

Peer Review

of the scientific works submitted for participation in the competition for occupying the academic position of “Professor”, announced by the University of Plovdiv “Paisii Hilendarski” in area in higher education: 4. Natural Sciences, Mathematics and Informatics professional field: 4.6 Informatics and Computer Science (Informatics – Distributed Systems and Applications)

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In the competition for „Professor“, announced in the Newspaper of State, issue 94 of 12.11.2021, and on the website of the University of Plovdiv "Paisii Hilendarski", for the needs of the Faculty of Economics and Social Sciences, Associate Professor Olga Dobрева Rahneva, PhD from the University of Plovdiv „Paisii Hilendarski“ participates as a candidate.

1. General description of the procedure

By order № ПД-21-37 / 10.01.2022 of the Rector of the University of Plovdiv „Paisii Hilendarski“, I was appointed a member of the Scientific Jury of the competition for the occupation of the academic position of „Professor“ at the University of Plovdiv in the field of higher education: 4. Natural Sciences, Mathematics and Informatics of professional field: 4.6 Informatics and Computer Science (Informatics – Distributed Systems and Applications), announced for the needs of the Faculty of Economics and Social Sciences.

To participate in the competition, documents have been submitted by only one candidate – Associate Professor Olga Dobрева Rahneva, PhD, from the University of Plovdiv “Paisii Hilendarski”.

The set of materials for the competition, presented by Associate Professor Rahneva, is complete and is in accordance with the Regulations on the Development of the Academic Staff of the University of Plovdiv „Paisii Hilendarski“.

Assoc. Prof. Olga Rahneva has submitted a total of 22 scientific publications, 3 monographs and two textbooks, not used in previous academic procedures.

2. Brief biographical data

Assoc. Prof. Olga Rahneva graduated in 1980 as a “Mathematician and teacher in secondary schools” at the University of Plovdiv „Paisii Hilendarski“. From 1981 to 1982 she was a teacher at secondary school "Nikola Vaptsarov", Plovdiv. From 1982 to 1986 she worked as a technologist at Territorial information and computing center, Plovdiv.

From 1986 to 2008 she has been a lecturer in informatics at the University of Food Technologies – Plovdiv.

Olga Rahneva graduated in 1995 with a master's degree in Finance and Accounting at the University of National and World Economy, branch Plovdiv. She obtained the educational and scientific degree “Doctor” (01.01.12. Informatics) in 2006.

From 2008 to 2014 she has been an Associate Professor in Informatics in University of Food Technologies – Plovdiv. Since 2014, she has been an Associate Professor in Informatics in the Faculty of Economics and Social Sciences at the University of Plovdiv „Paisii Hilendarski“.

3. General characteristics of the candidate's activity

From 1986 to 2014 Assoc. Prof. Olga Rahneva has taught the following lecture courses at the University of Food Technologies – Plovdiv.: „Databases”, „Pascal Programming”, „Programming and computer systems”, „Computer systems and communications”, „Informatics”, „Economic Informatics”, „Information Technology”, „Tourism Management Information Systems” and „Electronic Market”.

Now Assoc. Prof. Olga Rahneva teaches the following lecture courses in various bachelor’s programs at the Faculty of Economics and Social Sciences: „Informatics for specialties“, „Information systems and technologies for specialties“ and „E-commerce for specialties“

Assoc. Prof. Rahneva was the head of the University of Food Technologies’ team for participation in the Republican Student Programming Olympiads. She participated in the technical committee of the 21st International Olympiad in Informatics, August 8-15, 2009, Plovdiv.

For participation in the competition are presented 22 scientific publications, 3 monographs and two textbooks. Of the presented publications, 12 of the papers are published in the conference proceedings. There are 11 scientific papers referenced in Scopus, 4 papers are referenced in Web of Science and one is referenced in IEEE. One of the publications has one co-author. The others have two or more co-authors. Seven of the papers are in Bulgarian. The candidate has 16 participations with reports in international and national scientific forums after receiving the academic position associate professor.

The scientific activity of the candidate can be divided into 4 scientific fields:

- A. Distributed systems and applications – 10 scientific publications and one monograph;
- B. Applications of informatics in mathematics – 9 scientific publications and 2 monographs;
- C. Other applications of informatics – 3 scientific publications;
- D. Educational content - two textbooks.

In *scientific field A*, the publications examine problems arising from the creation and actual use of tools and software in the process of e-testing and training. Attention is paid to the development environments for e-testing and training and providing remote access to educational resources.

Several of the publications are related to the development and supplementation of the Distributed e-Testing Cluster (DeTC). [1] describes the functional features and the developed tools for creation and automatic generation of tests in DeTC. Special emphasis is made on the approaches to testing in assessment during a real group testing examination with DeTC. [2] describes algorithms for finding fast the minimal number of unique tests in real group test examinations in DeTC, depending on the neighboring seats configuration. The application of RIA in distant e-

testing group examination is considered [3]. An overview is made of technologies Silverlight and WCF as means to implement RIA. The paper [4] describes a Virtual Classroom for electronic distance learning in high schools and universities. Further, the integration capabilities with the DeTC are emphasized as means to conduct real e-testing examination.

The papers [6] and [8] present the electronic textbooks “Developing Business Web Applications” and JavaScript, which are implemented and introduced into the process of education by Distributed e-learning platform (DisPeL). The structuring of learning content in lessons is considered, to achieve adaptability, develop a system of tests for self-assessment and intermediary control of knowledge. One of the functionalities of the system in [8] is the generation of statistical information about the exams.

The paper [7] describes a computer algebra-aided generation of two types of English language tests, which further develops our recent work in this domain. [9] describes computer algebra aided generation of English language test questions for evaluating learners’ knowledge of the lexical and grammatical structures that are met in the text; matching words and their meaning; matching parts of the whole; finding synonyms, antonyms and generalizations/specializations of words; test questions for adverbs and adjectives as well as word formation, particularly negative forms of adjectives.

The article [21] presents some pedagogical strategies for development of various cognitive skills for learners. The different methodological approaches to learning through the application of innovative educational tools are discussed. The advantages of technological approaches in the learning process are pointed out.

The monograph “Distributed Systems And Applications In Learning” [27] presents a software framework for distributed applications for the business and education, apposite to the modern connected world. The monograph continues with description of a new models for electronic education and electronic testing examination and assessment. The software environment Distributed e-Testing Cluster (DeTC) developed with the software framework, is described. The third focal point of the monograph is the software environment Distributed Platform for e-Learning (DisPeL), which is also developed using the framework and is an evolution of DeTC. It evolves with services that automate more activities of the learning process – administration and reporting, e-learning, customizable and adaptable learning content. The work presents a cloud-based architecture used for the development of DisPeL.

The scientific works in the field “*Applications of informatics in mathematics*” are dedicated to research on sigmoidal, cumulative and adaptive functions, which have been actively used in the last five years in various branches of science.

In [11] prove upper and lower estimates for the one-sided Hausdorff approximation of the Heaviside function by means of a Xgamma cumulative sigmoid (XGCS) are proven. The “transmuted transmuted – G (TT-G) family” of distributions with “respect to the Hausdorff distance” has been analyzed [12]. In paper [13] the characteristic “supersaturation” of the cumulative distribution function of the generalized Log-Burr-III distribution to the horizontal asymptote in the Hausdorff sense have been studied. In [15] a new family of recurrence generated transmuted power Garima (TPG) cumulative distribution function is defined. In paper [16] one of the important

characteristics “saturation” of the new (OW–TL–GPS) family of cumulative functions to the horizontal asymptote with respect to Hausdorff metric is studied. In [17] some general classes of trigonometric cumulative distribution functions are studied. In [18] some general classes of trigonometric cumulative distribution functions with baseline inverted exponential (cdf) are studied. The paper [20] describes one of the characteristics “saturation” of the odd Weibull inverted Topp-Leone (OWITL) distribution to the horizontal asymptote with respect to Hausdorff metric as we prove some estimates.

In all works from *field C* the results are supported by numerical examples, solved with the programming environment CAS Mathematica.

The monograph “Investigations On Some New Models In Debugging And "Growth" Theory (Part 3)” [25] is dedicated to the newest modeling trends in debugging theory and their applications. A Hausdorff metric is chosen to evaluate the test data which are fitted to the sigmoid models. The models are tested with real data. In monograph [26] some general classes of trigonometric cumulative distribution functions (cdf) and “saturation” in the Hausdorff sense for some special cases of the families are investigated. Some families of recurrence generated functions based on trigonometric (cdf) are constructed. Both monographs are appropriate for teaching PhD students.

Three articles are included in the next *scientific filed*. The work [5] describes the development of software agents that search for similarities in papers submitted by students within the dynamic website development class. These similarities are identified by specific code attributes that guarantee with high accuracy that the paper contains copied content. The agents are integrated in the e-testing process within the master’s program. The paper [14] describes how using computer and 3D printing technologies can facilitate the education in Music for children with severely limited sight. A 3D model of the circle of fifths in Braille is designed. The article [19] presents the architecture of the regional data center in the field of intelligent crop production. The advantages of the private cloud over the public ones are presented.

Two textbooks are included in the *scientific filed D*. The textbooks are specially developed for the master's program "Business Software Technologies" of Faculty of mathematics and informatics. They are written in English. All developed textbooks for this master's program are printed on paper, published in e-book format and integrated into the software environment Distributed Platform for e-Learning (DisPeL). The textbooks [23] and [24] are intended for students who have no experience in programming and mainly have an economic qualification. The textbooks are divided into 15 and 10 chapters, respectively. The content of the textbooks is in accordance with the curriculum of the master's program. Every chapter has a test over the covered material.

The candidate's contributions in field A are: Problems arising from the creation and actual use of tools and software in the process of e-testing and training have been investigated; Distributed e-Testing Cluster (DeTC) is supplemented and improved; Distributed Platform for e-Learning (DisPeL) is improved. New methods are provided for automatically generating English language tests; The monograph [27] systematizes the long-term research of the candidate in the field of Distributed Systems and Applications in Education.

The candidate's contributions in field B are: research has been conducted on sigmoidal, cumulative and adaptive functions, which have been actively used in the last five years in various

branches of science - Population Dynamics, Debugging and test theory, Computer Viruses Propagation, etc .; Different properties of new classes of cumulative and adaptive functions have been studied, which allow for statistical research and approximation of specific data from different branches of science; The results are supported by numerical examples, solved with the programming environment CAS Mathematica.

The candidate's contributions in field C are: software agents have been developed, looking for similarities in the content of submitted homework projects; 3D tools have been created to help the education in Music for children with severely limited sight; The architecture of the regional data center for intelligent agriculture is presented.

The candidate's contributions in field D are: Two textbooks in English for the master's program "Business Software Technologies" at the Faculty of Mathematics and Informatics are presented; The textbooks are integrated into the software environment Distributed Platform for e-Learning (DisPeL); Students in this master's program are trained and tested in the DisPeL environment.

A total of 380 citations of the works submitted for the competition have been noticed, 49 of which are in Scopus and WoS.

The presented scientific papers cover the minimum national requirements for occupying the academic position of „Professor“.

4. Assessment of the personal contribution of the candidate

Despite the fact that the presented publications are co-authored, there is no doubt about the personal participation and contribution of the candidate in the presented materials. I found no evidence of plagiarism.

5. Critical comments and recommendations

I have no comments and recommendations to the candidate.

6. Personal impressions

I have known Olga Rahneva from various school programming competitions, and since 2005 we have been working on some topics in the field of informatics and education.

Assoc. Prof. Olga Rahneva, PhD, is an established scientist and specialist in the field of informatics and education in informatics and IT. She also works with young scientists and currently she is the supervisor of 2 PhD students. The lectures and exercises she conducts are at a very good level.

CONCLUSION

The documents and materials presented by Assoc. Prof. Olga Rahneva, PhD, in the educational and research activities fully meet the requirements, conditions, and criteria of the Law on the Development of Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for the Application of the LDASRB, and the Regulations for the Development of the Academic Staff of the University of Plovdiv "Paisii Hilendarski" for occupying the academic position of "Professor".

The results achieved by her in teaching and research fully comply with the specific requirements of the Faculty of Mathematics and Informatics.

The candidate has original scientific and applied contributions, which have received international recognition. Some of them are published in journals and scientific journals published by international academic publishers. His theoretical developments have practical applicability, and some of them are directly oriented to the educational work. The scientific and teaching qualification of Assoc. Prof. Olga Rahneva is unquestionable.

All of the above is sufficient reason to give a **positive conclusion** for the election of Associate Professor Olga Dobrova Rahneva, PhD for the academic position of Professor in „Informatics“ of professional field „4.6 Informatics and Computer Science“ (Distributed Systems and Applications), area of higher education 4. „Natural Sciences, Mathematics and Informatics“.

I recommend that the highly respectable Scientific Jury, designated for the announced competition, propose to the Honorable Faculty Council of the Faculty of Mathematics and Informatics at the University of Plovdiv „Paisii Hilendarski“ to elect Associate Professor Olga Dobrova Rahneva, PhD for the academic position of „Professor“.

04.03.2022 г.

Plovdiv

Signature:

/Prof. Angel Golev, PhD/