**by Professor Dr. Pavlina Kalcheva Jordanova (Yordanova), professor in the**
**Scientific field of higher education: 4. Natural sciences, mathematics and informatics,**
**Professional field: 4.5. Mathematics (Theory of probability and mathematical statistics)**
**at Department of "Economics and Mathematical Modeling"**
**at the Faculty of Mathematics and Computer Science of**
**the Konstantin Preslavsky University of Shumen,**


**about competition for the academic position of "professor", in the**
**Scientific field of higher education: 4. Natural Sciences, Mathematics and Informatics,**
**Professional field: 4.5. Mathematics (Mathematical statistics and psychometrics),**
**announced in SG no. 28/02.04.2024 for the needs**
**of the New Bulgarian University, Master's Faculty, Department of Informatics**


The opinion was prepared on the basis of 3-PK-235/29.05.2024 of the Rector of the New Bulgarian University (NBU). It complies with the requirements of: the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the Implementation of the LDASRB, the Regulations for the Organization and Activities of the NBU, the Ordinance on the Development of the Academic Staff of the NBU and the template for the structure of a competition opinion for occupying the academic position of "professor" at the NBU. The competition has only one candidate: Associate Professor Dr. Dimitar Vladislavov Atanasov.

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

The applicant's documents for the evaluation of the competition were received only electronically. They contain: curriculum vitae, diplomas, list of publications and copies of them, reference to the contributions and citations, reference to the fulfillment of the minimum national requirements, etc., which gives me reason to accept them for consideration and to ascertain that all the formal requirements of the procedure have been met.

In this point I will describe the quantitative characteristics of the materials submitted by the candidate for the competition. In the parentheses, after the "≥" sign, the minimum number of points

required by the Ordinance on the Development of the Academic Staff of the NBU is written. The considered works do not repeat those used by the candidate for the acquisition of the educational and scientific degree "doctor" or the academic position "associate professor".

In **the group of indicators A** the candidate has submitted a diploma for the educational and scientific degree "doctor" H 23204/26.03.2008. № 01/ Pr. 1/25.01.2008., on the topic: "Robust scaling and scoring methods" for this gets 50 points ($\geq$ 50).

In the **group of indicators B** the candidate did not submit materials. For this he gets 0 points ($\geq$ 0).

In the **group of indicators C, sub-indicator 4:** Associate Professor Dimitar Atanasov, presented the scientific publications described in the following table. They are referenced and indexed in world-renowned databases of scientific information.

| Databases | Quartile in year of publication (yr) [1] | IF in year of publication (without self-citations) | Points realized by candidate |
|---|---|---|---|
| Web of Science (WoS) c IF | Q1 (2021) | 3.088 (2.818) | 25*3 = 75 pts. |
| | Q2 (2020) | 2.821 (2.500) | 20*3 = 60 pts. |

[1] In the categories "Mathematics interdisciplinary applications" and "Educational psychology".

According to the data from the previous table the candidate has **135** points **($\geq$ 100)**.

**Group of indicators D, sub-indicator 7:** Associate Professor Dimitar Atanasov presented the scientific publications described in the following table. They are referenced and indexed in world-famous databases with scientific information and do not repeat the works described in the previous table and in the previous procedures. Two of the papers presented are in a journal that is referenced in WoS, but I can't find either IF or SJR in the year of publication, so these papers are placed in the row "Other publications" and JCI is presented for them.

| Databases | Quartile in year of publication (yr) | IF, or SJR, or JCI in year of publication (without self-citations) | Points, realized by the candidate |
|---|---|---|---|
| Web of Science c IF | Q4 (2020) | IF 0.378 (0.283) | 12*3 = 36 pts. |
| | Q4 (2020) | IF 0.378 (0.283) | 12*3 = 36 pts. |
| | Q3 (2021) | IF 1.416 (1.283) | 15*3 = 45 pts. |
| | Q4 (2023) | IF 0.2 (0.1) | 12*3 = 36 pts. |

| Scopus c SJR без IF | (2021) | SJR 0,161 | 10*3 = 30 pts. |
|---|---|---|---|
| | (2021) | SJR 0,401 | 10*3 = 30 pts. |
| Other publications | Q2 (2020) | WoS JCI 0.91 | 6*3 = 18 pts. |
| | Q2 (2021) | WoS JCI 0.91 | 6*3 = 18 pts. |

According to the data from the previous table, the candidate has **249** points **(≥ 200**).

In the **group of indicators D** in Web of Science or Scopus I find 88 citations of Assoc. Prof. Dimitar Atanasov, which means **88*2*4 = 704** points (≥ 100).

In the **group of indicators E** Assoc. Prof. Dimitar Atanasov has presented materials and civil contracts for carrying out scientific works on 3 projects of the NBU, 15 national projects with the Ministry of Education, UNICEF and BDIOO and 5 international projects with the National Center for Evaluation of Education in Kingdom of Saudi Arabia, etc., which were concluded after his habilitation. Due to the ambiguity in the definition of the term "project" in the LDASRB and in the rules for it, such as "When a personal civil contract is concluded with the relevant institution, is the researcher a project leader", without commenting on the exact number of the points of the candidate according to this indicator, I think that the minimum requirements of the law are satisfied.

**In the group of indicators "Ж" from the NBU's requirements** Associate Professor Dimitar Atanasov presented membership in two national scientific organizations, information for three software packages and on three statistical tests made by him, showing application of the results of his work in practice. He had participated in the creation of the Bachelor's program "Information Technologies", as well as in the development of courses and curricula in this and other programs. In my opinion, he has proven professional applied skills in the field of mathematics, which is why he has more than the required **70** points for this indicator.

In the **group of indicators "3" of the requirements of the NBU** Associate Professor D. Atanasov had supervised four diploma theses and one student in writing an article and giving a scientific report. He developed author's materials for six courses, and supported the work of one PhD student. He had taught more than two courses in English. Therefore, in my opinion, he has more than **70** pts.

In the **group of indicators I of the requirements of the NBU** Associate Professor D. Atanasov has declared that he conducts the classes according to the schedule, regularly participates in the meetings of the departmental council, respects the admission time, participates in the Commission for evaluating full-time teachers at the Bachelor's Faculty, participates in the program

board of the "Informatics" department and since 2019 is its head. He participates in the faculty council of the Master's faculty, participates in the academic council of the NBU and has not been penalized under KT. Therefore, in my opinion, according to this indicator the candidate has 70 points.

## II. Research (creative) activity and results

The candidate's full list of publications contains over 56 publications. 10 scientific publications (whose science metrics were described in section I of this review) are submitted for participation in the competition. Here I will focus on the scientific contributions of the author in these publications, which can be distinguished in three directions. These are:

• Development, improvement and research of psychometric methods in the field of assessment of individual abilities and knowledge. Articles [1, 2, 4, 9, 10] from the attached candidate list belong here.

• Statistical methods for estimating the parameters of branching stochastic processes and studying some of the properties of the obtained estimates. These are articles [3, 5, 7, 8].

• Application of various statistical methods in psychometrics and in the assessment of individual characteristics and abilities. See article [6].

In the first part of articles, Prof. D. Atanasov combined the main advantages of classical test assessment with psychometric models with unobservable, i.e. latent variables, and compared them with the classical weighted D-scoring approach used by the author in his collaboration with the National Assessment Center of the Kingdom of Saudi Arabia. Publications [1] and [2] are indicated by the candidate as corresponding to a monographic work. In article [1], the parameters of the distribution of the latent characteristic, which is the ability of individuals, are estimated by using the method of maximum likelihood. In the well-known item response theory, these independent observations are represented as Bernoulli random variables, with a value of one representing a true answer and zero a "false" answer. In these articles, this approach is compared to the weighted D-scoring approach, where these indicators are weighted by coefficients that describe the difficulty of the question. A non-linear regression is used in which both the independent variables and the outcome variable are dichotomous. The results of different approaches are shown to be highly correlated. The main contribution of the author is the application of these techniques in practice. In a paper [2], these models are compared with a model in which the observed are divided into subgroups according to their abilities. A test is suggested for the hypothesis of whether an

individual's abilities differ from those of the corresponding group. The other three papers [4], [9] and [10] in this group consider other applications and comparisons of these same techniques with already existing similar ones. In the article [10], with their help, the difficulty of the test questions from the first part of the state matriculation exam for the profiling subject "Informatics", where the students answer a question with a free or optional answer, in the academic year 2021/2022, was comprehensively investigated.

Articles [3, 5, 7] and [8] represent the stochastic modeling of the number of observed individuals infected with COVID-19 in Bulgaria, provided that some of the infected people are not registered. The theoretical foundations of the model are presented in an article [3]. A discrete-time branching process with two types of particles is used. Their population sizes are determined by the number of infected people and the number of registered infected individuals. The model allows to estimate the probability that an individual will be registered as an infected if he is indeed infected. Then, in the articles [5] and [7] an option for immigration is added. More precisely a random number of individuals are added to the base population in each generation. In the article [8], the most general model of the spread of the COVID-19 infection in Bulgaria is applied, adding the group of vaccinated individuals.

In the article [6], a factor model for measuring motivation for learning is presented. It takes the emotions "hope", "boredom", "helplessness" related to learning and school as indicators of the degree to which students manage to achieve important for them learning objectives. Statements related to the "joy" subscale are not grouped into a separate factor. The research was conducted on a representative sample of Bulgarian secondary and primary schools.

According to the author's report, in addition to his main scientific contributions, Assoc. Prof. D. Atanasov has also developed a significant amount of software, primarily related to psychometric calibration, development of assessment scales and implementation of psychometric tests and assessments of their qualities. The following software products have been developed: DELTA, SATA and TEQNCA. They are all for the assessment of student achievement through tests and are intended for the National Center for Educational Assessment in the Kingdom of Saudi Arabia. Another such is the Matlab package for D-Scoring. The other one is open access: R package for D-Scoring https://github.com/amitko/DScoring.git

The last two represent the implementation of D-Scoring in practice.

An open access Matlab package https://github.com/amitko/matlab-bp-engine has been implemented for simulation and statistical estimation of branching stochastic processes.

**II.     Academic and teaching activity:**

Between 1999 and 2008 years Associate Professor Dimitar Atanasov had been working as a senior assistant in Probability and Statistics at the FMI of SU "St. Kliment Ohridski".

Since 2009 now, the main teaching activities of Assoc. Prof. D.  Atanasov have been at NBU. They consist of more than 12 past courses in the master's program "Applied Statistics" and in the bachelor's programs "Psychology", "Network Technologies (in English)", "Informatics" and "Telecommunications" of the NBU, and over 8 current courses in the same specialties or in the master's program "Extraction of knowledge and technologies for big data" of the NBU.

Assoc. Prof. D. Atanasov had been the thesis supervisor of four excellently defended bachelor's or master's theses. Currently he supervises one current PhD student at NBU.

All these give me reason to think that the candidate has the required teaching and work experience for taking the considered position.

**IV. Administrative and public activity:** According to the applicant's individual report and the evidence presented by him, Associate Professor Dimitar Atanasov has made software for UNICEF, MON and the National Center for Education Evaluation in the Kingdom of Saudi Arabia.

Since 2020, he is the head of the "Informatics" department and a member of: the Program Board of the "Informatics" Department; The Faculty Council of the Master's Faculty; The committee for evaluating full-time academic staff at the Bachelor's Faculty and the Academic Council of NBU.

Assoc. Prof. D. Atanasov is a member of: Bulgarian Statistical Society; Bulgarian Society for Research and Evaluation in Education; The editorial board of the journal "Mathematics and Informatics"; The conference organizing committee:

'Computer Science and Education in Computer Science (in the period 2019-2023;

'International Summer Conference on Probability and Statistics (in the period 2008-2014).

He participated in a public debate on topics related to the modeling and forecasting of the COVID-19 pandemic and in initiatives of the Ministry of Education and Science on the topics of the quality of external evaluation in secondary education and the added value of schools.

Assoc. Prof. D. Atanasov is the scientific supervisor of a doctoral student at the doctoral program "Informatics" on the topic "Annotation of video content using neural networks".

**V. Personal impressions of the candidate (if any):** My observations of Assoc. Prof. Dimitar Atanasov are that he is a helpful and responsible colleague.

**VI. Opinions, recommendations and notes on the activity and achievements of the candidate:**

The overlapping, although not to a very large extent, of texts mainly in the introduction and conclusion of articles [3, 5] and [7] gives strange impression. In some places it contains whole sentences. Although, the authors of these articles are the same, we should remind them that in different articles, the same story of the problem or the same theory should preferably be expressed in different ways.

I would recommend Assoc. Prof. Dimitar Atanasov to be more actively involved in the training of followers: scientists and researchers, and to be more active in his scientific work.

These remarks in no way detract from the achievements of the candidate.

**Conclusion:** The materials submitted by the candidate show **that he satisfies the basic requirements of the LDASRB, the Regulations for its implementation and the relevant guidelines and regulations of the NBU.** From the observations made on the work of the candidate, and based on my familiarity with the presented scientific works, their significance, the scientific, and applied contributions contained in them, I find **it reasonable to recommend Associate Professor Dr. Dimitar Vladislavov Atanasov to occupy the academic position of "Professor" in the Scientific field of higher education: 4. Natural sciences, mathematics and informatics; Professional field: 4.5. Mathematics (Mathematical statistics and psychometrics) at NBU.**

02 July 2024          Signature:

         **/ Professor Dr. Pavlina Kalcheva Jordanova (Yordanova)/**