Important information related to the exams for promotion in the didactic career, posted according to art. 3, alin. 4 al H.G. 56/25.01.2024

FACULTY OF SCIENCES

Department of Computer Science

Description of the position:
Professor, pos. 3,
Disciplines: **Genetic Algorithms**, **Intelligent Control and Classification Systems**
Field: INFORMATICS

Attributions/activities related to the position, including teaching and activity types that are related to teaching and research, respectively:

I. Teaching-related activities:

Lecturing	**116 hours**
Seminars, Laboratories, Projects	**144 hours**
Other activities	**188 hours**

Total **448 hours** Average hours per week **16 conventional hours**

II. Scientific and methodical preparation, and other activities for the benefit of education: **972 hours**

III. Scientific research activity: **300 hours** (development of conference papers, writing papers and books)

TOTAL: 1720 hours

Competition subjects, including talks, lecturing or others, or themes from which members of the commission may choose the subjects for the effective tests:

I. Genetic algorithms

1. Advanced techniques in genetic algorithms: selection, recombination, and mutation
2. Applications of genetic algorithms in artificial intelligence
3. Applications of genetic algorithms in operational research
4. Hybridization of genetic algorithms with other heuristic methods
5. Comparison of genetic algorithms with other swarm intelligence methods

II. Intelligent Control and Classification Systems

1. Artificial neural networks in intelligent control
2. Classification techniques based on machine learning: algorithms, evaluation, and applications
3. Statistical analysis of intelligent control and classification systems
4. Hybrid control systems: integrating swarm intelligence algorithms with neural networks

5. Convolutional neural networks in image classification

Selected bibliography:

1) Bishop, C.M., 2006. Pattern Recognition and Machine Learning. Springer.
2) Altman, D.G., 1991. Practical Statistic for Medical Research. Chapman and Hall.
3) Christopher M. Bishop, Pattern Recognition and Machine Learning (Vol. 4). New York: Springer, 2006.
4) Goodfellow, I., Bengio, Y., Courville, A., 2016. Deep Learning. MIT Press, Cambridge, MA/London.
5) Haykin, S., 1999. Neural Networks. A Comprehensive Foundation, second ed. Prentice-Hall.
6) Eiben, A.E., Smith, J.E., 2003. Introduction to Evolutionary Computing. Springer, Heildelberg.
7) Eiben, A.E., 2003. Multiparent recombination in evolutionary computing. In: Gosh, A., Tsutsui, S. (Eds.), Advances in Evolutionary Computation: Theory and Applications. Springer, Heidelberg, pp. 175–192.
8) LeCun, Y., 1989. Generalization and Network Design Strategies (Technical Report, CRG-TR-89-4). University of Toronto.
9) Christopher M. Bishop, Pattern Recognition and Machine Learning (Vol. 4). New York: Springer, 2006.
10) John P. Cohoon and David B. Copeland - A Practical Guide to Genetic Algorithms for Optimization, CRC Press, 2021.

DECAN,
Conf. univ. dr. Cristian TIGAE

DIRECTOR DEPARTAMENT,
Lect. univ. dr. Gabriel STOIAN

Important information related to the exams for promotion in the didactic career, posted according to art. 3, alin. 4 al H.G. 56/25.01.2024

FACULTY OF SCIENCES
Department of Chemistry

Description of the position under competition:
Position: Full Professor position 6.
Subject(s): Fuels, lubricants and special materials for automotive applications;
Chemistry;
Advanced techniques for materials investigation.
Scientific field: Industrial Engineering

Duties/activities related to the position under competition, including the teaching time and

the types of activities included in the teaching and research workload, respectively:

I. Didactic activities:

Teaching activities	147 hours;
Applied teaching activities (seminars, laboratories, projects)	112 hours;
Other activities	189 hours.

Total 448 hours Weekly average: 16 conventional hours.

II. Scientific and pedagogical training and other activities in the interests of education: 972 hours.

III. Scientific research activity: 300 hours (elaboration of scientific communications, writing studies and articles, editing books, participation in national and international scientific events).

Total: 1720 hours

The subjects of the competition examinations, including any lectures, courses or the like, or the subjects from which the competition committee may select the subjects for the tests:

1. Alternative gaseous fuels: LPG, hydrogen.
2. Liquid alternative fuels: methanol, ethanol, biodiesel.
3. Synthetic lubricating oils: production, performance characteristics, comparison with mineral oils.
4. Liquids used for engine cooling and braking.
5. Plastics used in the automotive industry. Types and properties.
6. Chemical bonds: ionic bond, covalent bond.
7. Modes of expressing the concentration of solutions.
8. Types of electrodes.
9. Electrode associations, galvanic cells: Daniel - Jacobi cell.
10. Electrolysis: theoretical principles, laws of electrolysis.
11. The “kinetic window” – an advanced approach to design meso-, micro- and nano-structured materials using the Two-Steps Sintering (TSS) treatment.
12. Extended Depth of Focus – a dedicated technique for macroscopically evaluation of special samples’ texture and topography.
13. Nanoindentation – high technology method to characterize advanced nanostructured materials from the point of view of the mechanical behavior.

Selective Bibliography:

1. M. Mateescu, Combustibilii auto și poluarea mediului. Prezent și viitor, Editura Universitaria Craiova, 2005.
2. M. Gheorghișor, Carburanți și lubrifianți pentru autovehicule, Editura Tiparg, 2012.
3. F. Dan, Combustibili. Poluare. Mediu, Editura DACIA Cluj Napoca, 2002.
4. I. Barabas, Lubrifianți pentru automobile – proprietăți, performanțe, evaluare, Cluj-Napoca, Editura UT PRESS, 2013.

5. I. Blejoiu, N. Cioateră, Chimie tehnică, Editura Universitaria Craiova, 2002.
6. C. Spînu, M. Isvoranu, C. Tigae, Chimia materialelor, Editura Universitaria Craiova, 2006.
7. A. J. Jacobson, Materials for solid oxide fuel cells, Chem. Mater., 22, 660 – 674, 2010.
8. Handbook of Manufacturing Engineering and Technology, SpringerLink, Powder Processing of Bulk Components in Manufacturing: Andrew Ruys, Oana Gingu, Gabriela Sima, Saeed Maleksaeedi; pag. 487-566.
9. Nanoindentation: Measuring methods and applications, D.A. Lucca, K. Herrmann, M.J. Klopfstein, CIRP Annals, Vol 59, Issue 2, 2010, pag. 803-819.

DEAN
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Conf. dr. Nicoleta Cioateră

Important information regarding the organization of the competitions, in agreement with art. 3, paragraph 4 of Government Decision 56/25.01.2024

FACULTY OF SCIENCES
Department of Chemistry

Description of the position under competition:
Position: Full Professor, position 7.
Subject(s): General chemistry;
Chemistry of non-metals;
Bioavailability of inorganic species.
Scientific field: Chemistry

Duties/activities related to the position under competition, including the teaching time and the types of activities included in the teaching and research workload, respectively:

I. Didactic activities:

Teaching activities	182 hours;
Applied teaching activities (seminars, laboratories, projects)	70 hours;
Other activities	196 hours.

Total 448 hours Weekly average: 16 conventional hours.

II. Scientific and pedagogical training and other activities in the interests of education: 972 hours.

III. Scientific research activity: 300 hours (elaboration of scientific communications, writing studies and articles, editing books, participation in national and international scientific

events).

Total: 1720 hours

The subjects of the competition examinations, including any lectures, courses or the like, or the subjects from which the competition committee may select the subjects for the tests:

1. General Chemistry:
1.1. Atomic Structure
1.2. Strong chemical bonds. Ionic bond. Covalent bond
1.3. Types of chemical reactions. Reactions without a change in oxidation state. Reactions with a change in oxidation state (redox reactions)
1.4. Solutions. Electrolytic dissociation of water. The concept of pH. Hydrolysis of salts
1.5. Concepts of chemical kinetics. Factors that influence the reaction rate. Reaction mechanisms
1.6. Concepts of electrochemistry. Laws of electrolysis. Electrode potential. Electromotive force of cells
1.7. Adsorption. Adsorption isotherms. Adsorbents

2. Chemistry of non-metals:
2.1. Methods of obtaining non-metals. Obtaining non-metals by thermal decomposition of some combinations. Obtaining non-metals by chemical oxidation. Obtaining non-metals by chemical reduction
2.2. Hydrogen. Physical properties. Chemical properties. Hydrogen combinations
2.3. Group VIII (Monatomic gases). Physical properties. Chemical properties. Combinations of monoatomic gases
2.4. Group VII (Halogens). Chlorine. Physical properties. Chemical properties. Combinations of chlorine
2.5. Group VI. Oxygen. Physical properties. Chemical properties. Combinations of oxygen
2.6. Group V. Nitrogen. Physical properties. Chemical properties. Nitrogen compounds
2.7. Group IV. Carbon. Physical properties. Chemical properties. Inorganic compounds of carbon

3. Bioavailability of inorganic species:
3.1. Bioavailability of inorganic species
3.2. Chemical factors controlling bioavailability
3.3. Influence of competitive equilibria on the bioavailability of species in redox couples
3.4. Methods for estimating speciation and bioavailability of inorganic species
3.5. Geochemical and geological factors controlling the bioavailability of inorganic species
3.6. Speciation and distribution of elements and health
3.7. Bioavailability of some elements. Arsenic. Cadmium. Chromium. Lead. Uranium

Selective Bibliography:
1. D. Negoiu, Tratat de chimie anorganică (Vol I si II), Editura Tehnica, 1972.

2. F.A. Cotton, G. Williamson, Advanced inorganic chemistry, J. Wiley & Sons, New York, 1980.
3. F.A. Cotton, G. Wilkinson, P.L. Gaus, Basic inorganic chemistry, J. Wiley & Sons, New York, 1982.
4. C.G. Constantinescu, M. Negoiu, C. Constantinescu, Chimie Anorganică (Vol. I), Editura Tehnică, 1986.
5. D.F. Shriver, P.W. Atkins, C.H. Langford, Chimie anorganică, Editura Tehnică, 1998.
6. U. Muller, Inorganic Structural Chemistry. Second Edition, John Wiley & Sons, 2006.
7. B.W. Pfennig, Principles of Inorganic Chemistry. Second Edition, Editura Wiley, 2022.
8. P. Chiriță, Chimie anorganică. Nemetale, Editura Universitaria, Craiova 2006.
9. G. Rayner-Canham, T. Overton, Descriptive Inorganic Chemistry. Sixth Edition, Macmillan Learning, 2013.
10. Chiriță, Nemetale. Aspecte practice și teorie, Editura Sitech, Craiova, 2016.
11. S.N. Luoma, Bioavailability of trace metals to aquatic organisms - A review. The Science of the Total Environment 28 (1983) 1-22.
12. D.C. Adriano, (Editor), Biogeochemistry of trace metals. Boca Raton, CRC Press, 1992.
13. W. Salomons, Environmental impact of metals derived from mining activities: Processes, predictions, prevention. Journal of Geochemical Exploration 52 (1995) 5-23.
14. G.S. Plumlee, M.J. Logsdon, L.F. Filipek (Editors). Reviews in Economic Geology, Volumes 6A and 6B. The Environmental Geochemistry of Mineral Deposits. Part A: Processes, Techniques, and Health Issues. Part B: Case Studies and Research Topics. Published by the Society of Economic Geologists, Inc. (SEG), 1999.
15. G. Hanrahan, Modelling of Pollutants in Complex Environmental Systems. Volume II. Edited by ILM Publications. First edition, 2010.
16. H.M. Selim (Editor) Dynamics and Bioavailability of Heavy Metals in the Rootzone. Boca Raton, CRC Press, 2017.

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Important information related to the exams for promotion in the didactic career, posted according to art. 3, alin. 4 al H.G. 56/25.01.2024

FACULTY OF SCIENCES

Department of APPLIED MATHEMATICS

Job description:
Associate professor, position 7,
Discipline (Disciplines): Linear Algebra, Analytical and Differential Geometry
The scientific domain: Mathematics

The attributions/activities related to the professor position, including the didactic norm and the types of activities included in the didactic norm, respectively the research norm:

I. Teaching-related activities:

Lecturing	168 hours;
Seminars, laboratories, projects	112 hours;
Other activities	168 hours.

Total 448 hours Average hours per week 16 hours

II. Scientific and methodical preparation, and other activities for the benefit of education: 972 hours.

III. Scientific research activity: 300 hours (elaboration of scientific communications, writing studies and articles, publishing books, participation in national and international scientific events).

Total: 1720 hours

The topic of the competition tests, including lectures, courses or similar or the topics from which the competition committee can choose the topic of the tests:

1. Linear Algebra, Analytical and Differential Geometry
    a. **Vector Spaces**: Linear dependence, basis, dimension, coordinates, subspaces.
    b. **Linear Mappings**: Kernel and image, the rank Theorem, the matrix associated to a linear mapping, eigenvalues and eigenvectors, the diagonal and Jordan form.
    c. **Bilinear and Quadratic Forms**: The reduction of a quadratic form to a canonical form (Gauss and Jacobi methods), the signature of a quadratic form.
    d. **Euclidian Spaces**: Norm, inequality of Cauchy, orthonormal basis, Gram-Schmidt procedure, orthogonal complement, symmetric operators, applications.
    e. **Analytical Geometry**: Geometric vectors, products of geometric vectors, orthonormal Cartesian frames, the straight line and plane in space, conics and quadric surfaces, ruled surfaces and rotational surfaces.
    f. **Differential Geometry of Curves and Surfaces**: Parametrized curves, curvature and torsion of a curve, the frame of Frenet; Parameterized surfaces, curves on a surface, the tangent plan and the normal at a regular point of a surface, the first and the second fundamental form of a surface, the length of a curve on a surface, curvatures, geodesics.

Bibliography:

[1] A. Belage et autres, Exercices resolus d'algebre lineaire, Masson, Paris, 1983.
[2] M. Berger, Geometry I, II, Springer Verlag, Berlin-Heidelberg, 1987.
[3] D. Lay, S. Lay, J. McDonald, Linear Algebra and its Applications, Fifth Edition, Pearson Education Ltd, 2016.
[4] F. Munteanu, M.M. Stănescu, V. Slesar, Culegere de probleme de algebră liniară, geometrie analitică şi geometrie diferenţială, Ed. Universitaria, Craiova, 2009.
[5] F. Munteanu, M.M. Stănescu, V. Slesar, Probleme de algebră liniară, geometrie analitică şi geometrie diferenţială, Ed. Sitech, Craiova, 2010.
[6] G. Murărescu, M. Sterpu, Teoria diferenţială a curbelor şi suprafeţelor. Teorie şi aplicaţii, Ed. Universitaria, Craiova, 2003.
[7] M. Neagu, Geometria curbelor şi suprafeţelor. Teorie şi aplicaţii, Ed. Matrix Rom, Bucureşti, 2013.
[8] C. Radu, Algebră liniară, geometrie analitică şi diferenţială, Ed. ALL, Bucureşti, 1998.

[9] G.E. Silov, Mathematical analysis. Finite dimensional spaces, Ed. Stiinţifică şi Enciclopedică, Bucureşti, 1983.
[10] O. Stănăşilă, Analiză liniară şi geometrie, Ed. ALL, Bucureşti, 2000.
[11] G. Strang, Introduction to Linear Algebra, Fifth Edition, Wellesley-Cambridge Press, 2016.
[12] C. Udrişte, C. Radu, C. Dicu, O. Mălăncioiu, Probleme de algebră, geometrie şi ecuaţii diferenţiale, EDP, Bucureşti, 1981.
[13] C. Vladimirescu, Matematici speciale, Editura Universitaria, 2020.
[14] I. Vladimirescu, I., Matematici aplicate, Reprografia Universităţii din Craiova, 1987.
[15] I. Vladimirescu, F. Munteanu, Algebră liniară, geometrie analitică şi geometrie diferenţială, Ed. Universitaria, Craiova, 2007.
[16] T. Vladislav, I. Raşa, Matematici financiare şi inginereşti, Ed. Fair Partners, Bucureşti, 2001.

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