

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	Chief Asst.	PhD	Iliyan	Stoykov	Mitov	UCTM-Sofia
№	academic position	scientific degree	name	middle name	last name	workplace
2						
№	academic position	scientific degree	name	middle name	last name	workplace

Scientific area:

5	Technical sciences
code	Plastic deformation processing technologies, machines and systems

Professional area:

5.6	Materials and materials science
code	name

Scientific specialty:

Materials science and technology of engineering materials

The competition has been announced:

64	05.08.2025	Physical Metallurgy and Thermal Aggregates	FMMS
in SG issue	date	for the needs of the Department	Faculty

The review was written by:

Professor	Doctor	Emil	Georgiev	Mihailov	UCTM, Sofia
academic position	scientific degree	name	middle name	last name	workplace

1. Review for the candidate:

Chief Asst.	PhD	Iliyan	Stoykov	Mitov
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	
B) The documents are complete but do not fully comply with the requirements of the Regulations	2 points	X
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, Chief Asst. Dr. Eng. Iliyan Mitov, meets and exceeds the minimum requirements for holding the academic position "Associate Professor", regulated in the PPZRASRB and PPNSZAD at the UCTM, Sofia, in the scientific field 5. Technical Sciences.

The indicators of the candidate for the academic position "Associate Professor" at the UCTM, in the individual groups, are as follows:

- A (50 points) - Dissertation "Research of process phenomena in rotary kilns"
- B (150 points) - 10 publications. The publications are in accordance with the requirements of the Regulations for the acquisition of scientific degrees and holding academic positions at the Technical University of Bulgaria.
- D (207 points with a minimum of 200 points) - 5 scientific publications are presented in publications that are refereed and indexed in world-renowned databases with scientific information (99 points), 12 publications in non-refereed journals with scientific review or in edited collective volumes (108 points).
- E (630 with a minimum of 100 points) - The points are achieved as follows: 610 points from citations and/or reviews in scientific publications, referenced and indexed in world-renowned databases with scientific information, 20 points in non-refereed journals with scientific review.
- E (no points required) Assistant Professor Dr. Eng. Iliyan Mitov has, as a result of a published university textbook, 1 pc. in co-authorship – 10 points.
- The total number of points is 1047, with a required 400.

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 presented works are related to experimental and theoretical scientific research, with the aim of better understanding a fundamental aspect, mastering, and applying the behavior of metallic materials.
The problems encompass thermal engineering research aimed at enhancing the energy and environmental efficiency of industrial units, as well as the utilization of waste from metallurgical processes, wear resistance, heat treatment, and metallography of metals and alloys.

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.
In scientific, applied, and publication activities, the candidate analyzes, interprets, cites, and creatively applies the results achieved by other researchers, thereby contributing to the enrichment of theoretical knowledge and information in their respective areas of research.

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 research goals are realistic and have been achieved with the comprehensive and adequate application of modern research methods.
The candidate's research is of a scientific and applied nature, aimed at solving both theoretical and real-world technological problems.

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.
In the development of the candidate's research work, various methods were used, including experimental studies, mathematical modeling, and data processing. To implement the research, theoretical, analytical, and numerical models were developed, along with experimental procedures for studying metals and alloys and improving production technologies for their processing. The results obtained were confirmed through real experiments in metallurgical enterprises. Part of the research was conducted in collaboration with international teams at European universities. The goals set in the research are realistic and have been achieved with adequate application of modern research methods. Engineering and research software products have been mastered and actively used to conduct the research.

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.
The candidate's research activities have been developed in the following main areas: • thermal engineering problems for increasing the energy and environmental efficiency of industrial units; • utilization of waste from metallurgical processes; • wear resistance, heat treatment, and metallography of metals and alloys. The following more important scientific and applied scientific contributions have been achieved in the individual areas: • Has been developed a system for technological and thermal integration with the application of mathematical modeling of the individual stages of the production of flat steel products, the implementation of which has been established as a possible reduction in the costs of pre-deformation heating by up to 40%. • Using software products ANSYS-Fluent, etc., for modeling combustion, aerodynamic, and heat exchange processes in metallurgical furnaces, experimental and computational methods for sizing furnace chambers have been developed, which allow the application of the results of laboratory research to real production conditions. • With participation in an international research team and project, research has been conducted, and laboratory installations have been designed, manufactured, and put into operation for studying the behavioral and geometric characteristics of heat exchange processes when processing bulk materials in rotary furnace units. Methods and approaches have been developed, enabling the experimental determination of thermal parameters in rotary furnaces based on their technological and operational parameters. Mathematical models have been developed to determine the behavior and parameters of the melt from the processed material, and approximate relationships for engineering calculations have been derived.

- When studying the processes of pelletization and metallization of iron-containing residual materials, the influence of the size and relative content of the reducer (coal), the effects of different cooling modes (air, water), and the negative impact of additives such as water glass on the degree of metallization were established. Empirical dependencies were derived, and optimal conditions for laboratory and industrial implementation were proposed.
- When studying the process of calcination of barite extracted from a tailings pond, in order to obtain BaSO_4 with improved whiteness, optimal conditions (temperature, residence time, particle size) were determined, under which an increase in whiteness by 4–20 units was achieved. The results are applied to establish industrial production of bleached barite in the former tailings pond of MK "Kremikovtsi" (Botunets district, Sofia).
- The technological possibilities for the utilization of iron-containing waste from metallurgical production have been experimentally studied by direct reduction in a rotary kiln at different temperatures (1050–1150 °C) and in the presence of a reducer (coal). The established reduction parameters (temperature, time, pressure, gas composition) have been applied to the construction of a plant for direct reduction of iron-containing pellets in the town of Lom.
- After systematization and experimental comparison of competing technologies, the most effective method for industrial application for iron extraction from tailings ponds was selected, and the results were used to build a flotation plant for barite and iron concentrate (Botunets district, Sofia).
- When studying the reduction of copper oxides obtained as waste during hot rolling of copper slabs, in electrothermal rotating bed conditions, the optimal conditions (temperature, time, particle size) for their utilization by obtaining globular copper particles (0.4–0.8 mm) with technical purity were obtained. The results were confirmed by X-ray and sieve analyses.
- When studying the abrasive wear behavior of M390P powder steel and various high-chromium cast irons, quantitative dependencies between the temperature and the quenching/tempering regime, hardness, and wear resistance parameters (V and E) were established, and optimal thermal regimes were determined, providing a balanced combination of hardness and wear resistance for specific operating conditions.
- A scientifically based selection of heat treatments for different classes of materials has been implemented. For steels of class EN 1.3505 (AISI 52100), for powder high-chromium steels, and for chromium cast irons, regimes allowing optimization of hardness, wear resistance, and machinability have been derived.
- Practical guidelines for control of production parameters (heat treatments, machine settings, lubrication, and maintenance) have been proposed, the applications of which can extend the service life of parts and equipment. Criteria for early diagnosis and incoming control of materials have been developed.
- For the first time, new layered composite materials based on Ge–Te–In chalcogenides and azopolymers have been synthesized and studied

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 analysis of the publications and the achieved results, my assessment of the teaching activity and in connection with the fact that the candidate has fulfilled the minimum requirements of the Law on RASRB, PNSZAD and PPNSZAD of HTMU for holding the academic position of "Associate Professor", I give a positive assessment of his activity and take the liberty of proposing to the esteemed scientific jury to accept and evaluate positively the candidacy of Chief Asst. Dr. Eng. Iliyan Mitov for the academic position of "Associate Professor" in the scientific specialty "Materials Science and Technology of Mechanical Engineering Materials", professional direction 5.6. Materials and Materials Science, field of higher education 5. Technical Sciences.

Candidate ranking (in case of more than one candidate who has received a positive evaluation to occupy the academic position):

Based on the assigned points, the candidates who have received a **positive** evaluation are ranked as follows:

1	Chief Asst.	PhD	Iliyan	Stoykov	Mitov	92
place	academic position	scientific degree	name	middle name	last name	points
2						
place	academic position	scientific degree	name	middle name	last name	points
3						
place	academic position	scientific degree	name	middle name	last name	points

	The review was written by:		
14.11.2025	Emil Georgiev	Mihailov	signature