

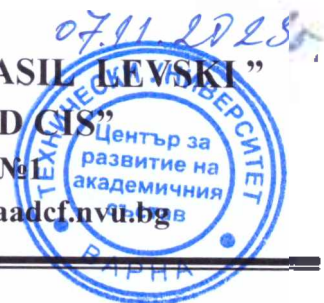


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REVIEW

on the materials in the competition for occupation of the academic position of
"associate professor"
in professional field 5.13 **General engineering**, course *Engineering methods for modeling
and analysis* at the Technical University - Varna
with candidate: Eng. **Maria Consulova-Bakalova**, PhD
Reviewer: Prof. Eng. Krasimir G. Kalev, PhD.

1. General provisions and biographical data

1.1 General provisions

The review was written in implementation of a decision taken at a meeting of the Scientific Jury on the announced competition published in the State Gazette, issue 53, 20.06.2023 for the occupation of an academic position "associate professor" in professional field 5.13 General engineering, course "Engineering modeling methods and analysis", Faculty of Mechanical Engineering, Department of Mechanical Engineering and Metal Cutting Machines.

The content of the review is in accordance with the requirements of the *Regulations for the terms and conditions for holding academic positions at the Technical University - Varna* (RTCHAPTU-Varna).

1.2. Biographical data

Dr. Maria Konsulova-Bakalova, Eng., graduated with a master's degree in "Electronic Technology and Microelectronics" with a specialization in "Medical Electronics". In 2007, he successfully defended his thesis in the doctoral program Automated Systems for Information Processing and Management.

Eng. Dr. Maria Konsulova-Bakalova holds various positions in the field of education and scientific research, as an associate at the Institute for Nanostructural Technologies and Analyzes - Germany, honorary lecturer at the Technical University - Varna, organizer of distance learning and since 2009 year, after a successful presentation in a competition, she was appointed as the Ch. Assistant in the Department of Mechanical Engineering Technology and Metal Cutting Machines at the Faculty of Mechanical Engineering at the Technical University - Varna.

2. General description of the presented materials

The candidate for the announced competition has submitted a total of 55 works, of which an abstract of a dissertation - 1 piece. (A.1, Reference according to Art. 2b of the Law on the Development of the Academic Staff (LDAS), Art. 60, Paragraph 3 of the Regulations for the Implementation of the Law on the Development of the Academic Staff (RLDA) for the

fulfillment of minimum national requirements for employment of the academic position "associate professor" in the field of higher education 5. Technical sciences), monograph - 1 item. (B.3, Reference in accordance with Art. 2b of the LDAS, Art. 60, para. 3 of the RLDA for the fulfillment of minimum national requirements for occupying the academic position "associate professor" in the field of higher education 5. Technical sciences), scientific publication in editions that are referenced and indexed in world-famous databases with scientific information - 10 nos. in co-authorship (G.7, Reference according to Art. 2b of LDAS, Art. 60, para. 3 of RLDA for fulfillment of minimum national requirements for occupying the academic position "associate professor" in field of higher education 5. Technical sciences), scientific publication in non-refereed journals with scientific review or in edited collective volumes - 34 items. (D.8, Reference in accordance with Art. 2b of the LDAS, Art. 60, paragraph 3 of the RLDA for the fulfillment of minimum national requirements for occupying the academic position of "associate professor" in the field of higher education 5. Technical sciences), teaching aids - 5 pcs. (item C from List of scientific publications and other scientific developments), publications in connection with dissertation work - 5 nos. (item X from the List of scientific publications and other scientific developments).

The scientific reports are described and classified in a list, with brief summaries in Bulgarian and foreign languages.

Of the 44 (10+34) scientific publications presented for review, 4 were independently developed, the rest were co-authored.

In the provided materials, there are data on participation in six scientific research and three educational projects (items 1 and 2 of the Author's Reference for participation in scientific research and educational projects, respectively).

In the Minimum National Requirements for occupying the academic position "associate professor" in the field of higher education Technical Sciences, the candidate's participation in national scientific or educational projects is not evaluated, but the candidate has such. In this regard, in the Summary report on the requirements achieved by groups of indicators in group E, under indicator 18. Participation in a national scientific or educational project, the following are not reported: 1) project No. KP-06-PN-37/49 "Ergonomic study of the work environment through innovative computer models, with the aim of preventing musculoskeletal disorders" in the "Funding of fundamental scientific research - 2019" competition of the "Scientific Research" Fund; 2) project BG051PO001-4.3.04-0014, "Development of electronic forms of training in the system of higher education" under the Operational Program "Development of Human Resources" 2007-2013; 3) Project No. BG051PO001-3.3.06-0005, "Development of the potential of doctoral students, post-doctoral students, young scientists and specialists in engineering sciences at TU - Varna and their contribution to the development of a knowledge-based economy" 4) Project BG 051PO001-3.1 .08-0014, "Development and improvement of the management system of the Technical University of Varna.

The candidate in the competition fulfills the minimum national requirements for the scientific and teaching activity for occupying the academic position of "Associate Professor" in the scientific field of Technical Sciences and professional field of General Engineering according to the Law on the Development of the Academic Staff in the Republic of Bulgaria (LDAS), Regulations for the Implementation of the Law on the development of the academic staff in the Republic of Bulgaria (RLDA) and the requirements under Art.1. (3), Appendix 1 of RTCHAPTU -Varna. From the minimum number of points, the candidate has presented scientific and academic results corresponding to 1254 points. Performance by indicator group is as follows:

A group of indicators	Content	Minimum required points by groups of indicators	Points by groups of indicators of. Eng. M. Bakalova, PhD
A	Indicator 1	50	50
B	Indicator 2	-	-
B	Indicators 3 or 4	100	100
Г	Sum of indicators 5 to 11	200	439,2
Д	Sum of indicators from 12 to 15	100	300
E	Sum of indicators from 16 to 28	150	(40)
Ж	Indicator 29	30	512
Total		430	1401,82 (1441,82)

The results of the scientific and teaching activities of Eng. Dr. Maria Konsulova-Bakalova meet the minimum national requirements for the scientific field of Technical Sciences defined in the Appendix to Art. 1a, para. 1 of the RLDA for occupying the academic position "associate professor" based on the indicators under Art. 2b, para. 2 of LDAS and Art. 1. (3), Appendix 1 of RTCHAPTU-Varna.

3. General characteristics of the candidate's research and applied scientific activity

The materials submitted by the candidate for the research and scientific-applied activity can be referred to the professional direction of the announced competition for the academic position of "associate professor".

The developed monographic work on Automation of engineering work. Automated design and analysis fully corresponds in content to the announced competition. It skilfully describes the basics of designing machine-building details using modern computer technology using engineering terminology. Innovative engineering analysis solutions for simulation are illustrated, through which the design engineer has the opportunity to evaluate the efficacy of the developed design before prototyping is completed. And last but not least, the idea of more digitization and automation of engineering work with the advent of the so-called Industry 4.0 and Industry 5.0 is reflected.

I accept the proposed grouping of the posts into several thematic areas:

- modern methods of training in engineering specialties;
- application of statistical methods for modeling dependencies and pattern recognition;
- application of CAD/CAE systems in engineering practice:
 - computer technologies in product design;
 - study of cutting tools;
 - computer design of products intended for production by injection molding;
 - simulation modeling of thermal and deformation-stress state processes after high temperature treatments.

I believe that the name "application of computer technologies in the design of tooling for injection molding" is more correct.

I do not accept publication No. D7.8 and D7.9 from the List of scientific publications and other scientific developments for review, as I do not find it relevant to the specialty of the announced competition.

The problems investigated by the candidate for the academic position "associate professor" fit into the professional direction for which the competition was announced and their solution is a prerequisite for creating a better educational environment in the interest of the students.

The peer-reviewed works provide a complete picture of the research activity of Dr. Maria Konsulova-Bakalova, Eng., in the professional field of "General Engineering".

4. Assessment of the candidate's pedagogical training and activity

From the candidate in the competition according to Art. 2b, para. 2, item 2 of 3PACPB presented evidence (No. 11.3 Reference for the development of lecture courses and laboratory exercises) for 13 created new lecture courses in academic disciplines: Fundamentals of automated design in mechanical engineering, Applied software, 3D modeling, Computer systems for mechanical engineering, Engineering methods for modeling and analysis, Product design with CAD/CAE systems, Optimal design in mechanical engineering, Visualization modeling of technological objects, Three-dimensional modeling, Computer-aided engineering analyzes and Design automation in mechanical engineering. 13 thematic series of laboratory exercises have also been developed for the respective lecture courses. The prepared lecture courses and laboratory exercises for them are conducted in two master's programs, in three specialties of the "Bachelor" educational-qualification degree of the Technical University of Varna, one lecture course for students with foreign language studies and under the Erasmus+ program.

Based on the experience gained in the teaching activity, curricula (No. 11.2 Author's reference for the developed curricula) have been updated in the field of the scientific specialty of the announced competition for curricula of engineering specialties in the "Bachelor's" and "Master's" degree of TU Varna.

The report on classroom employment (No. 11.1 Report on educational activity) also highlights an enviable experience in teaching subjects corresponding to the specialization Automation of engineering work and systems for automated design, providing the necessary base of knowledge and skills of future engineers from professional fields of Mechanical Engineering, Electrical Engineering, Electronics and Automation, General Engineering, etc.

The active teaching work of the candidate in the competition is also noticeable in the successful management of 5 students in the Master's College of Economics who defended their diploma thesis and 24 students in the Bachelor's College of Economics who chose the final form of study "thesis defense". In addition, information on annual participation in the last four years in state examination commissions for evaluating graduating students is also presented.

Participation in the development of teaching aids, as well as independently written ones (No. 6 List of scientific publications and other scientific developments) are the result of continuous and systematic work in the field of the specialty of the competition and create a clear idea of the academic results in the teaching activity, which are relevant to the scientific field and the professional direction of the competition announced by TU Varna, according to the measurable indicators from the table. 2 of the Appendix to Art. 1a, para. 1 of RLDA.

The results described in the provided documentation prove the high pedagogical training and active teaching activity of Eng. Dr. Maria Konsulova-Bakalova, ensuring the quality of the education of students in the area of professional field of General Engineering.

5. Basic scientific and scientific-applied contributions

Pursuant to Art. 19(2), item 6 of RTCHAPTU-Varna, the candidate in the competition for "associate professor" submitted a certificate of original scientific contributions (No. 8 of the Application to the Rector entitled Habilitation extended author's certificate of contributions).

I accept the proposed classification of the contributions of the candidate for the academic position of "associate professor" and evaluate them as scientific and applied.

Regarding the submitted monograph (habilitation thesis):

- in the field of statistical methods for decision-making, there is a contribution: proving with a new toolkit the possibility of joint use of procedures for data preparation and reducing the dimensionality of tasks with known software products for design and simulation analyzes (ch. 5 Preparation of the data for entering them into various decision-making systems - clustering and reducing the dimensionality of the tasks);

- obtaining confirmatory facts with a new approach regarding the reduction of the dimensionality of factor spaces of complex multidimensional objects of real physical systems (chap. 5 Preparation of the data for their input into various decision-making systems - clustering and reduction of the dimensionality of the tasks);

- in the field of numerical analysis and the use of modern computing machines for engineering design and analysis, there are confirmatory facts about the possibilities of solving tasks in the field of: mechanical engineering through an applied software product; electrical engineering, electronics and automation; energy; transport, shipping and aviation; general engineering etc. (ch. 4 Preparation of the data for their input into various decision-making systems - clustering and reduction of the dimensionality of the tasks);

- confirmatory data regarding the application of innovative teaching methods using modern educational technologies (ch. 2 and ch. 3 Two-dimensional geometric modeling).

Contributions of scientific publications in publications refereed and indexed in world-renowned databases of scientific information or in non-refereed peer-reviewed journals:

- creation of new methods, constructions and technologies in the application of computer-aided design and engineering analysis systems:

- computer technologies for designing in the SolidWorks environment of engineering details ([G8.19], [G8.22], [G8.23], [G8.24], [G7.7], [G8.32], [D7.1]);

- computer simulations in the analysis of physical and geometric parameters of cutting tools ([D8.16], [D8.17]);

- application of computer technologies in the design of tooling for injection molding production ([D8.12], [D8.18], [D8.20], [D8.30]);

- simulation models for research and analysis of: surface roughness ([G8.11]); heat processes in the study of the thermodynamic state during air plasma cutting ([G8.15] and [G8.10]), welding ([G8.13], [G8.14], [G7.4], [G7.5] and [G8.34]) and nitriding ([G8.25] and [G8.26]).

- obtaining confirmatory facts by conducting tests of engineering products and technologies (tools [D8.21] and technological processes [D8.33], [D7.6], [D7.2], [D7.3] and [D7.10]).

- scientific and applied contributions, reduced to the use of the author's own program for processing and recognition of one-dimensional and multidimensional signals (ch. 5. of the monograph) in various fields: intelligent measurement systems ([D8.1], [D8.2] and [D8.5]), visualization of data and feedback ([D8.9] and [D8.6]), assessment of ecosystem status ([D8.27], [D8.28] and [D8.29]) and in systems for diagnostics in stationary and transport energy ([G8.6] and [G8.9]).

- applied contributions related to the application of modern training methods in engineering specialties: approaches to combining different software products in the training process ([D8.7]), opportunities for electronic and distance learning in disciplines related to design and calculation of details [G8.8].

I accept that all contributions are the personal work of the applicant in the competition for the academic position of "associate professor".

The citations of the candidate's scientific works are described in document № 9 Author's

reference for the citations of the works of the competition.
Regarding the national requirements for occupying the academic position of "associate professor" in the field of higher education Technical Sciences, according to group "D" indicators, 52 citations of 17 works have been established. Of these, citations in scientific publications, referenced and indexed in world-famous databases with scientific information or in monographs and collective volumes - 23 items, citations in monographs and collective volumes with scientific review - 12 items. and citations in non-refereed peer-reviewed journals 17 items.

6. Significance of contributions to science and practice

The contributions achieved by the candidate in the competition correspond to the defined forms and signs in science for the evaluation of scientificity.

The requirements for the scientific activity based on the relevant scientometric indicators in the professional direction "General Engineering" for the academic position "associate professor" have been met.

7. Critical notes and recommendations

Without diminishing the value of the materials provided, it is noticeable that in some of the publications the descriptive style prevails instead of the analytical one. Minor formal remarks can also be indicated, such as use of imprecise expressions and uncorrected editorial errors.

I would recommend the candidate wishing to occupy the academic position of "associate professor" in his continuing activity on the basis of the accumulated research potential to concentrate his forces and energy to a greater extent in the field of the chosen scientific specialty or study discipline, as recorded in the announced competition.

8. Personal impressions and opinion of the review

I do not have any other information about the candidate, apart from the provided materials on the competition.

C O N C L U S I O N

The presented results of the research and teaching activities testify that the candidate in the competition has fulfilled the requirements of LDAS, RLDA and RTCHAPTU-Varna. This gives me the reason to express a positive conclusion and recommend to the respected Scientific Jury to choose Eng. Dr. Maria Ivanova Konsulova-Bakalova to occupy the academic position of "associate professor" in the field of higher education 5 Technical sciences, professional direction 5.13 General engineering in the Department of Mechanical Engineering of the Faculty of Mechanical Engineering of the Technical University of Varna.

28.10.2023
Shumen

Reviewer:
Prof. Eng. Kr

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