Appendix 12d

REPORT
to occupy the academic position:

"Professor"	
"Associate Professor"	X
	one of the academic positions indicated shall be marked with the sign "X"

Candidates to occupy the position:

1	Ch. Assist. Prof.	Dr.	Dimitar	Borisov	Borisov	University of Chemical Technology and Metallurgy
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

5	Technical sciences
code	name

Professional area:

5.13	General engineering
code	name

Scientific specialty:

Technologies and systems for environmental protection

The competition has been announced:

104	05.12.2025	Environmental Engineering	Faculty of Chemical and System Engineering
in SG issue	date	for the needs of the Department	Faculty

The report was written by:

Professor	Dr.	Alexandra	Ivanova	Grancharova	University of Chemical Technology and Metallurgy
academic position	scientific degree	name	middle name	last name	workplace

1. Report for the candidate:

Ch. Assist. Prof.	Dr.	Dimitar	Borisov	Borisov
academic position	scientific degree	name	middle name	last name

1.1. Meeting the minimum requirements under the Regulations:

A) The candidate meets the minimum requirements	20 points	X
B) The candidate doesn't meet the minimum requirements	0 points	
		one of the answers given is marked with the sign "X"

It must be filled in if answer B is marked. The publication activity of the candidate is analyzed. The response of the results achieved (quoted) is analyzed.
Ch. Assist. Prof. Dr. Dimitar Borisov participates in the competition for Associate Professor position with 1 monograph based on 11 publications in refereed journals, 19 scientific publications, 3 of which are refereed and indexed in the world-renowned databases of scientific information and 16 are published in non-refereed peer-reviewed journals, 1 teaching manual, and 10 citations.

1.2. Relevance of scientific and / or applied research:

A) The research is relevant. Part of the research is pioneering (no results are known on the topic by other authors)	8 points	
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	6 points	X
C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	4 points	
D) The smaller part of the research is relevant	2 points	
E) Research is not relevant	0 points	
		one of the answers given is marked with the sign "X"

The evaluation of the relevance of the research must be substantiated.
The scientific developments with which Dr. Dimitar Borisov participates in the competition for Associate Professor position address current issues related to the optimization of technological plants and systems, multi-criteria optimization and optimal decision-making in environmental protection, the application of neural networks and deep learning in environmental protection, energy efficiency, and sustainable development.

1.3. Objectives of the research:

A) Realistic and of scientific and / or applied interest	8 points	X
B) Realistic, but not of scientific and / or applied interest	4 points	
C) Unattainable (unrealistic)	0 points	
		one of the answers given is marked with the sign "X"

Objectives must be specified. The type of the set objectives must be justified
The goals set by Ch. Assist. Prof. D. Borisov in developing his scientific works are of scientific and applied interest and are related to solving research tasks in the following areas: developing new optimization methods with accelerated convergence, defining and researching new fractional-rational generalized strategies for finding optimal solutions to multi-criteria optimization problems, using deep learning methods to solve current applied problems (improving the accuracy of a fire detection model through pre-processing of images collected by cameras, a technique for detecting objects by autonomous vehicles, improving the accuracy of a model for detecting brain abnormalities based on computer tomography images).

1.4. Candidate research contributions:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	
B) They are of significant scientific and / or applied interest, complete and / or summarize previous research	16 points	X
C) They are of scientific and / or applied interest	12 points	
D) Lack of significant contributions	8 points	
E) Lack of contributions	0 points	
		one of the answers given is marked with

		the sign "X"

Contributions must be specified. The type of results achieved must be justified.
The scientific and the scientific-applied contributions in the works of Ch. Assist. Prof. Dr. D. Borisov can be summarized as follows: • New combined optimization methods are proposed, which have accelerated convergence and are based on the dichotomy, the golden section, and the Kiefer-Johnson method. The testing of the new methods with objective functions of various complexity shows that they are much more efficient than the classical methods and provide 2 to 4 times faster solutions depending on the size of the admissible space of the control parameters. • A new heuristic algorithm with accelerated convergence for one-dimensional optimization in an unbounded space is proposed and studied. The results show that the new method has a better convergence rate compared to other algorithms. • A new stochastic random search method and algorithms for multi-dimensional optimization with accelerated convergence is proposed. The study shows that the new algorithms for multi-dimensional optimization have much faster convergence than the classical random search methods. Another advantage of the developed methods is that they can be easily modified to solve different types of optimization problems. • A new accelerated algorithm for multi-dimensional optimization with complex ridge objective functions is proposed. • A new accelerated algorithm for global optimization based on the Price's method is proposed. The convergence rate to the solution of the new proposed methods and algorithms significantly exceeds the convergence rate of the best known Price's method. • New fractional-rational generalized strategies (with and without the use of weighting coefficients) are proposed for finding the optimal decisions of multi-criteria optimization problems. The proposed strategies are studied using real technological examples. Results are presented and leading solutions are recommended. • A method to improve the accuracy of a deep learning model for fire detection by preprocessing images collected from cameras is proposed. Experimental results show that the accuracy of the proposed model reaches over 92%, which is higher than that of other deep learning models. • An object detection technique specifically developed for autonomous vehicles and based on YOLO v5 is studied. • A method for improving the accuracy of a deep learning model for detecting brain abnormalities based on computed tomography images is studied. The experimental results show that the presented method achieves high accuracy.

1.5. Participation of the candidate in the achievement of the presented results:

A) The candidate has at least an equal participation in the submitted papers	8 points	X
B) The candidate has at least an equal participation in most of the submitted papers	7 points	

C) The candidate has a secondary participation in most of the submitted papers	4 points	
D) The candidate participation is unnoticeable	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items C or D is marked. A review of the materials submitted by Ch. Assist. Prof. Dr. D. Borisov for the competition shows that the majority of the research papers are his own work (he is the sole author of 12 of the publications), while he has made an equal contribution to the others.

1.6 Pedagogical activity:

A) The candidate has effective and sufficient pedagogical activity at the university. The textbooks issued are modern and useful (they meet the requirements of the Regulations). The work with undergraduate and doctoral students is at a high professional level.	8 points	X
B) The candidate has sufficient pedagogical activity at the university. The textbooks issued satisfy the requirements of the Regulations.	6 points	
C) The pedagogical activity and / or textbooks issued are insufficient (do not meet the requirements of the Regulations)	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the items B or C is marked.

1.7. Critical notes:

A) Lack of critical notes	8 points	X
B) Critical notes of a technical nature	7 points	
C) Critical notes that would partially improve the results achieved in a small part of the research	5 points	

D) Critical notes that would partially improve the results achieved in most of the research	3 points	
E) Significant critical notes	0 points	
		one of the answers given is marked with the sign "X"

Critical notes must be provided if one of the answers C, D or E is marked.

1.8. Conclusion

A) The evaluation of the candidate's activity is **POSITIVE**	This evaluation is assigned to a total number of at least 50 points	**X** **74**
B) The evaluation of the candidate's activity is **NEGATIVE**	This evaluation is assigned to a total number below 50 points	
		one of the answers given is marked with the sign "X"

To be filled in if requested by the member of the scientific jury
The overall scientific and teaching activity of the candidate gives me the reason very confidently to propose Ch. Assist. Prof. Dr. Dimitar Borisov Borisov to be selected as Associate Professor in the scientific specialty 5.13. General engineering, Technologies and systems for environmental protection.

13.03.2026	The report was written by:	
date	**Prof. Dr. Alexandra Grancharova**	signature