

STATEMENT

on the competition for the academic position
“Associate Professor”
in professional field 4.6 Informatics and Computer Science (Programming and Algorithms),
at Sofia University “St. Kliment Ohridski” (SU),
Faculty of Mathematics and Informatics,
announced in State Gazette No.65/16.08.2019 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 38–591/11.10.2019.

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

- Assist. Prof. Nora Angelova Angelova, 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. Nora Angelova Angelova, PhD, has presented a total of 23 titles, including 23 publications in domestic and international scientific issues and conferences.

The candidate has submitted a total of 4 additional documents supporting professional achievements.

- a) a letter of confirmation from the Editor-in-chief of the series “Studies in Computational Intelligence” that the publications [1–3] are in press and will appear soon in conference proceedings to be published as part of the series;
- b) a certificate for membership at the Union of Mathematicians in Bulgaria;
- c) a certificate for participation with a report in a scientific seminar organised by the Bulgarian Academy of Sciences;
- d) a letter certifying the candidate’s participation in two ongoing research projects.

2. Short Biographical Data

Assist. Prof. Nora Angelova Angelova, PhD, received a Bachelor of Science in Informatics at FMI in 2012 and Master of Science in Informatics at FMI in 2013 in the Master’s programme “E-business and e-governance”. In 2017 she defended her doctoral dissertation at the Institute of Biophysics and Biomedical Engineering at the Bulgarian Academy of Sciences. During her studies at FMI she was a Teaching Assistant, and in 2017 acquired an Assistant Professor position at FMI. Since 2012 she is employed as a Senior Software Engineer at the company “Astea Solutions”. Nora Angelova is a participant in two ongoing research projects.

3. General Evaluation of Scientific Work and Professional Achievements

Assist. Prof. Nora Angelova Angelova, PhD, has a total of 33 publications. Her scientific research is in three main research directions, created and developed by the candidate's scientific adviser, Corr. Memb. Prof. Krassimir Atanassov, DSc. DSc:

- a) intuitionistic fuzzy sets — an extension of fuzzy sets;
- b) generalized nets — a tool for modeling parallel processes, an extension of Petri nets;
- c) intercriteria analysis — an approach for studying the interconnections between objects or between object properties.

Nora Angelova's work is a combination of theoretical and applied research. The majority of her scientific publications (a total of 21) are in the direction of intuitionistic fuzzy sets. The main problems studied by the candidate may be summarised as follows:

- a) intuitionistic fuzzy sets (IFS);
 - study of the properties of intuitionistic fuzzy logical operations;
 - application of the IFS as tools for solving specific problems;
- b) generalized nets (GNs):
 - definition of new extensions of GNs;
 - modeling of real processes with GNs;
 - software implementation of GNs;
- c) intercriteria analysis (ICrA):
 - application of ICrA for determining possible correlations between variables;
 - application of ICrA for analysing the similarity between intuitionistic fuzzy formulae and operations.

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

Assist. Prof. Nora Angelova Angelova, PhD, has 7 years of teaching experience at FMI: 5 of them as a Teaching Assistant and 2 as an Assistant Professor. As a Teaching Assistant the candidate has taught exercise classes in the three foundational and compulsory programming courses: Introduction to Programming, Object-oriented Programming, and Data Structures and Programming (for the Software Engineering BSc programme this course is titled Data Structures and Algorithms). After joining the Department of Computer Informatics, Nora Angelova's teaching activities were focused entirely on lectures at the above mentioned courses, which is evidence for her excellent fit for the position. It is impressive that the candidate already has experience in teaching at all four BSc programs in the field "Informatics and Computer Science". She also participated in the organisation and teaching of the elective course "Communication and Presentation skill", which, regrettably, has had only a single edition to date.

Nora Angelova has advised two Master's students who have successfully defended their theses. Additionally, for a second year she occupies the key role of an academic adviser for the BSc programme "Informatics". The candidate works very actively with students and conducts trainings for Teaching Assistants at the Department of Computer Informatics.

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

A total of 23 publications were presented for this competition, including:

- 11 in the journal "Notes on Intuitionistic Fuzzy Sets", 10 of which are referenced in Zentralblatt;
- 4 in other scientific journals, 1 of which is in a journal with a Scimago Journal Rank (SJR);
- 5 in series, 3 of which are in press in the series "Studies in Computational Intelligence", which has an SJR;
- 3 in conference proceedings, 2 of which are with SJR.

From the presented publications a total of 6 are in editions with SJR and 10 are referenced in Zentralblatt. It is worth noting that the candidate has provided evidence that [20] is included in an edition with SJR, but in the report for compliance with the minimal national requirements this paper is scored with 18 instead of 30 points. For all papers, except those in press [1–3], a hyperlink to an electronic version is provided. Nora Angelova is the sole author of paper [1], while all other papers are co-authored with up to 5 other authors. Since the candidate did not explicitly specify her own contribution in papers [2–23], I assume that all co-authors have equal contributions in all of them.

The provided citations report includes evidence for a total of 14 citations of 8 of the presented publications. The evidence is in the form of hyperlinks to electronic versions of the citing articles, or excerpts from an accessible database. Based on the citations report:

- paper [19] is most cited with 5 citations, 4 of which are in editions with SJR;
- papers [21,22] have 2 citations each, 1 of which is in a journal referenced in Zentralblatt;
- papers [7,9,10,13,20] have 1 citation each, 2 of which are in editions with SJR.

The report shows 2 additional citations of 1 paper not included in those presented for this competition.

The scientific contributions of Nora Angelova may be described as a combination of theoretical and applied research. The candidate's results are clearly structured in the provided scientific contributions report. The summary below follows the report's structure:

a) Research direction *generalized nets (GNs)*:

There are 3 publications in this direction with diverse results:

- paper [4] describes an application of GNs for modeling software protection;
- paper [5] describes a new method for formal verification of GNs based on Floyd's method;
- paper [6] presents a definition of extensions of GNs.

I have reservations towards a statement made in paper [4] that the complexity of GNs increases the reliability in comparison, for example, of specifically developed anti-deassembler methods.

b) Research direction *intuitionistic fuzzy logic (IFL)*:

Most of the presented publications, a total of 17, are in this research direction. In addition to the 15 papers indicated by the candidate I am also considering papers [8,19], which lie in the intersection of IFL and ICrA. The papers main topic of study are intuitionistic fuzzy logical operations (IFLOs). The results may be categorised as follows:

- paper [12] defines a new IFLO;
- papers [12,13,17] are dedicated to the study of properties of specific IFLOs by presenting proofs for some of the properties and claiming that the rest can be proved similarly;
- papers [11,16,18,19] are dedicated to the study of properties of a large number of IFLOs; in [11,16] there are proofs of several of the cases with the rest claimed to be provable similarly, and for the theorems stated in [18] no proofs are presented;
- papers [9,10,15] represent a list of new IFLOs generated by existing ones through several template constructions;
- paper [1] describes an extension with new constructions of the software tool for automated checking of IFLOs, IFSTool, which was originally implemented by D. Dimitrov;
- papers [20–23] present results from the automated analysis of the validity of properties and axioms for a multitude of IFLOs (including newly defined properties and axioms) via the software tool IFSTool without providing proofs, with the exception of [23] where an example of a proof is presented;
- paper [8] describes an application of IFLOs to ICrA.

c) Research direction *intercriteria analysis (ICrA)*:

There are 4 publications in this research directions, the results in which may be summarised as follows:

- papers [7,8] propose extensions of the original algorithm for intercriteria analysis, introduced by K. Atanassov et al., by the introduction of concepts and operations from intuitionistic fuzzy sets and intuitionistic fuzzy logic;
- papers [14,19] describe applications of ICrA for studying a real biochemical process and properties of IFLOs.

d) Paper [3] is in a separate research direction; it proposes an extension of a 3D variant of Conway’s “Game of Life”.

6. Critical Remarks and Recommendations

I have the following remarks to Assist. Prof. Nora Angelova Angelova, PhD, concerning the presented documents:

- the teaching activities report does not discern which courses were taught as Teaching Assistant and which ones were taught as Assistant Professor;
- the scientific contributions report does not explicitly specify the candidate’s contribution in the co-authored publications;
- the results from the automated analysis of IFLOs in papers [20–23] would be more appropriately formulated as experimental results and not as theorems, since the software tool IFSTool has not been formally verified.

I would recommend to the candidate to continue her active teaching work and her collaboration with students, to develop and publish her own teaching materials, to develop an own elective course, and to extend her scientific interests in additional research directions.

7. Personal Impressions

I know Assist. Prof. Nora Angelova Angelova, PhD, since 2009, when she was in my exercise class for the course Data Structures and Programming. She immediately made a strong and positive impression as she stood out from her colleagues by demonstrating a good grasp for new concepts, attention to detail, outstanding discipline and precision. In 2017 I was part of the academic jury reviewing Nora Angelova's application for Assistant Professor and her performance on the exam was excellent. I was impressed that immediately after acquiring the position Nora Angelova started lecturing on all three compulsory courses in programming in C++. During our work at the Department of Computer Informatics, I have observed her adapting extremely quickly and performing her duties diligently. She is generally regarded as a colleague who can be relied upon.

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 academit 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. Nora Angelova Angelova, 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. Nora Angelova Angelova, PhD, to the academic position "Associate Professor" in professional field 4.6 Informatics and Computer Science (Programming and Algorithms).

November 28, 2019

Prepared by: _____
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