

**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	Associate Professor	PhD	Dimitar	Ivanov	Pilev	UCTM
No	Academic position	scientific degree	name	middle name	last name	workplace

**Scientific area:**

4	Natural sciences, Mathematics and Informatics
code	name

**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	Faculty of Chemical and System Engineering
in SG issue	date	for the needs of the Department	Faculty

**The review was written by:**

professor	DSc	Angel	Borisov	Dishliev	UCTM
academic position	scientific degree	name	middle name	last name	workplace

**1. Review for the candidate:**

Associate Professor	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
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B) The 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 set of documents submitted for participation in the competition for filling the academic position "professor" fully meets the requirements of the Regulations for the acquisition of scientific degrees and the filling of academic positions at UCTM.

### 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 following table provided by the reviewer indicates the minimum national requirements that apply to all indicators for the academic position of "Professor". The results achieved by the candidate on these indicators are also presented. Achievements are measured in statutory national point equivalent:

national indicator	minimum number of points	materials submitted by the candidate	number of points reached
Dissertation work	50	Dissertation work	50
Habilitation work - scientific publications	100	4 publications in journals with classification as follows: IF, Q2 – 3 pieces $\Rightarrow$ $3 \times 60 = 180$ points; SJR – 1 item $\Rightarrow$ $1 \times 30 = 30$ points	210
Scientific publications (outside the habilitation work)	200	9 publications in journals with classification as follows: IF, Q2 – 2 pieces $\Rightarrow$ $2 \times 60 = 120$ points; IF, Q3 – 1 item $\Rightarrow$ $3 \times 45 = 45$ points; SJR – 6 pieces $\Rightarrow$ $6 \times 30 = 180$ points	345
Citations in scientific publications	100	27 citations are presented in publications published in journals that are referenced in Web of Science or Scopus:  $\Rightarrow 27 \times 8 = 216$ points	216
Guide for doctoral students, projects, study aids	100	Supervisor (individual) of a successfully defended (in 2023) doctoral student:	120

		<p>Evgenia Metodieva Savova-Videnova, topic:  <i>"Modeling of noSQL databases with temporal characteristics"</i>  Scientific specialty: 4.6. Informatics and Computer Science (Informatics)</p> <p>⇒ 50 points;</p> <p>Participation in national scientific or educational projects:</p> <p>3 projects ⇒ 3x10= 30 points</p> <p>Participation in an international scientific or educational project:</p> <p>1 project ⇒ 1x20= 20 points</p> <p>Author of a study aid as follows:  <i>Dimitar Pilev, Informatics Part I, Study Guide, University of Chemical Technology and Metallurgy - Sofia, 2024, p. 84, ISBN 978-954-465-164-0</i></p> <p>1 aid ⇒ 1x20=20 points</p>	
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The table above shows that each of the minimum national indicators is exceeded.

From the data provided, we come to the conclusion that the candidate for professorship (of his own volition) did not include in the competition materials:

- All your publications (which have not been used for participation in previous contests). I would like to point out that D. Pilev is the author of over 50 scientific works;
- All citations known to the candidate.

### 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 publications submitted for participation in the competition (as noted by the candidate) are focused on several scientific topics:

- Mathematical modeling and optimization of production processes in the oil refining industry. It is clear that this type of research is directly related to achieving higher results in production. This, in itself, means that the scientific activity on the subject is extremely important and to a large extent gives meaning to the work of the relevant scientific and implementation teams;

- Another group of the author's research is related to analyzing and comparing known models used to recognize facial emotions. These models are directly related to:
  - improving the learning process of students based on their facial emotions, during online lectures or exercises,
  - preliminary adaptation of the study material, according to the degree of perception by the students,
  - supporting the quality of the learning process in terms of changing the pace of teaching,
  - consideration of the students' attitude towards certain events,
  - the influence of time on the emotional state of people,
  - detection of an early stage of some diseases, etc.;
- Some commonly used platforms in Bulgaria have been studied and compared. Based on the research, the qualities that an abstract (so-called "ideal") platform for distance learning in an electronic environment should have were determined;
- Statistical models have been adapted, determining the quantities of some classes of specific compounds contained in the wine (red or rosé);
- A new regression model was created, including new interaction variables, used in modeling PM<sub>10</sub> concentrations in Sofia. Temperature, humidity, wind speed and radiation are recorded. The pollutant is CO. The developed models (in their various variations and time intervals of use) can serve to develop pollution control and management systems.

To conclude this point, it is my belief that peer-reviewed results are directly related to one's practical activity. Their goal is to improve and optimize some processes of modern development. The developments mentioned above are important and of course current. In other words, "they have a prior right to a permanent existence," which time and the interest they will generate will confirm.

#### 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.

I am convinced that each individual researcher (no matter how talented and able to work) is not able to familiarize himself with and assimilate all the published results on a given scientific topic (even in a relatively "narrow" scientific direction). The main reasons for this are:

- The presence of relatively numerous sources containing information on the researched topic (in the discussed case, the sources are immeasurably many);
- Externally imposed limited access to the information (for example: some of the sources are technically unavailable, others are financially unavailable, third sources are unavailable from a linguistic point of view, etc.);
- Existence of repetition or "excessive proximity" between some studies, which is why some of them are ignored by the user (or in a narrower sense by the scientific community);
- Lack of scientific interest on the part of the specific researcher to certain aspects of the theory (although related to his research), etc.

For the above reasons, the knowledge of a given scientific problem by a particular researcher should mean that he possesses a certain set of scientific knowledge on the subject (of course not all), which:

- They have the necessary quality, depth and scope;
- They enable the specific researcher to delve into the content of a significant part of the scientific results on the subject. This means, accordingly, that the researcher is able to carry out independent scientific interpretations of the results and subsequent scientific research.

I believe that my colleague D. Pilev knows to a sufficient extent the current state (as well as the historical development) of the considered scientific problems and the corresponding mathematical objects of research in the scientific works submitted for review. I reach this conclusion by considering:

- At the beginning of the presented scientific works, a serious, rich in content and fundamental introduction to the discussed topic is made. There helpfully indicate the goals, applications and main results of leading authors, on which the specific research of the candidate for the academic position of "professor" is based;
- When reading, even during the initial acquaintance with a scientific work (from the collection for participation in the competition), it is not necessary to use additional, introductory, reference literature. This circumstance is convenient for the professional reader without prior training on the researched topic, to which many belong and my grace. In this way, it is also demonstrated that "the author is yours" with what has been achieved in the researched theory and its applications;
- The fluent command of the terminology, the main definitions and statements related to the content of the discussed scientific works, as well as the ability to combine specific properties and qualities of various mathematical and applied objects is the basis for my statement about the candidate's high professional competence;
- On each of the researched topics, sufficient concrete applications from real practice are given, which once again convince us of the credibility and usefulness of the presented results;
- The indicated literature used and some comments on the works of other authors represent a confirmation of the author's sympathy for the scientific problems under consideration. Here I will note that the literature (or as it is customary to say "bibliography") accompanying the researches of Prof. D. Pilev, contains only scientific developments that are directly related to the scientific work of the author. There are no literary sources that are placed "on any external merit";
- The multitude of essential remarks (some of them of independent interest), which clarify and supplement the author's theoretical results, give me reason to consider that the theory of these complex mathematical objects, and even more precisely their real application, is deeply thought out;
- In some of the peer-reviewed publications, it can be seen that the author creates his own research technology. Moreover, it precisely defines the factors that have a significant influence on the studied processes. He is able to creatively transform known results and research methods belonging to other researchers. Possesses the ability to reasonably set achievable goals in relation to the objects of study, and in some cases to overcome accompanying difficulties of a technical nature.

#### 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.
<p>The scientific publications of the candidate for the academic position of "professor" are of a mixed nature (theory and application, which has a concrete nature). Among the theoretical aspects of the candidate's research work, I will list the creation of a relatively large number of mathematical models of processes and phenomena from practice. We can conditionally divide the models into two types:</p> <ul style="list-style-type: none"> <li>- New;</li> <li>- Improvement and refinement of known methods and models.</li> </ul> <p>The presented specific model approximations and optimizations and the conducted comparative analyzes show that all the achieved results (although theoretical) have a direct relation to the practical application. The main goal of the research is to improve the efficiency of the corresponding modeled processes, achieve higher results and improve the quality of the production. I will explicitly emphasize that some of the models have a direct practical focus and can be directly applied in production without further clarification. Their effectiveness and usefulness are shown. I will give a few examples:</p> <ol style="list-style-type: none"> <li>1. The mathematical methods created by a creative team with the participation of Assoc. Prof. D. Pilev are applied in the selection process of suitable alternative types of oil processed at LUKOIL Neftohim Burgas AD. The methods have contributed to the realization of an economic effect of over 20 million BGN.</li> <li>2. A new method for evaluation, diagnosis and database modeling of an important and profitable production process at LUKOIL Neftohim Burgas AD was successfully developed, namely: "Hydrocracking of H-Oil tar". Through this method, the reasons for the high contamination rate of the equipment and the low conversion rate were identified. Inter-criteria data analysis and fouling rate modeling through non-linear regression allows refinery professionals to take appropriate corrective actions leading to significant impact. For example, the conversion in the hydrocracking process increases by 13%, which contributes to a significant increase in the amount of diesel fuel obtained by the above-mentioned method up to 76%.</li> <li>3. The database models created by the applicant, data security and resilience during transfer and storage, etc. are the basis for the implementation of individual modules of SIS (Student Information System). I will mention some of these modules: <ul style="list-style-type: none"> <li>- NACID module;</li> <li>- Enrollment next semester module;</li> <li>- Reference module;</li> <li>- Module study schedule, exam dates, occupancy halls, etc.</li> </ul> </li> </ol>

#### 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.

To a large extent, the specific objectives are clarified in a previous point of the review, namely point 1.3, concerning the relevance of the research, and also in the next point - 1.8, referring to the contributions in the peer-reviewed publications. This gives me reason not to specify and list the research objectives of the applicant for the academic position of "professor", thus avoiding repetition.

Here (in general) I will note that the goals set in the work of Associate Professor Pilev consist in finding and adapting methods for processing numerical information directly related to practice. Analyzing the obtained results improves the human activity. Of course, the general goals set in this way are not tailored to the capabilities of one or a finite number of researchers, nor for a certain limited period of time. I believe that the candidate has contributed to the realization of this "eternal and unattainable in its fullness" goal.

**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.

I will note that, in my opinion, for some scientific research (and more specifically for some research in mathematics and informatics) the question raised about research methodology should not be taken in a narrow, specific sense. This is also the case with the discussed studies. No known "fixed" method is used here, and only this method (or several such known methods or algorithms) of research. Achieving the results is due to the application of a complex of methods and algorithms, which are products of several sciences.

A characteristic feature of the majority of the scientific work in the peer-reviewed publications is the presence of certain stages in the research. More precisely, we can conditionally divide the research into several successive stages, of which I will note the following here:

- Setting a specific research goal - the goal must necessarily have a practical orientation;
- Locating and finding specific discrete numerical data for the studied process - as a rule, the data is real from a specific production process;
- Selection and application of an appropriate mathematical model describing some important properties of real discrete data;
- Analyzing the results and evaluating possible modeling inaccuracies;
- Comparing achievements with similar results obtained by other authors;
- Discussion of the obtained properties of the modeled processes;
- Conclusions for practice. Proposals for improvement and optimization of production technologies.

In general and at the same time most precisely, the author uses the traditional methods of mathematical analysis (which are always the basis of research related to mathematical modeling and optimization). Among the methods used, we can include the methods of numerical (approximate) approximation of the information. In particular, we will mention the methods of non-linear regression analysis.

**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	
C) They are of scientific and / or applied interest	12 points	X
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.



One of the research topics of the candidate for the academic position of "Professor" concerns the fluidized bed vacuum residue hydrocracking process and the fluid catalytic cracking process. Establishing the interaction and mutual influence of these two processes in the conversion of heavy oil is an important modern theoretical task. Subsequently, the results obtained and the conclusions drawn can serve as a basis for optimizing the respective production and increasing its profitability. These studies can be attributed to modern modeling and optimization of refining processes. Process evaluations are performed by significant statistical characteristics using inter-criteria analysis. Modern mathematical software packages were used.

Another important theoretical result consists in the development of a non-linear regression model for converting basic parameters of hydrocracking processes for vacuum residues. Here it is important to note that they are processed on mixtures of different residues. The goal is to establish the degree of influence of the parameters on the increase in processing. The results were tested for specific mixtures and values of the observed parameters.

The refractive index of opaque petroleum liquids is a characteristic used to evaluate the structure, thermodynamic and transport properties of petroleum liquids. This index cannot be measured unless special experimental techniques are used. For this reason, empirical correlation and metaheuristic models have been developed predicting the refractive index of petroleum liquids as a function of density, boiling point, and fractional composition. The presented models are compared with other known models for determining the refractive index.

Using a specific viscometer, various straight distillation residual oils and hydrocracked vacuum residual oils mixed with various light oils were tested for their viscosity. In addition, known empirical correlation models were tested for their ability to predict viscosity. Known hypotheses of other authors related to viscosity measurement were confirmed.

Another major research topic is analyzing known, pre-trained models used to recognize facial emotions. The models are used to improve the learning process of students based on their facial emotions, during online lectures or exercises.

A comparative analysis of the most frequently used platforms for distance learning in an electronic environment was made. The qualities that an "ideal" distance learning platform should have are indicated.

Statistical models have been developed that determine, based on the red color, the polyphenolic content, flavonoids and anthocyanins in the wine (red or rosé).

A regression model was developed, including specific interaction variables and quadratic functions, applied to model hourly concentrations of PM<sub>10</sub> in Sofia depending on the meteorological indicators

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temperature, humidity, wind speed and radiation and the presence of one pollutant - CO. The developed models are a potential tool both for forecasting PM<sub>10</sub> concentrations and for developing pollution control and management systems.

Similar type of research, bordering on their practical application, which I indicated above, are always relevant. Therefore, I consider the candidate's research to be contemporary and useful to the scientific community. The use of the results will be useful and cost-effective for a number of productions and trainings.

**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	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.

I know Associate Professor D. Pilev relatively well. I will say that, in my opinion, he is exceptional: honorable, hardworking, serious, benevolent and responsive colleague and scientist.

I cannot accept that his participation in the scientific research presented at the competition is formal. Although there are no documents (allocation protocols, etc.) defining the participation of each of the authors, my opinion is that in the processing of the information, creation and adaptation of the methods, part of the comparative analyzes and the relevant conclusions (especially from informational point of view) are primarily his work. This conviction of mine gives me reason to rate its merits the highest on the subject of this part of the review.

I also answer the recently standard question regarding the originality of the results:

**The peer-reviewed scientific works lack elements of repetition and plagiarism by foreign researchers.**

#### 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.

D. Pilev's educational and teaching activity started in 2007 and continues until now in the Department of Informatics of UCTM. During this period, he lectured on the following academic disciplines:

- Informatics I and II part, OCS "Bachelor", full-time study;
- Internet information systems and databases, OKS "Master", full-time and part-time education;
- Introduction to operating systems, OCS "Bachelor", regular and extramural training;
- Informatics (with teaching in English), OKS "Bachelor", full-time education;
- Java I and II part, OCS "Master", full-time and part-time study;
- Java I and II part, OCS "Bachelor", regular and part-time study.

The study aid (Informatics 1 part) is an introductory course in informatics, which is mainly intended for the students of ten majors of the bachelor's degree of education at UCTM. The study material is in accordance with the curriculum, including 30 hours of lectures and 30 hours of exercises. The aid consists of two main parts:

- Basic information about computers;
- Basics of C/C++ programming.

The help is written in such a way that the theoretical information should be relatively easy to understand even by learners who are taking their first steps in this modern science. In this sense, it is really an introduction to informatics. Knowledge is "served" to the reader sequentially. Each newly introduced concept is defined and explained clearly enough. There are no references to other textbooks, which allows the user to quickly (without wasting time "unfolding" other reference books) absorb the basic information on the subject. A sufficient number of examples are given, which contribute to the perception and deeper understanding of the educational material. The content of any such textbook (especially when the curricula for which it is intended is limited in time) can be subject to controversy and preferences. I will not take my own position on this matter. I will agree with the author on his choice of topics covered. In fact, he has the necessary experience and pedagogical practice - therefore his opinion on this matter is decisive.

In conclusion on this topic of the review, I will state that my assessment of the presented aid is high. I strongly believe that it is useful for our students.

#### 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.

I have no critical notes. As I said above (which can also be said to be easily noticeable), the scientific papers of the competition have been published in reputable scientific journals and therefore have received preliminary, internal, peer-reviewed, positive reviews.

All documents related to the competition are prepared precisely and conveniently for the reviewer. It seems to me that the scientific results obtained by the candidate (I mean only those with which he participated in the discussed competition) should be expanded and systematized in several monographs.

### 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	
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
<p>The analysis of the documents of the only candidate submitted for participation in the peer-reviewed competition shows that the level of his:</p> <ul style="list-style-type: none"> <li>- scientific research activity;</li> <li>- teaching work;</li> <li>- its scientometric indicators</li> </ul> <p>fully meet the requirements of the national and university normative documents for occupying the academic position "professor" at UCTM. The topic on which the candidate is working is current and of serious scientific interest to scientists both at home and abroad.</p> <p>Based on:</p> <ul style="list-style-type: none"> <li>- the above;</li> <li>- the point asset (90 points out of 100) which (in my opinion) he deserves</li> </ul> <p>I recommend to the members of the scientific jury to propose Assoc. Prof. Dr. Dimitar Ivanov Pilev to occupy the academic position of "professor" in professional direction 4.6. "Informatics and Computer Sciences" for the needs of the "Faculty of Chemical and Systems Engineering" at UCTM.</p>

01.08. 2024	Prof. DSc. Angel Borisov Dishliev	
date	The review was written by	signature