

REVIEW

by **Corr. Member Lyubka Atanasova Doukovska, DSc**
from the Institute of Information and Communication Technologies,
at the Bulgarian Academy of Sciences,
on the Competition for the academic position "**Professor**",
under the Scientific Field: 4. Natural Sciences, Mathematics and Informatics,
the Professional Area: 4.6. Informatics and Computer Sciences,
the Scientific Specialty: Informatics,
for the needs of the Bioinformatics and Mathematical Modelling Department
of the Institute of Biophysics and Biomedical Engineering
at the Bulgarian Academy of Sciences,
announced in Darjaven Vestnik No. 98 of 17.11.2020,
with a participant - **Associate Professor Lyudmila Pavlova Todorova, PhD**

In accordance with Order No. 695 of 15.07.2026 of the Director of the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences, I was included in the Scientific Jury of the competition for occupation of the academic position "Professor" in the Scientific Field 4. Natural Sciences, Mathematics and Informatics, the Professional Area 4.6. Informatics and Computer Science, the Scientific Specialty "Informatics", announced in the Darjaven Vestnik, Issue 54 of 12.06.2026, for the needs of the Bioinformatics and Mathematical Modelling Department of the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences, with the sole participant in the competition - Associate Professor Lyudmila Pavlova Todorova, PhD.

Lyudmila Pavlova Todorova was born on August 11, 1961 in the village of Brenitsa, Vratsa region. In 1984, she obtained the Master's Degree in Automatics and Telemechanics at the Technical University - Sofia. In the period 2003-2006, she was a PhD student in free-

form study at the Central Laboratory of Biomedical Engineering “Prof. Ivan Daskalov” at the Bulgarian Academy of Sciences and the Technical University - Sofia. She obtained the PhD degree in 2007 by decision of the Higher Attestation Commission with Protocol No. 15 of 20.11.2006.

Since 1996, she has been appointed as a “Researcher III degree” in the Mathematical Modeling, Optimization and Process Control department of the Central Laboratory of Biomedical Engineering “Prof. Ivan Daskalov” at the Bulgarian Academy of Sciences. In 2011, she was selected for the needs of the Bioinformatics and Mathematical modeled department, in the academic position of “Associate Professor” at the Institute by Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences, majoring in “Informatics”.

As a member of the Scientific Jury I have received the following documents:

1. Order No. 695 of 15.07.2026 of the Director of the Institute of Biophysics and Biomedical Engineering;
2. Application for participation in the competition by Associate Professor Lyudmila Pavlova Todorova;
3. A European Curriculum Vitae of Associate Professor Lyudmila Pavlova Todorova;
4. Copy of the diploma for educational and scientific degree PhD;
5. Copy of the diploma for academic position “Associate Professor”;
6. Abstract of the dissertation for obtaining the educational and scientific degree PhD of Associate Professor Lyudmila Pavlova Todorova;
7. Certificate of work experience in the specialty of Associate Professor Lyudmila Pavlova Todorova;
8. Information for fulfillment of the minimum national requirements under Art. 2b, # 2 and # 3 and the requirements of the Institute of Biophysics and Biomedical Engineering - BAS under Art. 2b, # 5, prepared, based on documents submitted for the competition provided by Associate Professor Lyudmila Pavlova Todorova;

9. List of scientific publications, with which the applicant participates in the competition by Associate Professor Lyudmila Pavlova Todorova;
10. List of scientific publications for the academic position "Associate professor";
11. List of scientific publications for the educational and scientific degree PhD;
12. Summaries of the scientific publications with which the applicant participates in the competition - in Bulgarian and English;
13. Habilitation reference for the scientific contributions of Associate Professor Lyudmila Pavlova Todorova;
14. Evidence under item 7. - copies of publications, citations, participation in projects, etc., proving the points for the individual indicators;
15. Copy of the announcement for the competition in Darjaven Vestnik, Issue 54 of June 12, 2026;
16. Copy of the Regulations for application of the Law in the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences.

According to the requirements of the *Development of Academic Staff Act in the Republic of Bulgaria* and the specific requirements in the Act's Institutional Regulation, the candidates for occupying the academic position of "Professor" must meet the following conditions, regulated in Art. 29. (Darjaven Vestnik, Issue 81 of 2010 - Decision No. 11 of 05.10.2010 of the Constitutional Court of the Republic of Bulgaria under cadastral plot No. 13/2010; amend in full, issue 101 of 2010; amend. and supplement, issue 30 of 2018, effective 05.05.2018) (1):

1. Have acquired the educational and scientific PhD degree;
2. Have held the academic position of "Associate Professor" at the same or another higher education institution or scientific organization for at least two academic years or at least five years;
3. Have submitted published monographs or equivalent publications in specialized scientific editions that do not repeat the ones submitted for the PhD degree and for the academic position of "Associate Professor";

4. Have submitted other original research papers, publications, inventions and other scientific and applied developments that are evaluated as aggregate;

5. To comply with the minimum national requirements under Art. 2b, # 2 and # 3, respectively, of the requirements of art. 2b, # 5;

6. Not to have plagiarism proven in the statutory order in scientific works.

(3) Applicants shall submit a report on the fulfillment of the minimum national requirements under Art. 2b, # 2 and # 3, respectively, of the requirements of art. 2b, # 5, and a reference to the original scientific contributions, to which the relevant evidence set out in this Act, in the regulation for its implementation, and the regulations of higher schools and scientific organizations.

Associate Professor Lyudmila Pavlova Todorova fulfills the requirement of Art. 29 (1) item 1 of the *Development of Academic Staff Act in the Republic of Bulgaria*, because by a decision of the Presidium of the Higher Attestation Commission at the Council of Ministers of the Republic of Bulgaria, based on a protected PhD Thesis's on the topic "System for Analysis of the Condition of Patients during Weaning from Prolonged Mechanical Ventilation" in the scientific specialty "Application of the Principles and Methods of Cybernetics in Various Fields of Science", with diploma No. 31056 of 02.02.2007.

Associate Professor Lyudmila Pavlova Todorova also meets the requirement of Art. 29 (1) item 2 of the *Development of Academic Staff Act in the Republic of Bulgaria*, because the applicant submitted a certificate No. 000053 of 22.11.2011 for the awarded academic position "Associate Professor" by the Bulgarian Academy of Sciences.

Associate Professor Lyudmila Pavlova Todorova fulfills the requirement of Art. 29 (1) items 3, 4 of the *Development of Academic Staff Act in the Republic of Bulgaria*, because she presented a list of 34 titles, of which 16 papers in journals with impact factor (IF), 11 papers in journals with impact rank (SJR), one book chapter and 6 other publications, which are referenced and indexed in world-renowned databases of scientific information. For participation in the competition, Associate Professor Lyudmila Pavlova

Todorova has presented a list of 520 citations known to date are presented, of which 208 in Web of Science and Scopus.

From the analysis of the competition papers submitted by the applicant I can conclude that the peer-reviewed publications “do not repeat the ones submitted for the acquisition of the educational and scientific PhD degree and for the occupation of the academic position Associate Professor”, in accordance with the requirements of Art. 29 (1), item 3 of the *Development of Academic Staff Act in the Republic of Bulgaria*.

According to the report on the implementation of the minimum national requirements and the minimum requirements of the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences by Associate Professor Lyudmila Pavlova Todorova, it fully covers the minimum requirements for indicators A, B, C, D and E for the Scientific Field: 4. Natural Sciences, Mathematics and Informatics, the Professional Area: 4.6. Informatics and Computer Sciences, the Scientific Specialty: Informatics, which fulfills the requirement of Art. 29 (1) item 5 of the *Development of Academic Staff Act in the Republic of Bulgaria*.

Associate Professor Lyudmila Pavlova Todorova has not submitted a statement for the original scientific contributions in the papers for participation in the competition, but the reviewer accepts that there is no legally proven plagiarism in the scientific papers submitted for this competition, which fulfills the requirements of Art. 29 (1) item 6 of the *Development of Academic Staff Act in the Republic of Bulgaria*.

Contributions in peer-reviewed works at admission for equally participation on the co-authors, can in short yes is present such as:

1. Extension of the Intuitionistic Fuzzy Set theory by introducing a new regulation over Intuitionistic Fuzzy Set, a new relation and new operators for geometric interpretation, as well as a scheme for obtaining a graded intuitionistic fuzzy estimate of the information contained in the Kaplan-Meier curves.

2. Expanding the theory of InterCriteria Analysis (ICrA) by introducing new algorithms for calculating the similarity scores between the criteria and by introducing new modifications of ICrA. The reliability of the proposed algorithms and modifications has

been proven by applying them to real data from medicine (neurosurgery and urology) and comparing the results obtained with those from classical statistical methods.

3. Extending the theory of indexed matrices with new approaches to their aggregation, based on “full relevance”, which provides an opportunity for better knowledge discovery and selection of the most informative input data.

4. Discovering interactions (consonance and dissonance) between criteria and, on this basis, supporting decision-making in medicine in diagnosis, treatment, prevention and rehabilitation in the field on neurology, ophthalmology, the intensive treatment (resuscitation) and neurosurgery.

5. Formation of indices for the needs of clinical practice in the field of neurology and neurosurgery.

6. Participation in the development of the commercial computer system Rila CogniSoft for the assessment and rehabilitation of neuropsychological impairments in individuals with multiple sclerosis. Based on a comparative analysis of existing solutions and methodologies, a new methodology for diagnosis and rehabilitation was created, which was implemented on a pilot basis, tested and validated. Two new approaches for the assessment of neuropsychological results were introduced, which were incorporated into the Rila CogniSoft system and will allow for early detection of cognitive impairments in patients with multiple sclerosis.

7. Formal description of the algorithms required for developing software products for medical purposes, namely: supporting clinicians' decisions to assess the readiness of critically ill ventilator-dependent patients to wean from mechanical ventilation; determining the course of multiple sclerosis based on neurophysiological assessment of multimodal evoked potentials; recording, assessing and rehabilitating cognitive impairments in individuals with multiple sclerosis

I accept the contributions formulated by the applicant in the works with which Associate Professor Lyudmila Pavlova Todorova participates in the competition, the results being scientific, scientifically applied and applied in nature and can be defined as enrichment of an existing scientific field with new knowledge.

Associate Professor Lyudmila Pavlova Todorova has been a team member in nine research projects, one of which she was the coordinator.

Associate Professor Lyudmila Pavlova Todorova is a supervisor of one PhD student, which is successfully defended.

In conclusion, I agree that the requirements of the Law for the *Development of Academic Staff Act in the Republic of Bulgaria* and the specific requirements in the Act's Institutional Regulations for its implementation, the Rules for the conditions and the order for acquiring academic degrees and for the occupation of academic positions in the Bulgarian Academy of Sciences and the Rules for the specific conditions for acquisition of academic degrees and occupation of academic positions at the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences are accomplished. After getting acquainted with the materials submitted by the applicant for the competition, I give my positive estimation about the choice of Associate Professor Lyudmila Pavlova Todorova in the competition for the academic position of "Professor" for the needs of the Bioinformatics and Mathematical Modelling Department of the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences, in the Scientific Field 4. Natural Sciences, Mathematics and Informatics, the Professional Area 4.6. Informatics and Computer Sciences, the Scientific Specialty Informatics.

I propose that the Scientific Jury unanimously vote for a proposal to the Scientific Council of the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences, to elect Associate Professor Lyudmila Pavlova Todorova for the academic position of "Professor" in the Scientific Field 4. Natural Sciences, Mathematics and Informatics, the Professional Area 4.6. Informatics and Computer Sciences, the Scientific Specialty Informatics.

01.10.2026

Sofia

Signature:

/Corr. Member Lyubka Doukowska, DSc/