

REVIEW

of the application package submitted in the competition for the **Professor position** in the professional area "**5.3 Communication and computer technology**", the academic course on "**Programming Foundations**", to the **Dept. of Computer Science and Engineering** at FCEA of TU-Varna

Applicant: **Assoc. Prof. Milena Nikolova Mileva-Karova, PhD**

Member of the scientific panel: **Prof. Todor Dimitrov Ganchev, PhD**

1. General provisions and biographical data

The competition for the academic position of Professor in the academic course "Programming Foundations" was opened by the Council of the Dept. of Computer Science and Engineering (CSE) and was approved by the decision of the Council of the Faculty of Computer Engineering and Automation (FCEA). The only candidate admitted to the competition is Associate Professor Milena Nikolova Mileva-Karova, PhD, Eng.

M. Karova completed her higher education at the VMEI-Varna in 1984, having qualified "Electrical Engineer" from the Dept. of Radio Engineering at the Faculty of Electronics. In 2006, she obtained a PhD degree from the FCEA of TU-Varna in the doctoral programme on Computer Systems, Complexes and Networks (code 02.21.04).

Assoc. Prof. Karova's career development in the "Programming Foundations" covers 37 years, during which she has consistently increased her qualifications, carrying out teaching and research activities inextricably linked to developing computer technology and programming languages—specifically, Eng. M. Karova started her teaching career as the Head of the "Club Computer" located in the Orbita Youth Center - Varna, wherein from 1985 – 1989, she carried out organisational and teaching activities with high school students on subjects related to fundamentals of computer technology and programming languages.

In 1989, she was admitted as an Assistant Professor in the Dept. of Computers of VMEI-Varna, where in 1991, she was promoted to Senior Assistant Professor and in 1998 to Chief Assistant Professor. In 2014, Dr M. Karova habituated in the professional area "5.3 Communication and computer technology" with a speciality "Computer Systems, Complexes and Networks" and took the academic position of Associate Professor in the CSE department of FCEA.

Since 2019, Assoc. Prof. Karova has served as a Deputy Dean of FCEA and is responsible for organising scientific and project activities and the personnel development of teachers and doctoral students in the faculty.

In summary, it is evident that due to her purposeful work, Assoc. Prof. Karova gained significant experience as an educator and demonstrated her professionalism as an experienced member of research teams and leader of organisational activities. She is a professional who is actively involved in developing projects in the CSE department and projects with companies from the IT industry.

2. General description of the application materials

Assoc. Prof. Karova participated in the competition for the position of Professor with 42 scientific publications -- 2 authored by her and 40 in co-authorship. In total, a set of 10 publications covers the indicator "B.4" as equivalent to habilitation work, two are indexed in world-renowned databases with scientific information according to the indicator "D.7", and the remaining 30 publications cover the indicator "D.8".

In addition, Assoc. Prof. Karova has submitted the lists of the publications used to fulfil the minimum national requirements for holding the position of Associate Professor (a total of 40 publications) and the PhD degree (a total of 3 publications). Her publications used in these competitions are distinct.

According to the group of indicators of the "D" category, lists with 20 citations -- according to the "D.12" indicator (citations in publications indexed in the world-known databases) are presented.

To satisfy the minimum requirements for the group of indicators of category "E", Assoc. Prof. Karova has presented information on the following:

- (i) "E.17 Supervision of PhD students" - a list of 2 PhD students who already obtained a PhD degree;
- (ii) "E.18 Participation in a national research or educational project" - a list of participations in a total of 7 projects, incl. five projects financed at the national level and two projects funded by TU-Varna;
- (iii) "E.19 Participation in an international research or educational project" - 1 international project;
- (iv) "E.20 Leader of a national research or educational project" - a list of 7 projects led by Prof. Karova that TU-Varna finances;
- (v) "E.24" - 1 university textbook prepared in co-authorship;

A comparison of the indicators presented by Assoc. Prof. Karova, with the minimum national and institutional requirements for the Professor position in the field "5. Technical Sciences", is shown in Table 1. As shown, Assoc. Prof. M. Karova significantly outperforms the minimum national and institutional requirements for acquiring the Professor position.

Table 1. Correspondence between the indicators set in the minimal national and institutional requirements for occupying a Professor position in the professional area "5. Technical Sciences" and the actual scores reported by the applicant.

A set of metrics	Content by indicators	Minimum requirements for the Professor position	Indicators by M. Karova
A	Indicator 1	50	50
B	Indicator 2	---	---
B	Indicator 3 or 4	100	230
G	Amount of performance from 5 to 11	200	288,2
D	Amount of indicators from 12 to 15	100	200
E	Amount of indicators from 16 to 28	150	315
ZH	Indicator 29	120	622
	Total by all indicators	720	1705,2

3. A general description of the RTD activity of the applicant

The wide range of topics covered by the scientific publications of Assoc. Prof. Karova demonstrates her multifaceted scientific output. Of the 42 publications submitted in the competition, 12 are indexed in world-renowned scientific literature databases—an up-to-date reference as of June 5th, 2023, shows 22 publications by the author in SCOPUS. As of the same date, Assoc. Prof. Karova has a Hirsch index = 4 with a total of 35 SCOPUS citations of publications involving the candidate when excluding self-citations for all co-authors.

The contributions of Assoc. Prof. Karova's publications are primarily in the category of applied research. These well reflect the considerable research and development activity (a summary is provided in section 5 below).

Prof. Karova has participated in 15 research and educational projects, including one financed by international funds, five financed under the operational programs of the Republic of Bulgaria, and nine financed by the TU-Varna.

In the competition for the Professor position, Assoc. Prof. Karova provides a list of 5 international business trips to France, Iceland, Spain, Portugal, and Hungary, with a total duration of 30 days, which indicates the candidate's activity in the search for international contacts. During her teaching career, Prof. Karova has accomplished 18 international teaching mobilities, significantly above the average for TU-Varna's educators.

4. Assessment of the pedagogical qualification of the applicant

The pedagogical activity of the candidate covers a period of 37 years -- including over 33 years at TU-Varna, and about four years as the Head of the "Club Computer" at the Orbita Youth Center - Varna. According to the submitted application package, for the previous three years, the candidate taught 622 lecture hours, which cover seven academic courses included in the curricula for the CSE Bachelor Degree students and Software and Internet Technologies students, as well as for the Master's curriculum on Systems with Artificial Intelligence. This is an excellent attestation of the work of Prof. Karova as an educator.

5. Major scientific and RTD contributions

The candidate has not provided a detailed analysis of her contributions in the groups of publications referred to indicators "B.4", "D.7", and "D.8", therefore I take this opportunity to present my perspective. The majority of the candidate's contributions are research or applied research-oriented. Some of these results have been obtained during the RTD projects of Assoc. Prof. Karova. The main contributions in the publications submitted for participation in the competition are summarised as follows:

- Research on the applicability of a group of methods and algorithms for machine learning on tasks related to the automated processing of texts for the needs of the Bulgarian language;

- Development of algorithms for encryption and study of their possibilities in the specifics of various applications related to ensuring information security in the communication of text and images;
- Investigating the applicability of a group of methods and tools in the composition of robot navigation systems.

The publications presented in the competition reflect the candidate's significant research and applied research activity. Based on the composition of the author teams for the majority of the publications and my impressions of the work of Prof. Karova, she has made a significant contribution to the quality of the developments and the results achieved.

In summary, to the extent that the contributions mentioned above adequately summarise the development progress reported in the publications presented by Prof. Karova, I believe that they can be attributed to the categories: proving with new means of already existing theories and hypotheses and confirmatory data, creating new methods and stands, developed methods related to analysis and recognition of text and images, encryption of information or navigation of robots.

6. Significance of contributions to practice

Regarding the practical significance of the candidate's research contributions, I can judge indirectly, based on the number of citations from independent authors and the number of projects in which she participated as a researcher or supervisor:

- (1) A significant part of the candidate's publications result from research projects - 15 projects in total;
- (2) A total of 35 citations are visible in SCOPUS, primarily by foreign authors, which indicates that Prof. Karova's work has attracted the attention of foreign researchers working on similar topics.

7. Critical notes and recommendations

I find the documentation well-organized and easy to check. I have no critical comments on the submitted application package. I am taking into account the experience, qualities and skills of Assoc. Prof. Karova, I recommend that she directs some part of her efforts towards gaining international recognition for her research activity, mainly by increasing the share of publications in scientific journals with an impact factor according to Thomson Reuters or in journals indexed in the databases for scientific literature WoS, SCOPUS, IEEE Digital Library, etc.. Part of the publications can be directed to journals falling into the Q1 and Q2 groups of WoS or SCOPUS, to support the promotion of TU-Varna in the academic rating systems. This will be a significant contribution to the institutional accreditation of the university and the accreditation of the professional field "5.3 Communication and computer technology".

8. Personal impressions and opinion of the reviewer

I have personally known M. Karova since 1985, in her capacity as the Head of the "Club Computer" in the Orbita Youth Center - Varna, and subsequently, after starting work the TU-Varna (1989) and as a university educator. In the years after 2016, I gained a comprehensive awareness of the scope of her teaching and scientific activity as a colleague in the CSE department. In this regard, I am pleased to certify that over the years, Assoc. Prof. Karova has proven her high workability, determination and professionalism in solving diverse engineering, teaching, research and organisational problems. In addition, in the years after 2019, in her capacity as Deputy Dean of FCEA, Assoc. Prof. Karova demonstrated her undoubted organisational skills. During her service in the Competitions Pannel of TU-Varna, she always distinguished herself with high professionalism and the ability to find suitable solutions when solving complex cases related to the evaluation of project proposals and the implementation of projects financed by TU-Varna.

CONCLUSION

The application package submitted in the competition provides an opportunity for an objective and multifaceted assessment of the research and teaching achievements of Assoc. Prof. M. Karova. The formal comparison of the presented documents with the minimal national requirements and the regulations of TU-Varna for acquiring the Professor position unequivocally demonstrates that the minimum national and institutional conditions are significantly exceeded.

After careful acquaintance with the provided documentation and my impressions of the candidate's qualities, I confirm that I support the candidate, Assoc. Prof. Milena Karova, PhD, in the competition for the academic position of Professor on the academic course "Programming Fundamentals" in the professional field: 5.3 "Communication and computer technology".

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/Prof. Todor Ganchev, PhD /