

REPORT

**on a competition for academic position of Associate Professor
in professional field 4.6 “Informatics and Computer Science”, scientific
speciality “Informatics (Informational models in genomics)”, announced in
SG, issue 91/29.01. 02.11.2021**

**for the needs of the Institute of Mathematics and Informatics – BAS,
with a single applicant**

**Dr. Roumyana Yordanova, Assistant Prof. at IMI-BAS
by Prof. Dr. Zlatinka Svetoslavova Kovacheva,
Institute of Mathematics and Informatics – BAS**

The present report has been prepared based on Order No. 342/ 23.12.2021 of the Director of the Institute of Mathematics and Informatics - BAS, Prof. Doctor of Mathematical Sciences Peter Boyvalenkov on the grounds of Art.4, (2) of LDASRB and a decision of the Scientific Council of IMI - BAS (protocol No. 20/17.12.2021). It is in compliance with the requirements of the Law for the Development of the Academic Staff in Republic of Bulgaria (LDASRB), the Regulations for its Application (RALDASRB) and the Regulations of IMI - BAS.

1. Requirements to the applicant

By Art. 24 (1) of LDASRB, the applicants to occupy the academic position of Associate Professor must meet the following conditions:

- to have been awarded the educational and scientific degree of Doctor;
- for minimum two years to have occupied the academic position of Assistant or Chief Assistant Prof.;
- to have presented a published monograph or equivalent publications in specialized scientific issues which do not reproduce those presented for awarding the educational and scientific degree of Doctor and for awarding of the scientific degree of Doctor of Science;
- to meet the minimum national requirements under Art. 26, Para 2 and 3, respectively the requirements under Art. 26, Para 5;
- to have no plagiarism proven as per the legally established order in the scientific works.

By the Regulations for the application of LDASRB in IMI-BAS, in Art. 3(1).2, the applicant for the academic position of Associate Professor has to present at least 5 publications in scientific issues with IF or SJR.

According to the presented materials and documents, the applicant meets completely all requirements, and exceeds some of them.

2. Short biographical data

Assistant Prof. Roumyana Yordanova graduated with a master's degree in Informatics in

1992 at Sofia University "St. Kliment Ohridski" (Diploma No 118741/ 20.02.1996). In 2005 she acquires a scientific degree "Ph.D." at Marquette University, WI, US (Diploma No 000046/ 02.02.2016). Since 1994 she has been working in the Institute of mathematics and informatics – BAS (since 2013 – as assistant professor). In the period 1998-2020 she worked as assistant, senior researcher and consultant in different scientific-research centers in US. In the period 2016-2021 she worked in Hokkaido University, Sapporo, Japan.

3. General characteristics of the research and applied research activities of the candidate

The following materials are provided, presenting the research and applied research activities of the candidate:

- list of all scientific publications, including 24 titles, 18 of them are indexed in Web of Science or Scopus;
- list of 11 scientific publications selected for participation in the competition for associate professor – 9 of them with impact factor (4 in Q1, 5 in Q2) and 2 with SJR;
- abstracts in Bulgarian and English and copies of scientific papers for participation in the competition;
- list of 1017 citations (including self-citations) in Scopus;
- list of 14 publications for participation in the competition, cited in Scopus;
- list of 4 scientific research projects for participation in the competition – one of them is international - with Academy of Sciences of Israel and one is funded by the National research fund;
- author's report on the achieved results for each of the scientific papers and the main contributions;
- reference for fulfillment of the minimum requirements for holding the academic position "associate professor";

The comprehensive and professional design of the presented materials is impressive.

All submitted publications are written in English and have been published in international publishing houses abroad.

For participation in the competition, Dr. Roumyana Yordanova presented instead of a habilitation thesis - 3 publications with JCR IF (Q1) and SJR. All these publications fall under the thematic area „Informational models in genomics“.

All submitted publications for participation in the competition were published in the period 2009-2020, therefore they have not been used to obtain the scientific degree "PhD" in 2005. I have not noticed plagiarism.

From the list of cited articles for participation in the competition, 14 articles are cited in Scopus. No self-citations are noticed. The large number of citations to the citing articles is impressive.

From the presented research projects with participation of Dr. Roumyana Yordanova, one is international, with participation of the Academy of sciences of Israel and one is funded by the National research fund.

The following table presents the total number of points of the candidate and the required minimum number of points in the groups of scientometric indicators, according to Art. 1a (1) and (2) of RALDASRB and Art. 2(1) of the Regulations on the terms and conditions for obtaining scientific

degrees and for holding academic positions of IMI – BAS:

GENERALIZED TABLE

for the number of points

for the field 4. Natural sciences, mathematics and informatics

for the academic position of "Associate Professor"

of Dr. Roumyana Yordanova

Group of indicators	Minimum number of points	Number of points of the applicant
A	50	50
Б	-	-
B	100	150
Г	220	290
Д	70	84
E	20	30
Total	460	604

The table shows that the applicant exceeds the required number of points on 4 of the 5 indicators.

4. Main scientific and applied scientific contributions

The main contributions of Dr. Roumyana Yordanova are in the informational, statistical and biological modeling including data processing, integration and analysis of large dimensional „omics” data, development of methods for combining data of different nature, optimization of the sample to achieve the required power of the methods, visualization methods and programs for the presentation of data and results.

In general, contributions can be grouped as follows:

- 1) Development and application of methods for “Systems Biology Analysis” and associations between different „omics” data. This includes information approaches for analyzing global genomic data in order to find specific polymorphisms associated with complex phenotypes (e.g. HDL, LDL cholesterol levels); methods for building high-resolution networks of associations between polymorphisms, RNA expressions and genomic data such as microarray expressions; methods for finding interactions between genes and the environment – [B1, B2, B3, Г5, Г6].
- 2) Development and application of methods for analysis of genomic microarrays, including time series microarrays. This includes analysis of time series microarrays, using

statistical methods, graphical models, generalized logical networks, as well as an ontological database for phenotype-centered genomic associations– [Г3, Г4, Г7, Г8]

- 3) Analysis of microbiological genomic data for modeling antimicrobial resistance. The applied innovative approach uses both standard machine learning methods and a Bayesian spatial model for incorporating the spatial correlation between data and to assess the relative risk of various bacteria and bacteriophages potentially associated with antimicrobial resistance. – [Г1].

The most numerous are the studies from the first group. The obtained results are further used in medical studies to find new directions for the treatment of various diseases such as cardiovascular, atherosclerosis and others. Large data sets have been processed in order to analyze, generate and visualize so-called hotspots, which are locations that regulate a large number of genomic expressions. Simulations to control global error have also been performed. Many of the genes found were further analyzed using informational approaches: search in various databases for biological characterization and annotation; “Pathway” (schematic biological) analysis, GSEA “enrichment” analysis, development of new methods for causal analysis.

5. Personal impressions, opinions and recommendations

I have excellent impressions of the professional competence and the interesting presentation of the candidate at the seminar of the Temporary Scientific Unit (TSU) and her participation in the XI-th international conference “Mathematics of informational modeling”, organized by the TSU in July 2021.

I have no questions or critical remarks to the candidate, except the different numbering of the publications submitted for the competition in the list of publications, the author's reference and the reference for fulfillment of the minimum requirements.

Conclusion

From the inspection of the submitted materials for the competition no violations in the procedure have been established. All requirements of Art. 24 (1), (2), (3), Art. 26 of LDASRB, Art. 53 (1) (2) and Art. 54 of RALDASRB, Art. 2 (1) and Art. 3 (2) of the Regulations on the Conditions and the Procedure for Acquisition of Scientific Degrees and for Occupation of Academic Positions in IMI – BAS have been observed.

All publications of the candidate, presented for participation in the competition have been refereed in the world-known scientific databases and have got recognition, which is proved by the numerous citations. The results obtained, and their application in genomics and medicine justify me to claim that Assistant Prof. Dr. Roumyana Yordanova is a built scientist in the field of information modeling, with great potential for development. I believe that her scientific work deserves to be highly assessed, and I suggest to the members of the respected jury to vote on a proposal to the Scientific Council of IMI - BAS to assign the academic position of "Associate Professor" to Assistant Prof. Dr. Roumyana Yordanova.

10.02.2022 г.

Signature:

/Prof. Dr. Zlatinka Kovacheva/