

REVIEW
on a competition for occupation of the academic position “Professor”
in professional field 4.6 Informatics and Computer Science
(Information Technologies),
announced in State Gazette No. 48 of May 26, 2020
by Sofia University St. Kliment Ohridski (SU),
Faculty of Mathematics and Informatics (FMI)

This review is prepared by Prof. Dr. Maria Nisheva-Pavlova from Sofia University St. Kliment Ohridski, FMI, as a member of the scientific jury for the competition according to Order No. PД 38-344 / 23.07.2020 of the Rector of SU.

One applicant has submitted documents for participation in the announced competition: Dr. Pavel Hristov Boytchev, Associate Professor at FMI, SU.

1. General description of the materials presented

The documents of the applicant comply with the requirements of the Act of the Development of the Academic Personnel of the Republic of Bulgaria (ADAPRB), the Rules for the Implementation of the Act of the Development of the Academic Personnel of the Republic of Bulgaria (RIADAPRB) and the Rules on the Terms and Conditions for Acquisition of Academic Degrees and Occupation of Academic Positions at SU (RTCAADOAPSU).

The applicant has submitted for the competition:

- Professional autobiography,
- Copy of diploma for higher education,
- Copy of diploma for educational and scientific degree “Doctor”,
- Copy of certificate for occupation of the academic position “Associate Professor”,
- Certificate of internship in the speciality,
- Documents proving the fulfillment of the requirements of Art. 115, para. 1, item 2 of RTCAADOAPSU,
- Lists of publications (list of all publications and list of publications presented at the competition),
- List of publications, presentations, projects and supervision activities, generated by the information system of SU,

- Reference for the fulfillment of the minimum national requirements and the requirements of SU for the professional field 4.6 Informatics and Computer Science,
- Lists of citations of publications of the applicant,
- Reference for original scientific contributions,
- Reference for the degree of fulfillment of the indicators under Art. 122, para. 2 of RTCAADOAPSU,
- Copies of publications presented at the competition,
- Abstracts of the publications presented at the competition (in Bulgarian and in English),
- Copy of the competition announcement in the State Gazette.

The documents of the applicant have been prepared carefully and in full compliance with the requirements of RTCAADOAPSU.

2. Details of the applicant

The applicant Assoc. Prof. Dr. Pavel Boytchev has a university degree in Informatics, completed in 1996 at the Sofia University. In 2001 he received a doctoral degree in Informatics. From 2001 to 2005 Dr. Boytchev worked as a visiting researcher at TI Stevens – Hoboken, New Jersey, USA, and the University of Electro-Communications – Chofu, Tokyo, Japan. From 2007 until now he holds an academic position of associate professor at the Department of Information Technologies at FMI, SU. In 2013-2014 he was the director of the master's program in E-learning and since 2016 he has been the head of the Department of Information Technologies at FMI.

3. General characteristics of the applicant's scientific work and achievements

The research activities of Assoc. Prof. Dr. Pavel Boytchev and the topics of his scientific works are entirely in the field of competition. He participates in the competition with 11 publications (one monograph, four articles in scientific journals, four articles in conference proceedings, and two books) that do not repeat those of the previous procedures for the acquisition of his doctoral degree and for the occupation of the academic position of associate professor.

Two of the scientific papers submitted for participation in the competition (the monograph and one article) are single-authored and the remaining nine are co-authored. I have no doubt about the applicant's significant personal contribution to the collective publications.

There is no proven plagiarism in the scientific works of Assoc. Prof. Dr. Pavel Boytchev.

In accordance with the requirements under Art. 1a, para. 1 of the RIADAPRB, the candidates for an the academic position of professor in professional field 4.6 Informatics and Computer Science must have: 50 points in group of indicators “A”, at least 100 points in group of indicators “B”, at least 200 points in group of indicators “Г”, at least 100 points in group of indicators “Д”, at least 150 points in group of indicators “E”.

RTCAADOAPSU does not define higher additional requirements than those specified in the RIADAPRB.

According to the submitted documents the applicant covers:

- 50 points in group of indicators “A”,
- 100 points in group of indicators “B”,
- 276 points in group of indicators “Г”,
- 104 points in group of indicators “Д”,
- 100 points in group of indicators “E”.

Therefore, the minimum national requirements and the additional requirements under Art. 1a, para. 2 and para. 3 of the RIADAPRB for occupation of the academic position of “Professor” in the professional field 4.6 Informatics and Computer Science have been completely covered by Assoc. Prof. Dr. Pavel Boytchev.

4. General characteristics of the applicant's teaching activities

The teaching activities of Assoc. Prof. Pavel Boytchev are considerable in scope and diverse in content. He has developed the content of a total of nine subjects from the curricula of various BSc and MSc programs at FMI. He teaches the courses in Fundamentals of Computer Graphics, Educational Languages and Environments, Computer Graphics with WebGL, Algorithms, Computer Graphics in Education, Geometry of Motion, Computer Graphics, Computer Systems in Education.

Dr. Boytchev has developed, constantly enriches and provides his students with a variety of author’s teaching materials in electronic format for all subjects taught by him. He was the scientific supervisor of two successfully defended PhD students, who are currently associate professors at FMI.

5. Substantive analysis of the scientific and applied scientific achievements of the applicant, presented in the materials for participation in the competition

The scientific papers, presented by Assoc. Prof. Pavel Boytchev for participation in the competition, contain original research results in the field of informatics and information technologies, which can be grouped and summarized as follows:

- Group 1: *Models of programming languages and environments*. An original model of the so-called Natural Object-Oriented Programming (OOP) which provides the standard capabilities of OOP, extended with conditional and multiple inheritance, with no need of additional language constructions. The maintained level of abstraction allows the same source code to be considered by the programmer as OOP code, procedural code or code in a functional programming language. The candidate proposes a model of compiler, which incorporates the generated compiled code, and thus the executable user file inherits the functionality of the compiler and in turn becomes a compiler with advanced functions. The Elica programming language and a corresponding application development environment, which implement the Natural OOP model in practice, have been created and enhanced for many years. The problem of creating a compiler for dynamic programming language has been successfully solved. The Lhogho compiler has been created, which continues to be the only working compiler for the Logo programming language.
- Group 2: *Methodology of specialized virtual environments*. A methodology has been developed for the design, creation and use of virtual learning environments that are specific to particular academic courses or concrete educational objectives both in terms of content and in terms of the user interface and the way of presenting the learning content.
- Group 3: *Models of metadata, meta-editors and multicultural ontologies*. An original model of meta-metadata designed to describe metadata for software components of applied games has been created. A model of meta-editor with a high level of abstraction has been developed, which works with this type of meta-metadata. A model of ontology extension has been proposed, which supports the possibility of transforming a monolanguage or multilingual ontology into a multicultural one.

In my opinion, the aforementioned results characterize the candidate Assoc. Prof. Dr. Pavel Boytchev as a well-established scientist with significant achievements, which give

reason to claim that he completely covers the concept of a leading researcher in the field of informatics and information technologies.

The conclusion on the significance of the candidate's research results is confirmed by the fact that a considerable part of them are applied in the development of innovative products to support teaching and learning in a number of academic courses. Several specialized virtual environments have been created, providing a programming or interactive interface, which are oriented to specific disciplines: СУИКА, used in the course in Educational Languages and Environments; Mexo, used in the Geometry of Motion course; ФМИЗД and Меipro, used in the Fundamentals of Computer Graphics course. An original model of synergy between educational software, university courses and educational content has been realized. A model for evaluating students through applied games has been developed. A competency model in the field of computer graphics has been created, which is applicable for evaluation of both students and problems. A multi-layered model of serious educational game has also been developed. Many interactive educational applications have been created, some of which use the Elica programming language. With Elica, other applications have been built that visualize mathematical concepts and properties.

The significance of the applicant's research results is also evidenced by their reflection in the works of other authors. Dr. Pavel Boytchev submitted data for a total of 61 citations of his publications, which do not repeat those of the previous procedures for the acquisition of his doctoral degree and for the occupation of the academic position of associate professor, in articles by other authors that were referenced and indexed in Web of Science or Scopus.

6. Critical notes and recommendations

I have no significant critical comments on the materials in the competition and in particular on the publications of Assoc. Prof. Dr. Pavel Boytchev. I recommend him to focus on more active teaching activities at Master's level and on working more actively with postgraduate and doctoral students and thus to contribute more fully to the preparation of the next generation of informatics researchers.

7. Personal impressions of the applicant

I have excellent personal impressions of the professionalism, thoroughness, original approach, dedication to work and precision in the teaching activities of Assoc. Prof. Pavel Boytchev. I

appreciate his collegiality and cooperativeness and his ability to create a good creative atmosphere around him.

8. Conclusion on the application

Having become acquainted with the materials and scientific works presented in the competition and on the basis of the analysis of their significance and the scientific and applied scientific contributions contained therein, I **confirm** that the academic achievements of the candidate Assoc. Prof. Dr. Pavel Boytchev meet the requirements of the ADAPRB, the Regulations for its implementation and the corresponding Regulations of SU for the occupation of the academic position of “Professor” in the professional field “Informatics and Computer Science”. In particular, the applicant meets the minimum national requirements in the professional field and no plagiarism has been detected in his scientific papers submitted at the competition.

I give a **positive assessment** of the application of Assoc. Prof. Dr. Pavel Boytchev.

GENERAL CONCLUSION

Based on the above, **I strongly recommend the scientific jury to vote on a proposal to the Council of the Faculty of Mathematics and Informatics of Sofia University St. Kliment Ohridski to select Assoc. Prof. Dr. Pavel Hristov Boytchev for the academic position of “Professor” in the professional field 4.6 Informatics and Computer Science (Information Technologies).**

September 16, 2020

Reviewer:

(Prof. Dr. Maria Nisheva-Pavlova)