REVIEW

about concourse for acquiring the academic position "Associate Professor",
professional field 4.6. Informatics and Computer Science (Programming),
for the need of Faculty of Mathematics and Informatics, Sofia University St. Kliment Ohridski,
announced in State Gazette, Vol. 61 from 02.08.2022
and on the websites of Faculty of Mathematics and Informatics and Sofia University St. Kliment Ohridski

Reviewer: Assoc. Prof. PhD Ludmila Pavlova Todorova, Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences (IBPhBME-BAS)**,** member of the scientific jury by Professional Direction 4.6. Informatics and computer sciences (Programming) of a concourse for the academic position "Associate Professor" with Ordinance No. RD 38-561/28.09.2022 of the Rector of Sofia University St. Kliment Ohridski.

For participation in the announced concourse for "Associate Professor" in professional field 4.6. Informatics and Computer Sciences (Programming) has submitted documents **only one candidate - Dafina Yordanova Petkova, PhD, Assistant professor** at Sofia University St. Kliment Ohridski, Faculty of Mathematics and Informatics..

I. General description of the presented materials

1. Application data

The documents and materials submitted by the candidate for the competition correspond to the requirements in the Academic Staff Development Act in the Republic of Bulgaria (ASDARB), regulation for application ofAcademic Staff Development Act in the Republic of Bulgaria in Sofia University St. Kliment Ohridski.

To participate in the competition, the candidate ch. Assistant Professor Dafina Yordanova Petkova presented a list of a total of 9 titles, all in refereed and indexed journals, of which in journals with an impact factor, 5 - in journals with SJR.

In the form of official notes, certificates from an employer, etc. all required documents are submitted:

1. curriculum vitae;

2. higher education diploma - master (with application);
3. diploma for the educational and scientific degree "doctor ";
4. principal assistant academic position paper;
5. certificate of work experience;
6. a reference to the submitted publications (IF and SJR of the journals in which they were published) and the citations;
7. certificates from an employer;
8. list of publications:
    a. list of all publications;
    б. list of publications submitted for participation in the concourse;
9. list of publications and conferences generated by the system “Authors“;
10. sample reference for the fulfillment of the minimum national requirements under Art. 2b of ASDARB for scientific field 4. Natural sciences, mathematics and informatics, professional direction 4.6. Informatics, with evidence attached to it;
11. a citation reference with a full bibliographic description of the cited and citing publications;
12. a reference on the indicators under Art. 112, para. 2 with evidence (description and appendices);
13. scientific works submitted for participation in the competition, structured and numbered according to the list under point 10b;
14. summaries of the presented publications in Bulgarian and in English (in one document);
15. a copy of the advertisement in the State Gazette.

2. Applicant data

Dafina Yordanova Petkova was born on June 10, 1982. In 2000 graduated from secondary education at the Secondary School "Acad. Sergey Korolyov", Blagoevgrad. In 2004 obtained a bachelor's degree in Informatics, and in 2010 - a master's degree in Bio- and Medical Informatics at the Faculty of Mathematics and Informatics of Sofia University St. Kliment Ohridski. Since 2016, he has been a doctoral student at the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences (IBPhBME-BAS) and in 2021. acquires PhD in Informatics.From 2004 to 2007, he worked as a programmer at Astea Solutions AD, Cosmos Software Enterprises Ltd. and Skyware Group Ltd.

3. General characteristics of the candidate's scientific works and achievements

The scientific results of Dafina Yordanova Petkova are presented in a total of 37 scientific papers, of which:

- 19 journal articles indexed in Web of Science and Scopus. Of them, 6 are in journals with an Impact factor. The overall IF is 17.4. Two of the articles are in journals in the first quartile (Q1), 3 in journals in the second quartile (Q2) and 1 article in a journal in the third quartile (Q3) - reference from Web of Science. There are 17 articles in journals with SJR. The overall SJR is 2.168. Three of the articles are in journals in the third quartile (Q3), 2 – in journals in the fourth quartile (Q4) - reference from Scopus*;*
- 12 articles in peer-reviewed scientific journals or series;
- 6 articles in proceedings (at conferences, etc.).

Of these, for participation in the concourse for associate professor, the candidate presents 9 publications - 3 with Impact Factor and 6 with SJR. The total IF of the publications presented in the competition is 9.842 (2 of papers with impact factor belong to quartile Q2 , 1 paper with impact factor belong to quartile Q3 , Web of Science reference), and the total SJR is 1.082. The presented scientific works meet the minimum national requirements, as well as the additional requirements of Sofia University St. Kliment Ohridski, according to Art. 105, item 4, for occupying the academic position "Associate Professor" in professional direction 4.6. Informatics and Computer Science (Programming). Dafina Petkova submits for participation in the competition for associate professor 7 cited with a full bibliographic description, all in journals referenced in Scopus. The total number of points in scientometric indicators according to the reference submitted by the candidate is 439 (indicator A - 50 points, indicator B - 123 points, indicator D - 210 points, indicator D - 56 points) with a requirement of 400 points.

From the analysis of the scientific works submitted by the candidate Dafina Yordanova Petkova for the competition, it follows that the peer-reviewed publications "do not repeat those submitted for the acquisition of the educational and scientific degree "doctor". There is no proven plagiarism in the scientific works submitted for the competition, which fulfills the requirement under Art. 29 (1) item 6 of ASDARB.

The scientific works submitted for participation in the competition present the results obtained by the candidate mainly in three thematic areas - metaheuristic algorithms, Generalized Nets and InterCriteria Analysis. Five of the publications present the work and the obtained results in the field of metaheuristic algorithms - development, adaptation and application in parametric identification

tasks, accuracy analysis. Generalized Nets are the focus of 4 of the candidate's publications, one of which couples a Generalized net model with one of the metaheuristic models for optimal search. Two of the publications are devoted to applications of InterCriteria Analysis, and in one of them, InterCriteria Analysis is applied with the aim of extracting additional knowledge about the relationships between differently tuned metaheuristic algorithms, more precisely - the algorithm of artificial bee colonies.

4. Characteristics and assessment of the candidate's teaching activity

The educational and pedagogical activity of the candidate, assistant professor PhD Dafina Yordanova Petkova is expressed in the conduct of practical exercises, seminars and lectures on "Introduction to programming", "Object-oriented programming", "Object-oriented programming (workshop)" and "Data structures and programming". which are compulsory courses in the undergraduate programs of Computer Science, Informatics, Applied Mathematics, Mathematics and Statistics at Sofia University St. Kliment Ohridski, Faculty of Mathematics and Informatics.

The candidate is the co-author of the "Compendium of C++ Programming Tasks. Part One. Introduction to Programming, 357 pages, ISBN: 978-954-9334-06-7, TechnoLogika EOOD 2008, Sofia", reissued in 2021.

5. Analysis of the applicant's scientific and applied scientific achievements contained in the materials for participation in the competition

The contributions in the peer-reviewed works, assuming equal participation of the co-authors, classified in the three scientific directions: (i) metaheuristic algorithms, (ii) Generalized nets and (iii) InterCriteria Analysis, can be considered in two categories - scientific and applied contributions and applied contributions.

The following more significant contributions can be attributed to scientific and applied ones:

- Efficient algorithms of the water cycle and of artificial bee colonies have been developed and adapted for application in tasks for parametric identification of nonlinear models of E. Coli fermentation processes.
- A hybrid metaheuristic algorithm (hybrid between artificial bee colony algorithm and genetic algorithm) has been developed, leading to higher accuracy and computational efficiency.

- A procedure for jointly tuning control parameters of a given metaheuristic algorithm has been developed, which improves the performance of the algorithm, achieving greater accuracy in the task of parametric identification of an E. Coli culture model.
- Generalized net models of the metaheuristic algorithm of the artificial bee colonies and of the production processes of different types of gasoline, taking place in the Lukoil Neftohim Burgas refinery, Bulgaria, were developed in order to study different hypotheses and situations in the production process.

The candidate's more significant applied contributions are:

- The developed metaheuristic algorithms and their hybrids are implemented programmatically in Matlab environment for parametric identification of non-linear models of fermentation processes.
- The Generalized net model of the CLIQUE clustering method, allowing upgrading to a self-learning network, and the Generalized net model of the production processes of different types of gasoline are simulated in GN IDE.
- InterCriteria Analysis was applied to evaluate the influence of artificial bee colony algorithm parameters on algorithm performance in a task of parametric identification of E. Coli fermentation process models.
- InterCriteria Analysis was applied to evaluate and analyze the influence of an experimental training methodology in the sports training of hockey players.

I accept the contributions formulated by the candidate, reflected in the works with which the assistant professor PhD Dafina Yordanova Petkova applied in the concourse for "Associate Professor" and I believe that with them the candidate proves the necessary scientific potential and scientific contribution in the field of informatics and computer science.

6. Critical notes and recommendations

I have no critical comments regarding the peer-reviewed works presented by the assistant professor PhD Dafina Yordanova Petkova for participation in the announced competition for "associate professor" in professional direction 4.6. Informatics and Computer Science (Programming).

7. Personal impressions for the candidate

The scientific activity of Dafina Yordanova Petkova, according to my personal impressions of her work in the "Bioinformatics and Mathematical Modeling" section at the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences (IBPhBME-BAS), is distinguished by thoroughness, precision, as well as with great scientific potential for the generation and implementation of original scientific ideas, thanks to solid knowledge and deep scientific interest in the field, hard work, self-demandingness and responsibility.

8. Conclusion

Having familiarized myself with the materials and scientific works presented in the competition and based on the analysis of their significance and the scientific and scientific-applied contributions contained in them, I confirm that the scientific achievements of the **Assistant Professor PhD. Dafina Yordanova Petkova** meet the requirements of ASDARB, the Regulations for its application and the relevant Regulations of Sofia University St. Kliment Ohridski for the candidate to occupy the academic position **"Associate Professor"** in professional direction 4.6. Informatics and Computer Science (Programming). In particular, the candidate satisfies the minimum national requirements in the professional direction and no plagiarism has been found in the scientific works submitted for the competition.

I give my positive assessment to the application.

II. GENERAL CONCLUSION

Based on the above, **I recommend** the scientific jury to propose to the competent authority for the selection of the Faculty of Mathematics and Informatics at Sofia University St. Kliment Ohridski to elect **Assistant Professor PhD. Dafina Yordanova Petkova to occupy** the academic position of **"Associate Professor"** in professional direction 4.6. Informatics and Computer Science (Programming).

15.11. 2022 г. Prepared the review: .....

(Assoc. Prof. PhD. Ludmila Todorova)