

# REVIEW

for procedure for academic position "professor"

Domain of High education: 5. "Technical sciences",

Professional field of study: 5.2 " Electrical engineering, electronics and automation "

Specialty: " Biomedical engineering and technologies "

for the needs of the department "Medical equipment, electronic and information technologies in healthcare"

The competition is published in "State newspaper" N102/23 December 2022 for the needs of the Faculty of Public Health of the Medical University - Varna

Candidate: **Associated Professor Ph.D. Kristina Stanimirova Bliznakova** from Medical University - Varna

Member of the jury: **prof. DSc, PhD Eng. Todor Atanasov Stoilov**, Institute of information and communication technologies – Bulgarian Academy of Sciences, Sofia, Acad.G.Bontchev str., BL.2

## I. Common biographical data of the candidate

Main data about the education and for her scientific degree and academic position of the candidate are summarized in Table1

**Table 1.**

Name	born	High education	Ph.D.	Associated professor
Kristina Bliznakova	15 august 1973	2022 – Plovdiv University – Master in Medical Radiation Physics and Technology, current 1998 - University of Patras, Greece – MSc in Biomedical Technologies 1996 Technical	2003 - The University of Patras, Greece – Biomedical Technologies, recognized by TU-Varna as a professional field of study 5.3. "Communication and Computer Engineering"	2019 - Associate professor at Medical University-Varna 2016 - Associate professor at TU-Varna, professional field of study 5.3. "Communication and Computer Engineering"

		University – Varna, , Master in Electronic Engineering and Microelectronics		
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In the submitted documents from the applicant's CV, it is declared that her high education is as bachelor and master in 1996 at TU-Varna as electrical engineer with specialty "Electronics and Microelectronics". The candidate has finished a second master's degree, completed in 1998 at the University of Patras, with specialty in Biomedical Technologies. An ongoing master's degree in "Medical Radiation Physics and Technology" has been declared at the University of Plovdiv. In 2003, she defended the educational and scientific degree "Ph.D." at the University of Patras, Greece, and the acquired degree was recognized at TU-Varna in professional field of study 5.3 "Communication and computer technology". In 2016, she was appointed as an "associate professor" at TU-Varna. Since 2019, she is an "associate professor" at Varna Medical University.

The candidate's current position is "associate professor" in the department of "Medical equipment, electronic and information technologies in health care" of the University of Medicine - Varna.

## **II. General characteristics of the candidate's research and scientific-applied activities**

The presented research papers for the competition for the academic position "professor" are prepared according to the legislative requirements in Bulgaria: The Law for academic promotion, The Rules for the application of this law. The submitted data for the fulfillment of the requirements for professional field of study 5.2 "Electrical engineering, electronics and automation" have been verified with a seal of the library of the Medical University - Varna.

To participate in the competition, the candidate submits a total list of 36 scientific publications and one chapter of a collective monograph. These publications are included and categorized in the document "Academic Reference" to fulfill the minimal National requirements for holding the academic position of "professor". The scientific publications are presented for the indicator's groups B and G of the National minimal requirements. A set of citations are given for covering the requirements for the indicator group D. A list of projects, which must satisfy the requirements of indicator group E illustrates the participation of the candidate in project activities as coordinator and/or project member.

The candidate has also correctly submitted lists of publications and activities used for the previous academic position "associate professor" and for the defense of the educational and scientific degree "Ph.D.". The attached data prove that for the current competition for the academic position "professor" the candidate correctly presents new, non-overlapping results used in previous competitions.

*Indicators group A:* It is presented a diploma for the award of the educational and scientific degree "Ph.D." on the topic "Research, development and application of a software platform for modeling and simulations of X-ray images". The candidate satisfies the requirement of this indicator.

*Indicators group B:* the requirements for this indicator group are to collect 100 points through a monograph, habilitation work or scientific publications (not less than 10) in referenced and indexed in world-recognized databases. The candidate presents 11 scientific publications. All of them have an impact factor (IF according to Web of Science), which proves that they are referenced and indexed in world-recognized databases. The reviewer's check of the numerical value of this metric and estimated that it exceeds the required level of 100 points.

The reviewer assumes that the requirements for indicator group B are satisfied, according to the legal requirements.

*Indicators group G:* it requires the candidate's publications to collect 200 points. The candidate presents a list of 25 publications and one chapter in a collective monograph. The first 11 scientific publications are classified, according to the requirements of category G7 for indexed scientific publications, referenced and indexed in world-recognized databases with scientific information (only Web of Science, Scopus and others).

This set of indexed publications were published in Journal of Physics: Conference proceedings, (Q3, IF 0.55), J. Physica Medica, (Q2, SJR 0.75, IF 3.12), Polish Journal of Management Studies (Q3, SJR 0.34) and at international conferences whose papers are published as books in series by the international academic publishing house Springer (conferences BioInfoMed, European Medical and Biological Engineering Conference, E-Health and Bioengineering Conference, Mediterranean Conference on Medical and Biological Engineering and Computing, International Scientific Conference Electronics).

The publications, which address category G8 are published in non-refereed editions. They have been published in the journal Scripta Scientifica Medica (published by the University of Medicine - Varna), at conferences in Ohrid, North Macedonia; Varna, Plovdiv, Sofia. The book chapter is also presented here.

The reviewer has checked not the full list of papers but until the value of points for the presented papers achieving the level of 200 points, which is the legislative requirement. The conclusion is that the candidate's score exceeds the requirements of the competition.

The reviewer accepts that the publications submitted for participation in the competition fulfill the requirements of indicator G.

*Indicators group D:* it requires 100 points obtained by set of citations in scientific publications, referenced and indexed in world-recognized databases and/or editions with scientific peer review. The candidate presents a list in which the number of citations for individual author publications is noted. The applicant submits a list of 17 citations. They are made in publications that are referenced and indexed in world-recognized databases. Thus, the candidate citations achieved level of 170 points, which satisfies the legislative requirements.

The reviewer assumes that the submitted data for citations in this procedure satisfy the requirements of indicator D.

*Indicators group E:* the requirements for this indicator concern activities about supervision of successfully defended "Ph.D." level by a student, leadership and participation in projects, publishing university textbook. The requirements for this indicator group insist achieving at least 150 points for the professional field of study 5.2. The candidate declares that she was the joint a supervisor of a successfully

defended "Ph.D." student. Lists for participation in two national projects, two international ones, management of three national projects and management of a big international one funded by the European programs are presented. The attraction of over than BGN 2,000,000 from projects funded by the National Research Fund and by European funded programs are dully illustrated.

The numerical evaluation of these activities exceeds many times the national requirements.

The reviewer assumes that the data presented in this contest satisfy the requirements of indicator groups E.

The applicant has additionally provided data about set of citations and publications, which are not included in the official submissions for this procedure. This is made to give additional proves for the activities of the candidate.

The reviewer's conclusion is that the candidate has sufficient academic and scientific production and satisfies the legislative requirements for participation in this competition. The presented lists of activities give ground for a positive assessment of the candidate's performance. Her individual indicators exceed the required levels for scientific production and scientific-applied activities.

### **III. Assessment of the pedagogical activities of the candidate**

The candidate is on a position as associate professor at the Medical University - Varna. The main activity in such University Academic Institution is teaching. The candidate's pedagogical duties and activities are presented in her CV and in the officially issued documents for the educational courses, which are taken at the University. The candidate teaches lecture on the topics of: "Radiological physics", "X-ray technology and other imaging techniques", "C++ programming", "Applied simulation products in health and healthcare". Teaching activity was also declared in the Universities where she was previously employed: University of Patras, Greece, Technical University - Varna.

The reviewer assesses that the candidate has professional training in broad professional fields and she has gained significant experience in leading educational processes at a University.

### **IV. Main scientific and scientific-applied contributions**

The candidate submits a list of 37 scientific publications, including one chapter of a collective monograph. Topically they refer to computer modeling and simulation problems and tasks in the field of mammary imaging. Solutions have been sought by modeling relevant processes to find accurate estimates for diagnosis, formulation of treatment and prediction of the development/stopping of malignant processes. Modeling and simulation processes include activities such as:

- development of a computer anthropomorphic model of a mammary gland for the purposes of optimization of digital mammography;
- applications of radiation therapy for applying rotation therapy with devices that modify the therapeutic beam;
- validation of methods for obtaining X-ray images of the breast in digital mammography and tomosynthesis;
- use of analytical dependencies for modeling breast structures. This allows to be evaluated numerical parameters of the glandular tree, adipose tissue, external shape of the breast, nipple, etc.

- development of new methods for screening and diagnosis of mammary gland, by using X-ray phase contrast of biological tissues.

These modeling and computer simulation activities lead to scientific results in the candidate's works, which thematically relate to:

- Development of advanced methods for diagnosis and screening of the mammary gland;

- Development of computer and physical models of the mammary gland, which allow studying the properties of the relevant tissues.

The presented copies of scientific publications illustrate that the author achieves scientific and scientific-applied results by solving problems that have the nature of creating computer models, for analysis, diagnosis and forecasting the development of processes in the object of research - the mammary gland.

These results have been presented in scientific publications that have found a place in representative scientific journals that have estimates of quantiles Q1 to Q4, in publications of the international academic publishing house Springer, in electronic libraries of international research organizations and publishing houses as IEEE, at conferences in our country and abroad (North Macedonia, Varna, Plovdiv, Sofia).

The reviewer assesses that the candidate demonstrates and proves scientific and scientific-applied results through the appropriate developments of computer models, which she applies in the simulation of processes in the field of medicine.

The reviewer finds a scientific contribution in the substantiation of quantitative assessments of objects and parameters of processes in mammary gland cancers.

The reviewer considers that the candidate's publications present suitable examples of realized scientific and scientific-applied and applied computer simulations of complex processes in the field of medicine.

## **V. Significance of the contributions for the science and practice**

The candidate's publications show the desire to apply modern computer solutions in the subject areas of healthcare and medicine. For their successful application, computer models of processes, quantitative evaluation of parameters by simulating a complex object, diagnosis and forecasting of the development of a hospital process have been derived. The reviewer has a positive impression that the candidate has conducted her own experiments in complex systems such as the human organism, she applied different means of treatment such as phase research, X-ray radiation, etc. These activities require significant professional background and practical experience and the candidate demonstrated that she acquires competences in interdisciplinary domains as medicine, technical sciences, computer and virtual modeling tools.

Evidences for the high professional experience and the real positive obtained results from the candidate's activities are given by the additional provided documents for obtained awards and honors: Pythagor National award, Award for achievements of the Ministry of Education and Science: «Most successful coordinator of a project under the HORIZON 2020 program»; Varna Award, awarded by the Municipality of Varna in the field of science and higher education, direction "Technical Sciences" for high achievements in the field of biomedical engineering. Documents are also presented about recognitions from international scientific forums. The candidate also has a patent approved by the Patent Office of Greece.

In the presented lists about projects participations it is evident that the candidate activities are very intensive for the application of research results in practical cases.

These activities and participation in project proposals are also indirect evidence of the usefulness and significance of the candidate's scientific and scientific-applied contributions in practice.

## VI. Critical remarks and recommendations

The reviewer assesses that the candidate provides his own researches in heterogeneous areas with systems that have complex nature. This wide content of researches towards complex object and processes, as well as various physical nature of the applied technological tools for analysis and diagnosis, require the researcher to keep high qualifications in several domains. It can be seen from the provided documents for this procedure that the applicant has successfully provided his research activities and technological proficiency. A significant prerequisite for achieving such competence are publication activities in international academic publications and well recognized journals.

I find that the candidate Kristina Bliznakova demonstrates great research and practical experience in the research field for the development of computer models and engineering solutions for the analysis and diagnosis of processes in medicine.

I recommend this experience of the candidate to be widely applied in teaching students and doctoral students in a Higher Education Institution.

My personal opinion about the submitted documents for the competition is positive. They are carefully arranged and easy to handle. I do not find that it is necessary to make recommendations to the candidate.

## Conclusion

The candidate in this competition Associated Prof. PhD. Kristina Stanimirova Bliznakova is presented with enough set of research works. In the candidate's works there are original research and practical contributions.

I find that the legislative requirements of The Law for academic promotion, The Rules for the application of this law are satisfied. All upper said and after my acquaintance with the presented documents and their contributions with research and practical results give me ground to suggest **Associated Prof. PhD Kristina Stanimirova Bliznakova to take the academic position "professor" in Medical University of Varna**, for the scientific domain of High education **5. "Technical sciences"**, Professional field of study **5.2 " Electrical engineering, electronics and automation "**, Specialty **" Biomedical engineering and technologies "**, for the needs of the department **"Medical equipment, electronic and information technologies in healthcare"** of Medical University of Varna.

04.04.2023

Reviewer:



Prof. D.Se., Ph.D. Todor Stoilov