

# STATEMENT

on the competition for the academic position

“Associate Professor”

in professional field 4.6 Informatics and Computer Science (Programming),

at Sofia University “St. Kliment Ohridski” (SU),

Faculty of Mathematics and Informatics (FMI),

announced in State Gazette No.61/2.08.2022 and the internet sites of FMI and SU

This statement is written and submitted by Assoc. Prof. Trifon Anchev Trifonov — FMI, professional field 4.6 Informatics and Computer Science, appointed to the academic jury for this competition by the Rector of SU in accordance with Order ПД-38-561/28.09.2022.

A **single candidate** has submitted an application for this competition:

- Assist. Prof. Dafina Yordanova Petkova, PhD, FMI

## I. General Description of the Submitted Documents:

### 1. Application Details

The documents submitted by the candidate are in full compliance with the requirements of the Academic Staff Development Act (ZRASRB), the Regulations Act for the Implementation of ZRASRB (PPZRASRB), and the Regulations Act about the Terms and Conditions for Acquisition of Academic Degrees and Occupation of Academic Positions at SU (PURPNSZADSU).

For the purposes of the competition Assist. Prof. Dafina Yordanova Petkova, PhD has presented a total of 9 titles, including 9 publications in domestic and international scientific issues and conferences.

The candidate has not submitted any further documents in addition to the documents required by way of procedure.

The submitted documents are prepared and structured with exceptional care, which greatly aids their evaluation. All papers and citations are accompanied by a link and an excerpt to a referring database, which makes them easy to cross-reference.

### 2. Short Biographical Data

Assist. Prof. Dafina Yordanova Petkova, PhD, successfully completed her Bachelor’s degree in Informatics in 2004, and her Master’s degree in Informatics in the Master’s programme “Bio- and Medical Informatics”, both of which at FMI. During her Master’s studies she worked as a software developer with three software companies and started work as an Assistant Professor at the chair of Computer Science at FMI, which I find truly impressive. In 2016 she started her doctoral studies at the Institute of Biophysics and Biomedical Engineering (IBPhBME) of BAS and successfully defended her doctoral thesis in 2020. Dafina Petkova continued her scientific research as an Assistant Professor at the department of Bioinformatics and Mathematical Modelling of IBPhBME up until 2021, while still teaching and doing research at FMI. In November 2021 she was awarded a Chief Assistant Professor position, which she occupies to date.

The presented report from the university platform “Authors” shows that Dafina Petkova was a participant in 6 research projects. The respective proofs were presented as part of a preceding procedure for a Chief Assistant Professor, in which I

was also a member of the jury, although these certificates were not included in the documents for the present procedure.

### **3. General Evaluation of Scientific Work and Professional Achievements**

Assist. Prof. Dafina Yordanova Petkova, PhD has an impressive number of publications — 37, all of which published in the past 6 years. Her scientific research is in the area of mathematical modelling of systems and processes and can be classified in the following three main directions:

- a) meta-heuristic algorithms (MhA) — strategies for solving complex applied optimization problems;
- b) generalized nets (GNs) — a tool for modelling parallel processes, an extension of Petri nets;
- c) inter-criteria analysis (ICrA) — an approach for studying the interconnections between objects or between object properties.

The main problems studied by the candidate may be summarised as follows:

- modelling and analysis of biological, chemical, medical, and other processes;
- optimisation of processes via MhA and their hybrids;
- definition of extensions of GNs and their software implementation.

After a detailed review of the submitted scientific publications I confirm that:

- a) the submitted publications are in full compliance with the minimal national requirements under Art. 2B (2) and (3) of ZRASRB, as well as with the additional requirements of SU for the academic position “Associate Professor” in the professional field of this competition;
- b) none of the submitted publications have been submitted in a preceding procedure for acquiring a scientific title or an academic position;
- c) there is no lawful evidence for plagiarism in the submitted publications.

### **4. Description and Evaluation of Teaching Activities**

Dafina Petkova is a long-standing and respected teacher at FMI with over 16 years of experience. She regularly teaches exercises for the key foundational courses “Introduction to Programming”, “Object-oriented Programming” and “Data Structures and Programming”. I am aware that she often organises additional training sessions and consultations for the students, which have difficulties in following the material. After the successful defence of her PhD thesis she transitioned to a lecturer of these courses.

As evident in the provided report, Dafina Petkova regularly fulfils the teaching minimum for auditory hours and exceeds the requirements for total teaching hours. I know that the sabbatical, paid, and unpaid leaves, which she took in the past few years, were due to the need for intensive and focused research related to her dissertation. I fully support this decision, as I am aware of the considerable challenges associated with simultaneous intensive teaching and active PhD research. Dafina Petkova is a co-author of a book with exercises on C++ programming, which has become the de facto standard reference for students in the three foundational programming courses in all Bachelor programmes at FMI.

### **5. Analysis of the Content of the Theoretical and Applied Contributions Described in the Submitted Publications**

Below I will utilise the reference numbering employed by the candidate in the list of publications presented for this procedure.

A total of 9 publications were provided for this competition, including:

- 3 in journals with Impact Factor (IF) [1,2,4];
- 5 in journals with Scimago Journal Rank (SJR) [5,6,7,8,9];
- 1 in conference proceedings, referenced by Scopus [3].

All provided papers are already published, a respective hyperlink to their electronic is provided, and are of joint works of a group of between 2 and 4 authors. Since the candidate has not explicitly stated her own contribution to the joint works, I assume that all co-authors share an equal contribution.

It should be noted that the presented papers in group B of the minimal national requirements exceed the necessary 100 points with 23 points, i.e., the inclusion of paper [3] in fact exceeds the required minimum.

The citation report provides proof for a total of 7 references, of which 6 are of the same paper [4]. The proof is in the form of hyperlinks to the electronic versions of the referencing papers, accompanied by an excerpt from the Scopus database.

The scientific contributions of Dafina Petkova may be characterised as a combination of theoretical and applied research. The candidate's results are suitably structured in the provided contributions report. Below is a summary of the results of the provided papers following the structure of the aforementioned report:

- meta-heuristic algorithms (MhA): the modelling capabilities of MhA are explored in the contest of cultivation of *E. coli* bacteria:
  - modelling via classical [2] and hybrid [1] MhA;
  - adjustment and optimisation of control parameters of MhA aimed at the improvement of their precision and effectiveness [4,5].
- generalised nets (GNs):
  - modelling with GNs of algorithms [3,8] and processes [9];
  - a detailed survey of the major results on GNs [6].
- inter-criteria analysis (ICrA): applied analysis of the connection between various indicators and parameters of models of real-life processes [5,7].

It is commendable that two of the publications are in the junction point of two of the candidate's research directions [3,5].

## 6. Critical Remarks and Recommendations

I have the following remarks on the provided documents:

- it would have been useful to enclose proof for the participation of the candidate in research projects, as they are evidence for scientific activity;
- the contributions report does not explicitly delineate the individual contribution of the candidate in the joint publications.

I have the following recommendations to Dafina Petkova regarding her future teaching and research work:

- consider active work with Master and PhD students;
- consider publishing papers in which she is the sole author.

## 7. Personal Impressions

I know Dafina Petkova since 2000, where we started together in the Informatics Bachelor's programme at FMI. She immediately struck me as an exceptionally affable and hard-working colleague. Even then she approached her studies with remarkable care and responsibility, and to this day is extremely forthcoming and always ready to help her colleagues. Her qualities were noticed by our professors and she earned an invitation to become a part-time Assistant Professor during her Bachelor studies. Her

affinity to teaching was what led to her joining the chair of “Computer Informatics” as a full-time Assistant Professor. Throughout the years I have had the pleasure to work with her on many occasions and have always been impressed by her devotion to work and her desire for persistent development and improvement. She often goes above and beyond to a degree where she puts her work before her family and even her own health. She is one of the most sincere and honest people I know, and always delightful to work with and talk to.

## 8. Conclusion

Based on the review of the documents and scientific publications submitted for this competition, as well as on the analysis of their significance and the theoretical and applied contributions, I hereby confirm that the scientific achievements of the candidate meet and exceed the requirements of ZRASRB, PPZRASRB, and PURPNSZADSU for acquiring the academic position “Associate Professor” in the scientific and professional field of this competition. More specifically, the candidate satisfies the minimal national requirements of the professional field and no plagiarism has been detected in the submitted scientific publications submitted.

I hereby state my **positive** assessment of the application of Assist. Prof. Dafina Yordanova Petkova, PhD.

## II. GENERAL CONCLUSION

Based on the above, I hereby **recommend** to the scientific jury to propose to the competent authority of the Faculty of Mathematics and Informatics at Sofia University “St. Kliment Ohridski” to elect Assist. Prof. Dafina Yordanova Petkova, PhD to the academic position “Associate Professor” in professional field 4.6 Informatics and Computer Science (Programming).

November 25, 2022

Prepared by: \_\_\_\_\_  
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