# Report

on the competition for the occupation of the academic position „Associate Professor“
in the professional field 4.6 Informatics and Computer Science,
specialty Informatics (Informational models in genomics)
for the needs of the Institute of Mathematics and Informatics,
Bulgarian Academy of Sciences,
announced in the State Gazette, № 91/2.11.2021

by Prof. Dr. Kalinka Kaloyanova
Institute of Mathematics and Informatics - BAS

I am presenting this review as a member of the Scientific jury in the above-mentioned competition, on the base of the order № 342/23.12.2021 of the Director of the Institute of Mathematics and Informatics (IMI) - BAS, which is based on the decision of the Scientific Council of IMI (Protokol № 20/17.12.2021).

The only candidate for the competition is Assistant Prof. Dr. Roumyana Kirova Yordanova from the Institute of Mathematics and Informatics - BAS.

As a member of the jury I have received the following documents:

1. CV;
2. Copy of master’s degree diploma;
3. Copy of diploma for the educational and scientific degree “Doctor”;
4. List of all scientific publications;
5. List of the scientific publications for the participation in the competition;
6. Author's reference for the scientific contributions of publications presented for the participation in the competition;
7. Abstracts of the scientific publications for participation in the competition;
8. Copies of publications for participation in the competition;
9. List of all citations;
10. List of citations for participation in the competition;
11. Copy of State gazette № 91, 2021
12. Certificate of the internship;
13. Reference for the fulfillment of the minimum requirements - Application 2.2;
14. A declaration that the presented publications and citations are not used in other procedures;
15. Application to the Director of the Institute of Mathematics and Informatics.

**General presentation of the materials, submitted for the competition. Compliance with the minimum requirements**

The presented documents testify that Dr. Roumyana Yordanova meets the requirements for the occupation of the academic position of "Associate Professor", specified in the Act for the Development of the Academic Staff in the Republic of Bulgaria, the Rules of the Implementation of the Act for the Development of the Academic Staff in the Republic of Bulgaria, as well as the Rules on the Terms and Requirements for Acquisition of Academic Degrees and Occupation of Academic Positions of IMI-BAS in the scientific field 4. Natural Sciences, Mathematics and Informatics, professional field 4.6. Informatics and Computer Sciences.

- Educational and scientific degree "Doctor" from Marquette University, Milwaukee, WI, USA, 2005.
- 3 publications, indexed in Web of Science (Q1) - 150 points, while 100 points are required for the group of indicators "B".
- 5 publications, indexed in Web of Science (Q2), one publication, indexed in Web of Science (Q1), two publications, indexed in Scopus with SJR – total 290 points for group "Г", while 220 points are required.
- The total number of publications with IF or SJR submitted for the competition is 11, which meets the specific requirements of Art. 3 (1) of the Rules on the Terms and Requirements for Acquisition of Academic Degrees and Occupation of Academic Positions of IMI-BAS
- 14 citations in papers, indexed in Scopus, forms 84 points for the required 70 points for the group of indicators "Д".
- She has held an academic position for more than 3 years.
- Roumyana Yordanova participates in an international research project as well as in a research project, funded by the Bulgarian National Scientific Fund – 30 points for group „Е", where 20 points are required.
- There is no identification of plagiarism in the presented publications
- The publications are not used in other procedures.

**General characteristics of the applicant's scientific and applied activities and his contributions in the submitted publications**

Roumyana Yordanova has submitted eleven publications for this competition. Three publications are presented as cumulative habilitation thesis – В1, В2, and В3, the other eight publications – Г1, Г2, … Г8, cover the requirements of the group of indicators "Г".

The publications were made in the period 2009 - 2021. The majority of the presented results were published in journals with impact factor (four papers with IF (Q1), five papers with IF (Q2)), and two publications, indexed in Scopus that have SJR.

All publications are co-authored. Considering the field of research, a big number of co-authors is expected.

Generally, the contributions of the candidate are in modeling, processing, and analysis in the study of various types of genomic data and visualization of results, which usually are filtered lists of genes, relationships, and annotations that are further used by biologists. In two of the publications - B2 and G1, the more specific contributions of the candidate are indicated.

The publications were made in medical journals because the results would be most adequately evaluated there. For this reason, data modeling and IT processing are not always presented in detail. However, it is clear that large amounts of heterogeneous data have been processed and analyzed, which require specific selection, adaptation, and combination of the models and methods applied to them.

In [B3] and [B2], RNA expressions and genetic data from specific mice selections were analyzed, and the specificity of their processing was related to both large volumes and control/elimination of possible errors and pathway analysis. Paper [B1] presents a study of macrophages, where also an analysis and visualization of hot spots was performed.

[Г6] presents the application of systems genomic analysis and statistical methods to a study of the gene-by-environment interactions in human cells, which is important for a number of human diseases. In [Г5], a new method for genome sets enrichment analysis - FDR-FET is proposed, which dynamically optimizes thresholds selection and error control, and improves the information content of the biological information. Behavioral responses to ethanol in mice have been studied and analyzed in [Г2] using various models, including genetic mapping, and high priority candidate genes are identified.

Some of the publications - [Г4], [Г3], [Г7], present results from the application of methods for the analysis of microarray genome data. In these analyses, in addition to the statistical methods, graph models and generalized logical networks are used. Paper [Г8] presents the developed specific environment - Ontological Discovery Environment, in which an ontology of phenotype-centered genomic associations is realized.

The novelty use of the Bayesian spatial convolutional model for the analysis of genome sequences from bacteria and the modeling of antimicrobial resistance is presented in [Г1].

All topics are actual and relevant, the results can be used in the treatment of many diseases.

**Citations**

14 citations of the candidate's publications are presented for the competition, all visible in Scopus.

**Personal impressions**

I haven’t personal impressions of Roumyana Yordanova.

**Comments and recommendations**

Several different numbers/designations of the publications were used in the materials submitted for the competition. This report uses the enumeration given in Application 2.2.

I would like to recommend to Rumyana Yordanova to look for a way to transfer her experience to more Bulgarian projects and studies/research activities.

**Conclusion**

In conclusion, the documents and materials presented by Assistant Prof. Dr. Roumyana Yordanova declare results that meet all requirements for the academic position of "Associate Professor" of the Act of the Development of the Academic Staff of the Republic of Bulgaria, the Rules for its implementation, as well as of the Rules on the Terms and Requirements for Acquisition of Academic Degrees and Occupation of Academic Positions of IMI-BAS in the scientific field 4. Natural Sciences, Mathematics and Informatics, professional field 4.6. Informatics and Computer Sciences.

I give a positive assessment of the application of Dr. Roumyana Yordanova.

I recommend to the Honorable Scientific Jury to vote on a proposal to the Scientific Council of IMI - BAS to select Roumyana Kirova Yordanova for the academic position of "Associate Professor" at IMI - BAS in the professional field 4.6. Informatics and Computer Sciences.

February 11, 2022

Signature:

/Prof. Dr. Kalinka Kaloyanova/