

**REVIEW**

to occupy the academic position:

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

**Candidates to occupy the position:**

1	Assoc. prof.	PhD	Dimitar	Ivanov	Pilev	UCTM
№	academic position	scientific degree	name	middle name	last name	workplace

**Scientific area:**

4	Natural sciences, mathematics and informatics
code	Scientific specialty

**Professional area::**

4.6	Informatics and Computer Science
code	name

**Scientific specialty:**

Informatics
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**The competition has been announced:**

23	19/03/2024	Informatics	Chemical and system engineering
in SG issue	date	for the needs of the Department	Faculty

**The review was written by:**

Prof.	PhD	Atansaka	Tencheva	Georgieva	Paisii Hilendarski
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					University of Plovdiv
academic position	scientific degree	name	middle name	last name	workplace

### 1. Review for the candidate:

Assoc.prof.	PhD	Dimitar	Ivanov	Pilev
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) he documents are complete but do not fully comply with the requirements of the Regulations	2 points	
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
The candidate has submitted all the necessary documents for participation in the competition for the academic position of "professor", fully comply with the requirements of the Regulations for the acquisition of scientific degrees and the occupation of academic positions at UCTM.

#### 1.2.Meeting the minimum requirements under the Regulations:

A) The candidate meets the minimum requireme	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.
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The candidate meets the minimum requirements according to the Regulations by exceeding them in four of the five indicators.

The ratio of the individual indicators is as follows:

- Indicator A: required 50, fulfilled **50**
- Indicator B: required 100, fulfilled **210** (4 publications, referenced and indexed in world-famous databases 10, 11, 12 - Q2; 13 - SJR)
- Indicator D: required 200, fulfilled **297** (9 publications, referenced and indexed in world-famous databases 1, 3 - Q2; 2 - Q3; 8, 9 – SJR; 4,5,6,7 - Scopus)
- Indicator E: required 100, fulfilled **216** (27 citations in publications referenced and indexed in Scopus and Web of Science)
- Indicator F: required 100, fulfilled **120** (Successfully supervised a PhD student, published university textbook, 4 participations in national and international research projects)

### 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	x
B) Research is relevant. Results from other authors are known for each of the topics and / or applications studied	5 points	
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

Assoc. prof Pilev's scientific research focuses on developing new mathematical models describing oil refining processes. Particularly relevant is the application of intelligent methods for optimizing such production processes to reduce environmental pollution. The candidate adeptly applies approaches based on intelligent methods for categorizing emotional states and mental health, cyber-physical security, and others.

### 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

The presence of a relatively large number of sources, as well as their correct citation, gives me grounds to believe that the candidate is familiar in detail the achievements of other authors on the studied topics.

**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.

The candidate's research is scientifically grounded and can be classified as scientific and applied. All developments have been tested, with some integrated into real production processes.

**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.		
<p>The research objectives are realistic and stimulate both scientific and applied interest. The candidate's developments are in the field of:</p> <ul style="list-style-type: none"> <li>• Improving the efficiency of production processes in oil refining;</li> <li>• Application of AI for early detection of mental disorders;</li> <li>• Integration of emotional states (fatigue, anxiety, frustration, happiness, boredom) into approaches for cyber-physical security.</li> </ul>		

### 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.		
<p>The candidate has utilized modern techniques and methods, enabling analysis of facts and reaching significant conclusions relevant to theory and practice. Briefly, some of the methods used include: SARA and HTSD analysis; Newton's method; Regression analysis; Correlation analysis; Image classification methods; Artificial neural networks.</p>		

### 1.8. Candidate research contributions:

A) With lasting scientific and / or applied response, they form the basis for new research and applications	20 points	
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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 interes	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
<p>The most important scientific-applied and applied contributions can be summarized as follows:</p> <ul style="list-style-type: none"> <li>• A procedure for simulating petroleum TBP (True Boiling Point) curves from HTSD (High Temperature Simulated Distillation) data was developed;</li> <li>• A new correlation model predicting the content of saturated petroleum from specific gravity and pour point was introduced;</li> <li>• Models predicting the conversion level of vacuum residues under various operating conditions were presented;</li> <li>• Models have been developed to predict the volatility index of petroleum liquids based on density, boiling point, and the SARA fraction composition.</li> <li>• Statistically significant relationships between different properties of petroleum have been identified;</li> <li>• The available models used for facial emotion recognition (DeepFace CNN and VGG) were analyzed. It was found that the compared models achieve higher accuracy in identifying positive emotions. These models have been used to improve the student learning process based on their facial emotions;</li> <li>• A bimodal model has been proposed that integrates facial emotions in combination with weather conditions. The model is suitable for early detection of mental disorders;</li> <li>• A hybrid multimodal model recognizing human emotions based on facial expression and body language is presented;</li> <li>• A new model of a cyber-physical security system has been introduced, utilizing facial recognition and intelligent algorithms to assess threat levels. The advantages of integrating AI methods into cyber-physical security are demonstrated, including improved accuracy, reduced response time, and enhanced capabilities for threat detection.</li> <li>• Threat severity criteria have been defined, applicable to offices, workspaces,</li> </ul>

server rooms, data centers, and other areas where data is stored.

- A dataset has been collected that can be used for training artificial neural networks integrated into cyber-physical security systems;
- Statistical models have been developed to determine the polyphenol content, flavonoids, and anthocyanins in red wines;
- A regression model has been applied to predict hourly concentrations of PM<sub>10</sub> based on meteorological indicators.

**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

The candidate has not presented separation protocols that is why I assume that he has at least equal participation in the submitted works.

**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	0 points	

insufficient (do not meet the requirements of the Regulations)		
		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
<p>Over the past 5 years, the candidate has led a total of 12 courses (7 for Bachelor's degree students and 5 for Master's degree students), having developed the curricula for all of them. The educational materials prepared are modern and accessible through an e-learning platform and the library of the University of Chemical Technology and Metallurgy. It is noteworthy that the educational resource "Informatics I" includes a module developed by Assoc. Palev for visualizing graphics and diagrams when working with applications (written in C/C++) in console mode.</p> <p>I believe that the candidate's pedagogical activities fully comply with the Regulations for the Acquisition of Academic Degrees and Holding Academic Positions at the University of UCTM.</p>

#### 1.11. Critical notes:

A) Lack of critical notes	8 points	
B) Critical notes of a technical nature	7 points	x
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
Providing summarized data on the research activity would be helpful for the reviewer. It would also be helpful if the citation list included links to the sources.

#### 1.12. Conclusion



A) The evaluation of the candidate's activity is <b>POSITIVE</b>	This evaluation is assigned to a total number of at least 65 points	X (94 points)
B) The evaluation of the candidate's activity is <b>NEGATIVE</b>	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

<b>25.07.2024</b>	The review was written by:	
date	<b>Prof. Atanaska Georgieva</b>	signature