REVIEW
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	Assistant Prof.	Doctor	Lilyana	Stefanova	Koleva	UCTM
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

5.	Technical Sciences
code	name

Professional area:

5.2	Electrical engineering, electronics, automation
code	name

Scientific specialty:

Automation of engineering work and systems for automated design

The competition has been announced:

96	17.11.2023	Dept. of Industrial Automation	Chemical and System Engineering
in SG issue	date	for the needs of the Department	Faculty

The review was written by:

Professor	Doctor	Idilia	Alexandrova	Batchkova	UCTM
academic position	scientific degree	name	middle name	last name	workplace

1. Review for the candidate:

Assistant Prof.	Doctor	Lilyana	Stefanova	Koleva
academic position	scientific degree	name	middle name	last name

1.1. Completion of the provided documents:

A) The competition documents are in full compliance with the Regulations	3 points	**X**
B) The documents are complete but do not fully comply with the	2 points	

requirements of the Regulations		
C) The documents are not completed in accordance with the requirements of the Regulations	0 points	
		one of the answers given is marked with the sign "X"

Missing documents and violated requirements must be described if response C is marked.

1.2. 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.

The candidate participates in the competition with 10 publications, refereed and indexed in SCOPUS, equivalent to a monographic work, carrying 138.5 points under indicator group B. With these publications, the candidate has not participated in previous procedures and they are not included in determining the points under indicator Г, which amount to 211.5 points and exceed the minimum requirements for this group of indicators, which is evident from the comparative table presented below. 7 of the publications presented for the competition were cited a total of 20 times. The total number of points from citations (group Д) amounts to 200, i.e. these are the scores of 20 citations in publications referenced and indexed in SCOPUS.

Group of indicators	Content	Assoc. Professor	Assist. Prof. Lekova
А	Indicator 1	50	50
Б	Indicator 2	-	-
В	Indicator 3 or 4	100	138,5
Г	Sum of indicators from 5 to 11	200	211,5
Д	Sum of indicators from 12 to 15	50	200
Е	Sum of indicators from 16 to the end	-	20

1.3. 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)	7 points	
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied.	5 points	**X**
C) Most of the research is relevant, but also some results are presented that have no scientific and / or applied value	3 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 thematic areas covered by the research activity of ch. Associate Professor Liliana Koleva, Ph.D., are predominantly related to the development of methods and approaches for modeling and optimization of various technological processes and systems, and are extremely relevant for the following reasons: 1) "Data analysis" is one of the ten main trends in the field of digital transformation for 2024; 2) The development of the Internet, sensor and measurement techniques, embedded systems and the ability to store large volumes of data create unprecedented opportunities for extracting useful information and new knowledge, which necessitates the development and use of new and highly effective methods and tools for the analysis of data and optimization.

1.4. Knowledge of the problems subject of research:

A) The candidate knows in detail the achievements of other authors on the researched topics and/or applications	6 points	**X**
B) The candidate is partially familiar with the achieved results on the researched topics and / or applications	4 points	
C) The candidate has no prior knowledge of the status of the researched problems	0 points	
		one of the answers given is marked with the sign "X"

The evaluation must be substantiated if answer C is marked.

1.5. Type of research:

A) Theoretical	4 points	
B) Applied	4 points	
C) Theoretical with application elements	4 points	**X**
D) It does not correspond to the level specified in the Act for the Development of the Academic Staff in the Republic of Bulgaria and the Regulations	0 points	
		one of the answers given is marked with the sign "X"

The level of research must be substantiated if answer D is marked.

1.6. 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 main objectives of the research activity presented by the candidate are related to the following thematic areas: • Mathematical modeling of technological processes;   • Multi-criteria optimization of technological processes;   • Creation of graphical user interfaces for analysis, simulation, modeling and optimization of technological processes   After the defense of his doctoral dissertation, Dr. L. Koleva significantly expanded the goals of his research activity in the direction of: • Development of applications for creating smart homes and offices;   • Research of various products and methods for data mining;   • E-education and online learning.   • Assessing the maturity of institutions;   • Customer satisfaction research;   • Process automation

1.7. Methods of research:

A) Adequate to research and set scientific objectives and /or applications	8 points	**X**
B) Partially appropriate, enabling part of the scientific objectives and / or applications to be achieved	4 points	
C) Inappropriate methods	0 points	
		one of the answers given is marked with the sign "X"

Methods must be specified. The type of methods used is justified.
The methods used can be summarized as follows: • Linear regression analysis;   • Design of experiment;   • A method for generating successive D-optimal plans;   • Supervised training of neural networks;   • Image classification method with neural networks;   • Image classification method with logistic regression;   • Image classification method with "K-nearest neighbors";   • Creation of graphical user interfaces in Matlab environment;   • Dispersion analysis;   • Multi-criteria optimization;   • Pareto optimal solutions;   • Graphical method for multicriteria optimization;

| • Multi-criteria optimization by loss function; |
| • Multi-criteria optimization according to the Generalized robust function of desirability - Overall. |

1.8. 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.

Scientific and applied contributions

• A tomographic approach and an algorithm for image reconstruction with radial current density distribution are proposed. (I.1, II.7)

• Mathematical models of the emission of the electron beam were created (I.1, II.7)

• Neural networks with different structure were trained to study the electron beam current density distribution (II.17)

• A graphical user interface was developed to control the movement of the electron beam (I.6, II.9)

• Regression models have been created to evaluate various variables of technological processes, such as:

  o Quality of welds in electron beam welding (I.4, I.9, II.14, II.19, II.29, II.30, II.32);

  o The residual concentrations of impurities in copper and titanium, the total coefficient of purification and losses after the process of electron beam melting and refining (ELTR) (I.8, II.2, II.24, II.27);

  o The geometric characteristics of a resist in electron beam lithography (II.1, II.23);

• Neural models were trained to evaluate the quality of welds in electron beam welding (I.4, I.9).

• On the basis of the created models, multi-criteria optimization approaches have been developed to find compromise optimal solutions under imposed technological limitations and limitations on the quality of the following technological processes:

  o Electron beam welding (I.9, II.19, II.29, II.30, II.31, II.32);

  o Electron-beam melting and refining (I.2, I.8, II.2, II.22);

  o Electron beam lithography (II.6, II.23);

  o Electron-beam induced coupling (I.7, II.13, II.25);

  o Manufacture of plywood (II.21, II.26).

• Robust design based on developed models of mean values and variance of the following variables and processes:

  o Geometry of welding joints in Electron-beam welding processes (II.31, II.32)

  o Quality indicators of positive/negative resist geometry after Electron-beam lithography (II.6);

  o Product quality indicators after Electron-beam induced joining (I.7, II.11, II.13).

• A method has been developed for successively generating a D-optimal design of the experiment in order to increase the accuracy of already evaluated models (I.3)

• An approach aimed at researching and evaluating the maturity level of the quality management system in education in higher education institutions has been developed by using the self-assessment approach and the tool provided by the ISO 9004:2018 standard "Quality Management - Organizational Quality - A Guide to Sustained Success" (II.35).

Applied Contributions

• A graphical user interface was developed for studying the electron beam current density distribution

(II.17);
• On the basis of the developed models and approaches for multi-criteria optimization, graphical user interfaces and software have been developed for research and simulation of the following processes:
  o Electron beam welding (II.15);
  o Electron beam melting and refining (I.2, I.8)
  o Electron beam surface modification (I.10)
  o Manufacture of plywood (II.26);
• Development of a system for automating home electrical appliances with remote control (II.18).
• Investigating the performance of different data mining methods in the Orange Data Mining product (II.34).
• A questionnaire was drawn up and a study was conducted of the satisfaction of students and parents of students with the electronic platforms offered for online learning and the available electronic resources (II.3, II.4, II.10, II.16, II.28) . The use of statistical methods has been proposed to calculate satisfaction.
• An Arduino based automated incubator for bird eggs was designed and implemented.

1.9. 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	
B) The candidate has at least an equal participation in most of the submitted papers	7 points	**X**
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.

1.10. 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.

1.11. 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.

1.12. Conclusion

A) The evaluation of the candidate's activity is **POSITIVE**	This evaluation is assigned to a total number of at least 65 points	**X**
B) The evaluation of the candidate's activity is **NEGATIVE**	This evaluation is assigned to a total number below 65 points	
		one of the answers given is marked with the sign "X"

To be filled in if requested by the reviewer
Based on the evaluation of the candidate's research and teaching activities, the relevance and significance of the contributions in the works presented, leading to a total score of **93 points**, I consider it reasonable to propose to the Honorable Jury the announced competition (SG No. 96 of 17.11.2023) to submit a report to the Faculty Council of the Faculty of Chemical and Systems Engineering, **Assistant professor Dr. Lilyana Stefanova Koleva** to take the academic position of **ASSOCIATE PROFESSOR** at UCTM-Sofia in professional direction 5.2. "Electrical engineering, electronics and automation", in the scientific specialty "Automation of engineering work and systems for automated design".

21.03.2024		The review was written by:	**Prof. Dr. Idilia Batchkova**
date			signature