assessment of individual characteristics and abilities. The fourth sub-area included the development of specialized software enabling the demonstration and practical application of the developed theoretical results.

1. **Evaluation of the monographic work, creative performances or other publications, corresponding in volume and integrity of the monographic work, including evaluation of the scientific and scientific-applied contributions of the author.**

There are two papers (#1 and #2) presented in the competition, which are classified in group B of the NACID reference. The papers are devoted to psychometric methods of ability

assessment, one published in 2020 and the other in 2021 (both after the 2013 docent competition).

Paper #1 studies the assessment of latent characteristics of test items and individuals' abilities. An approach for estimating the parameters based on the maximization of the marginal likelihood functions for the individual parameters is proposed. Paper #2 explored tests in which test items have different properties to measure characteristics on different subsets of the population. The estimation of the parameters is based on a sequence of statistical criteria comparing the characteristics of the test tasks obtained on the target group and rescaled to the corresponding characteristics obtained on the reference group. The papers are co-authored with D. Dimitrov and were published in a Scopus category Q2 journal. Points from these papers exceed the minimum requirements for group C.

2. **Evaluation of the contributions in the other attached publications (creative performances) made after the appointment of the academic position "Chief Assistant. It also includes an assessment of the peer review requirement.**

This group includes 8 papers from the competition list numbered 3-10. Four of the papers (#3, #5, #7 and #8) are devoted to statistical methods for estimating parameters of branching stochastic processes. This topic is fundamental in the scientific research of Assoc. Professor Atanasov. Scientific interests in it, in a global aspect, have been intensified in recent years in connection with the COVID-19 pandemic. The candidate, together with his co-authors, has developed an approach for modeling the number of observed infected individuals, provided that some of the carriers of the infection are not registered.

The main idea of this approach is presented in paper #3. A model of a branching process with two types of particles is proposed, with their population sizes set respectively by the number of carriers and the number of registered infected individuals. The model is summarized in papers #5 and #7 with the immigration component added. Models including a vaccination process limiting the development of infection have also been studied. The generalized form of the model is discussed in paper no. 8. A significant advantage of the considered models is the possibility of their parameters being estimated on the basis of publicly available information on the spread of the infection provided by the health authorities. The software tools used for the evaluation are available and open source. All these papers were published in 2020 and 2021.

Papers No. 4 and No. 9 of this group are from the other main topic of Prof. Atanasov, namely "Psychometric methods for ability assessment". An approach called D-scoring was applied and various classical statistics were investigated to evaluate the behavior and strategy of the individuals in the execution of the test (guessing, copying, etc.). Paper #9 explores the possibility of equating and comparing test results between individuals who have taken different tests. The research is based on the scores of latent test characteristics obtained in paper #1. These papers were published in the last two years. The last attached paper, #10, is applied. It draws some quantitative and qualitative conclusions about the results of a particular exam in order to improve the test part of the exam.

All presented scientific papers in this group D are in full compliance with the announced competition. Dimitar Atanasov has indisputably significant scientific results and, no less

valuable, indisputable applicability of his research. Moreover, all scientific results have been published in the last 4-5 years.

3. Citation from other authors.

The applicant has attached a "List of citations" including 88 citations, which were not used in a previous procedure. The presented list is in accordance with the minimum requirements of ZRASRB and NRAS of NBU.

4. Evaluation of the results of participation in research and creative projects and application of the obtained results in practice.

Assoc. Prof. Dr. Dimitar Atanasov has described his participation in 16 national and 4 foreign projects. They can be divided into three main directions:

- Projects in the field of branching stochastic processes and their applications. These projects are financed by the National Research Fund of the Ministry of Education and Science.

- Projects in the field of cognitive modeling. Funding for these projects is from the National Assessment Center of the Kingdom of Saudi Arabia.

- Applied projects. Various institutional projects are included here.

Prof. Atanasov's participation in all the described projects is essential and significant.

III. Teaching and learning activities

The candidate, Dimitar Atanasov, is an Associate professor in the "Informatics" department of the NBU. Over the years, he has participated in the improvement and development of several courses for the "Informatics" and "Information Technologies" programs. He has developed courses on Data Warehouse and Game Theory. He has updated a large part of the courses in the field of probability theory and statistics for various programs at the Dept. "Informatics" and Dept. "Cognitive Science and Psychology" of NBU. Dr. Atanasov has authored study materials for 6 courses at NBU, the materials for which are available at e-edu.nbu.bg. In recent years, Dimitar Atanasov has been the supervisor of at least four students from bachelor's and master's programs and is currently supervising one of them in a doctoral program at NBU. He has written numerous reviews and regularly participated in examination committees for both the bachelor's and master's programs at the Dept. "Informatics". He has taught several courses in English in NBU curricula.

IV. Administrative and public activities.

1. Participation in collective governing bodies of NBU.

In fulfillment of his academic duties, Associate Professor Atanasov conducts classes according to the schedule and regularly participates in the meetings of the departmental council. He participates in the Commission for evaluation of full-time teachers at the Bachelor's Faculty. He also participates in the Program Council of the Dept. "Informatics", Faculty Council of the

Ministry of Education and Academic Council. Since 2019, he is the head of the Dept. "Informatics".

All the evidence presented by the candidate confirms my personal impressions that Associate Professor Dr. Dimitar Atanasov has a serious managerial and organizational activity in the NBU.

Conclusion

The analysis of the submitted materials of the two participants in the competition for a professor in the professional field: 4.5 Mathematics (Mathematical statistics and Psychometry), I believe that of the two candidates Assoc. Professor Dr. Dimitar Atanasov satisfies the set of criteria and indicators for the acquisition of the title "Professor" according to LADAS, as well as the requirements of the Ordinance on the development of the academic staff of the NBU and Appendix 2. Minimum national requirements and requirements of the NBU.

I propose that the Scientific Jury vote in positive and recommend to the academic bodies of the NBU to award Associate Professor Dr. Dimitar Atanasov the academic title of "Professor" in the professional field: 4.5 Mathematics (Mathematical statistics and Psychometry).

26.07.2024   Signed:…………….