



Raport privind activitatea Școlii Doctorale din Universitatea Petrol - Gaze din Ploiești pentru anul universitar 2018-2019

Metodologii și regulamente elaborate/actualizate

- modificarea Metodologiei de organizare și desfășurare a concursului pentru funcția de Director al Consiliului Studiilor Universitare de Doctorat de la IOSUD - Universitatea Petrol-Gaze din Ploiești (art.9 din HS nr.16/29.11.2018)
- Metodologia de organizare a alegerilor și de numire a membrilor Consiliului pentru Studiile Universitare de Doctorat din cadrul Universității Petrol-Gaze din Ploiești (art.1 din HS nr.3/07.02.2019)
- Regulamentul de organizare și desfășurare a studiilor universitare de doctorat la Universitatea Petrol-Gaze din Ploiești (valabil pentru studenții doctoranzi înmatriculați înainte de anul universitar 2019-2020), Revizia 2, Ediția a 3-a (art.1 din HS nr.5/14.03.2019)
- Regulamentul privind organizarea și desfășurarea studiilor universitare de doctorat la Universitatea Petrol-Gaze din Ploiești (valabil pentru studenții doctoranzi înmatriculați începând cu anul universitar 2019-2020) (art.2 din HS nr.5/14.03.2019)
- Metodologia de organizare și desfășurare a concursului de admitere la studii universitare de doctorat 2019 (art.5 din HS nr.15/18.07.2019)

Creșterea numărului de conducători de doctorat abilitați

Susținerea unui număr minim de 3 teze de abilitare

Număr de teze de abilitare susținute (nume, prenume cadru didactic abilitat, facultatea):

1. CHIȘ TIMUR VASILE – afiliat la domeniul de doctorat Mine, Petrol și Gaze

Atragerea de granturi doctorale anuale

Doctoranzi cu și fără frecvență bugetați – 25

Admitere 2018

Ingineria sistemelor = 3 admiși bugetați

Inginerie mecanică = 4 admiși bugetați + 3 taxa

Inginerie chimică = 2 admiși buget + 1 taxa

Mine, petrol și gaze = 4 admiși buget + 1 taxa

Tabel 1. Doctoranzi bugatați admiși pe facultăți

Facultatea/Departamentul/ Universitatea Petrol –Gaze din Ploiești	Locuri scoase la admitere pentru doctoranzi cu și fără frecvență bugetați 2018-2019	Număr doctoranzi cu și fără frecvență bugetați admiși 2018-2019
Ingineria Petrolului și Gazelor	3	4
Inginerie Mecanică și Electrică	3+3=6	7
Tehnologia Prelucrării Petrolului	3	2
Științe Economice	0	0
Litere și Științe	0	0
Universitatea Petrol – Gaze din Ploiești	12	13

Număr de doctoranzi bugetați: 13

**Asigurarea de resurse financiare suplimentare prin atragere doctoranzi plătitori de taxe.
Doctoranzi cu taxă (români și străini) – 20**

Tabel 2. Doctoranzi cu taxă admiși pe facultăți

Facultatea/Departamentul/ Universitatea Petrol –Gaze din Ploiești	Locuri scoase la admitere pentru doctoranzi cu taxă 2018-2019	Număr doctoranzi cu taxă admiși 2018-2019
Ingineria Petrolului și Gazelor	3	1
Inginerie Mecanică și Electrică	3+3	3
Tehnologia Prelucrării Petrolului	3	1
Științe Economice	0	0
Litere și Științe	0	0
Universitatea Petrol – Gaze din Ploiești	12	5

Organizare concurs public pentru funcția de director CSUD

Ocupare funcție publică Director CSUD

DA – prof.univ.dr.ing. CIUPARU Dragoș Mihael

Teze de doctorat susținute:

Domeniul de doctorat: Mine, petrol și gaze

12 dec. 2018 – Pelin Ștefan – conducător prof.univ.dr.ing. Nistor Iulian

(rezumat teză <https://www.upg->

[ploiesti.ro/sites/default/files/doctorat/PELIN%20STEFAN%20REZUMAT%20TEZA%20VARIANTA%20FINALA%20OK.pdf](https://www.upg-ploiesti.ro/sites/default/files/doctorat/PELIN%20STEFAN%20REZUMAT%20TEZA%20VARIANTA%20FINALA%20OK.pdf))

Domeniul de doctorat: Inginerie industrială

29 nov.2018 – Neagu Ionuț – conducător prof.univ.dr.ing. Pavel Alecsandru

(rezumat teză <https://www.upg->

[ploiesti.ro/sites/default/files/doctorat/NEAGU%20IONUT%20DRAGOS%20REZUMAT%20TEZA%20DOCTORAT%20\(1\).pdf](https://www.upg-ploiesti.ro/sites/default/files/doctorat/NEAGU%20IONUT%20DRAGOS%20REZUMAT%20TEZA%20DOCTORAT%20(1).pdf))

ACTIVITATEA DE CERCETARE

Domeniul: INGINERIE CHIMICĂ

1. Dragomir R., **Rosca, P.**, Biofuel from Hydroprocessing Fish Oil-Rev. Chimie 71(1), 2020, p.176-184
2. Ion, D., Bombos, M., Vasilievici, G., Radu, A., **Rosca, P.** Hydroconversion of Residual Fatty Acids on a molybdenum-Copper catalyst- Rev. Chimie, 70(12), 2019, p.4266-4274
3. Tepelus, A., **Rosca, P.**, Dragomir, R., Biojet from Hydroconversion of Camelina Oil Mixed with Straight Run Gas Oil, *Rev. Chim.*, 70(9), 2019, p. 3284-3291.
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5. **Sandru, S., Onutu, I.**, Estimating ternary blends properties using ANNs trained with binary blends, *REV.CHIM. (Bucharest)* (70), No. 11, 2019, p. 2367-2370
6. Radulescu, S., Negoita, L.I. , **Onutu, I.**, Effective overall heat transfer coefficient solver in a triple concentric –tube heat exchange, *REV.CHIM. (Bucharest)* (70), No. 6, 2019, p. 2040-2043
7. **Sandru, S., Onutu, I.**, Comparative study of optimization algorithms used for obtaining diesel-biodiesel blends, *REV.CHIM. (Bucharest)* (70), No. 11, 2019, p. 1893—1896
8. **Sandru, S., Onutu, I.**, Comparative study of different blending methods used for biodiesel synthesis by transesterification *REV.CHIM. (Bucharest)* (70), No. 5, 2019, p. 1866-1870
9. Brănoiu, Gh., **Cursaru, D.**, Mihai, S., Ramadan, I., Rietveld Structure Refinement of the Apophyllite Crystals from Deccan Basalt Plateau Using X-ray Powder Diffraction Data, *Revista de Chimie*, 2019, 70, 12, p. 4248-4254.
10. Rădulescu, G., **Cursaru, D.**, An optimal method for lubricating oil compounds properties estimations-The Computer based approach, *Revista de Chimie*, 2019, 70, 11, p. 3942-3946.
11. Mihai, S., **Cursaru, D.L.**, Matei, D., Manta, A.M., Șomoghi, R., Brănoiu, Gh., Rutile $Ru_xTi_{1-x}O_2$ nanobelts to enhance visible light photocatalytic activity, *Scientific Reports*, 2019, 9, 1-8
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13. **Cursaru, D.L., Giagkas, N.**, Vizireanu, S., Mihai, S., Matei, D., Biță, B., Stancu, C., Manta, A.M., Ramadan, I., Improvement of antiwear properties by coating the steel surfaces and by lubricant additivation, *Digest Journal of Nanomaterials and Biostructures*, vol. 14 (4), 2019, 907-915
14. Manta, A.M., **Cursaru, D.L.**, Mihai, S., The influence of synthesis conditions on the structural and redox properties of Mn-MCM-41, *Digest Journal of Nanomaterials and Biostructures*, vol. 14 (3), 2019, 509-515
15. Matei, D., **Cursaru, D.L.**, Stănică Ezeanu D., Reduction of harmful components of cigarette smoke using MCM-48, *Digest Journal of Nanomaterials and Biostructures*, vol. 14 (2), 2019, 381-386.
16. **Ion, C.S.**, Bombos, M., Vasilievici, G., **Matei, V.**, Gasoline desulphurization by reactive adsorption on ZnO /bentonite, *Revista de Chimie*, vol.70, Nr.1, 2019, p.50-53
17. Gheorghe, V., Gheorghe, C.G., Bondarev, A., Matei, V., Bombos, M., The malachite green biodegradation in bioreactors on various PH domains, *Revista de Chimie*, vol.70, Nr.8, 2019, p.2996-2999
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21. **Doukeh, R.**, Bombos, M, Popovici, D., Pasare, M., **Bolocan, I.**, *Effect of Support on the Performance of CoMoRe Catalyst in Thiophene and Benzothiophene Hydrodesulfurization*, Revista de Chimie, 2019, **70**(1), p 27-32.
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23. **F. Enache**, "Utilization of e-cat flushing to control metal contamination and/or in emergency situation caused by cyclones failure", Refcomm Rotterdam, 30 Sept. – 3 oct. 2019, <https://refiningcommunity.com/presentation/utilization-of-fcc-e-cat-flushing-to-control-metal-contamination-and-or-in-emergency-situations-caused-by-cyclone-failure/>

Domeniul de doctorat: INGINERIE MECANICĂ

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1. Caltaru M, Badicioiu M, **Ripeanu R G**, Dinita A, Minescu M, Laudacescu E, Tribological characterization of the drill pipe tool joints reconditioned by using welding technologies, 9th International Conference on Tribology, BALKANTRIB'17 13-15 September, Cappadocia, TURKEY, 2017, Book Series: IOP Conference Series-Materials Science and Engineering Vol. 295, 2018, pp.1-11, ISSN 1757-8981, <https://doi.org/10.1088/1757-899X/295/1/012010>, Bristol BS1 6BE, England,2018;
2. **Ripeanu R G**, Badicioiu M, Caltaru M, Dinita A, Laudacescu E, Tribological characterization of the drill collars and casing friction couples, 9th International Conference on Tribology, BALKANTRIB'17 13-15 September, Cappadocia, TURKEY, 2017, Book Series: IOP Conference Series-Materials Science and Engineering Vol. 295, 2018, pp.1-10, ISSN 1757-8981, <https://doi.org/10.1088/1757-899X/295/1/012009>, Bristol BS1 6BE, England,2018
3. **Dudu C, Ripeanu R.G.**, Drumeanu A.C., Dinita A., **Lospa A.M.**, Evaluation of the corrosion wear speed of different equipment in the water injection treatment plant, The 10th International Conference of Product Design, Robotics, Advanced Mechanical & Mechatronic Systems and Innovation Conference (PRASIC 18), 8-9 November 2018, Book Series: IOP Conference Series-Materials Science and Engineering, Vol. 514, 2019, pp.1-8, ISSN 1757-899X, <https://doi.org/10.1088/1757-899X/514/1/012008>, Bristol BS1 6BE, England,2019 <https://www.scopus.com/authid/detail.uri?authorId=24067665900>;
4. **Lospa A.M., Ripeanu R.G.**, Dinita A., and **Dudu C.**, CFD Evaluation of sand erosion wear rate in pipe bends used in technological installations, The 10th International Conference of Product Design, Robotics, Advanced Mechanical & Mechatronic Systems and Innovation Conference (PRASIC 18), 8-9 November 2018, Book Series: IOP Conference Series-Materials Science and Engineering, Vol. 514, 2019, pp.1-8, ISSN 1757-899X, <https://doi.org/10.1088/1757-899X/514/1/012009>, Bristol BS1 6BE, England,2019 <https://www.scopus.com/authid/detail.uri?authorId=24067665900>;
5. **Bogdan-Roth M.**, Romanet M., **Ripeanu R.G.**, Device for machining non-circular gears, Proceedings on Engineering Science 16th International Conference on Tribology, 15 – 17 May, 2019, <http://www.serbiatrib.mfkg.rs/>, Vol. 1, No. 1 (2019), ISSN: 2620-2832 pp.449-453, Kragujevac, Serbia;
6. **Hagianu A., Nae I.**, Ionescu G.C., **Ripeanu R.G.**, Dinita A., Ramadan I.N., Research and studies on flexible tubing wearing, Proceedings on Engineering Science 16th International Conference on Tribology, 15 – 17 May, 2019, <http://www.serbiatrib.mfkg.rs/>, Vol. 1, No. 1 (2019), ISSN: 2620-2832 pp.321-329, Kragujevac, Serbia;

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11. Syed Ali Mehdi Naqvi, Muhammad Raza, Vincent T. Ybarra, Saeed Salehi, **Catalin Teodoriu**, Using content analysis through simulation-based training for offshore drilling operations: Implications for process safety, *Process Safety and Environmental Protection*, 2019, <http://www.sciencedirect.com/science/article/pii/S095758201830692X>
12. Fatemeh K. Saleh, Saeed Salehi, **Catalin Teodoriu**, Experimental investigation of mixing energy of well cements: The gap between laboratory and field mixing, *Journal of Natural Gas Science and Engineering*,2019, <http://www.sciencedirect.com/science/article/pii/S1875510019300046>
13. Adonis Ichim, Fatemeh K. Saleh, **Catalin Teodoriu**, Carl Sondergeld, Investigation of mechanical behavior and physical characteristic of portland cement: Implications for destructive and non-destructive methods, *Journal of Natural Gas Science and Engineering*,2019, <http://www.sciencedirect.com/science/article/pii/S0920410519301767>
14. Saeed Salehi, Chinedum P. Ezeakacha, George Kwatia, Ramadan Ahmed, **Catalin Teodoriu**, Performance verification of elastomer materials in corrosive gas and liquid conditions, *Polymer Testing*, Volume 75
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1. **Patirnac, I., Ripeanu, R.G.**, Laudacescu, E., Abrasive flow modelling through active parts water jet machine using CFD simulation, The 14th International Conference on Tribology September 19-21, 2019 – Cluj Napoca, https://minas.utcluj.ro/rotrib_program.html#header16-9, ROMANIA;
2. **Dudu, C., Drumeanu, A.C., Ripeanu, R.G.**, Dinita, A., Some considerations regarding the influence of working conditions on the corrosion wear of the injection water treatment plant equipment, The 14th International Conference on Tribology September 19-21, 2019 – Cluj Napoca, https://minas.utcluj.ro/rotrib_program.html#header16-9, ROMANIA;
3. **Lospa, A., Ripeanu, R.G.**, Dinita, A., Erosion modelling: A systematic review of available models and equations, The 14th International Conference on Tribology September 19-21, 2019 – Cluj Napoca, https://minas.utcluj.ro/rotrib_program.html#header16-9, ROMANIA;
4. **Bogdan-Roth M., Romanet M., Ripeanu R.G.**, Eccentric device for varying the gear ratio, The 14th International Conference on Tribology September 19-21, 2019 – Cluj Napoca, https://minas.utcluj.ro/rotrib_program.html#header16-9, ROMANIA;
5. **Hagianu, A., Nae, I., Ionescu, G.C., Ripeanu, R.G.**, Research on mechanical and geometrical characteristics of materials used for flexible tubing production, The 14th International Conference on Tribology September 19-21, 2019 – Cluj Napoca, https://minas.utcluj.ro/rotrib_program.html#header16-9 ROMANIA;
6. **Bogdan-Roth M., Romanet M., Ripeanu R.G.**, Device for machining non-circular gears, *Proceedings on Engineering Science 16th International Conference on Tribology*, 15 – 17 May, 2019, <http://www.serbiatrib.mfkg.rs/>, Vol. 1, No. 1 (2019), ISSN: 2620-2832_pp.449-453, Kragujevac, Serbia;

7. **Hagianu A., Nae I., Ionescu G.C., Ripeanu R.G.,** Dinita A., Ramadan I.N., Research and studies on flexible tubing wearing, Proceedings on Engineering Science 16th International Conference on Tribology, 15 – 17 May, 2019, <http://www.serbiatrib.mfkg.rs/>, Vol. 1, No. 1 (2019), ISSN: 2620-2832, pp.321-329, Kragujevac, Serbia;
8. **Dudu C, Ripeanu R.G.,** Drumeanu A.C., Dinita A., **Lospa A.M.,** Evaluation of the corrosion wear speed of different equipment in the water injection treatment plant, The 10th International Conference of Product Design, Robotics, Advanced Mechanical & Mechatronic Systems and Innovation Conference (PRASIC 18), 8-9 November 2018, http://old.unitbv.ro/Portals/9/Evenimente/Prasic/final_program.htm, Brasov, Romania, 2018;
9. **Lospa A.M., Ripeanu R.G.,** Dinita A., and **Dudu C.,** CFD Evaluation of sand erosion wear rate in pipe bends used in technological installations, The 10th International Conference of Product Design, Robotics, Advanced Mechanical & Mechatronic Systems and Innovation Conference (PRASIC 18), 8-9 November 2018, http://old.unitbv.ro/Portals/9/Evenimente/Prasic/final_program.htm, Brasov, Romania, 2018;
10. **Pupăzescu Al.,** Book Review, Non-destructive Testing and Repair of Pipelines, Springer International Publishing QAG, Cham, Switzerland, Engineering Materials, 2018.
11. Minescu, Mihail; **Teodoriu, Catalin;** Caltaru, Mihaela; Badicioiu, Marius Effect of Human Factor on OCTG Collapse Testing, ASME 2018 37th International Conference on Ocean, Offshore and Arctic Engineering, V008T11A024-V008T11A024, 2018, American Society of Mechanical Engineers
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13. Feng, Ming; **Teodoriu, Catalin** The Investigations of Two Analytical Heat Transfer Modelings to Predict the Temperature Profile in the Wellbore, ASME 2018 37th International Conference on Ocean, Offshore and Arctic Engineering, V008T11A031-V008T11A031, 2018, American Society of Mechanical Engineers
14. Kiran, Raj; Salehi, Saeed; **Teodoriu, Catalin** Implementing Human Factors in Oil and Gas Drilling and Completion Operations: Enhancing Culture of Process Safety, ASME 2018 37th International Conference on Ocean, Offshore and Arctic Engineering, V008T11A022-V008T11A022, 2018, American Society of Mechanical Engineers
15. Shenold, Chad; **Teodoriu, Catalin;** Salehi, Saeed Consideration of the Human Element in Cementing Operations and Well Integrity, ASME 2018 37th International Conference on Ocean, Offshore and Arctic Engineering", V008T11A021-V008T11A021, 2018, American Society of Mechanical Engineers

Brevete

1. **Nae, I.,** Ionescu, G., Dispozitiv pentru monitorizarea stării unei ancore pentru susținerea unei structuri metalice, brevet de invenție nr. 129899 din data 28.06.2019.

Contracte

1. **Rîpeanu, R.G.**(director contract), Petrescu, M.G., Dinita, A., Dumitrescu, A., Laudacescu, E., Ramadan, I, **Patirnac, I.,** Contract 5612/2019, Protecție Catodica, Beneficiar SNTGN TRANSGAZ S.A. Medias, valoare valoare încasată fără TVA 48000.
2. Ramadan, I., **Ripeanu, R.G.,** Dinita, A., Contract 9873/2019, Încercări la coroziune și teste mecanice, Beneficiar ABIWELD SRL Câmpina, 2019, valoare încasată fără TVA 6500
3. Drumeanu, A.C., **Ripeanu, R.G.,** Dinita, A., **Cursaru, D.,** Rosu G.A., Contract 12588/23.11.2017, Cercetări privind modul general de degradare a elementelor de interconectare a echipamentelor din componența instalației de tratare ape de injecție

- (Oprîșenești) și soluții de creștere a durabilității acestora, Beneficiar S.C. TRANSMARIN SRL, 2019 valoare incasata fara TVA 45000 (etapa I, II si III)
- Zoran C., Vlădoiu M., Ionescu G., **Nae I.**, Contract de cercetare 7938/2017 (Proiect ROSA nr. 159/20.07.2017), Denumire: SPECH - Cercetarea, proiectarea, dezvoltarea și testare pe stand a unui sistem de propulsie hibrid reactiv cu combustibil inovativ neomogen și control electronic adaptiv al parametrilor de ardere, pentru aplicații din domeniul lansatoarelor spațiale, Beneficiar: ROSA valoare incasata fara TVA 540000.

Domeniul de doctorat: INGINERIA SISTEMELOR

Cărți

- Deb. Dipankar, Dey, Rajeeb, **Balas, Valentina E.** *Engineering Research Methodology, A Practical Insight for Researchers*, ISBN 978-981-13-2947-0, © 2019, Available Formats: Hardcover, eBook, 110 pag.
- Dey, Rajeeb, Ray, Goshaidas, **E. Balas, Valentina E.**, *Stability and Stabilization of Linear and Fuzzy Time-Delay Systems A Linear Matrix Inequality Approach*, ISBN 978-3-319-70149-3, © 2018, Available Formats: Hardcover, Softcover, eBook, 250 pag.
- Balas, V.E.**, Roy, S.S., Sharma, D., Samui, P. (Eds.), *Handbook of Deep Learning Applications*, ISBN 978-3-030-11479-4, © 2019, Available Formats: Hardcover, eBook
- Balas, V.E.**, Solanki, V.K., Kumar, R., Khari, M. (Eds.) *Internet of Things and Big Data Analytics for Smart Generation* ISBN 978-3-030-04203-5, © 2019, Available Formats: Hardcover, eBook
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- Peng, S.-L., Wang, S.-J., **Balas, V.E.**, Zhao, M. (Eds.), *Security with Intelligent Computing and Big-data Services*, ISBN 978-3-319-76451-1, © 2018, Available Formats: Softcover, eBook
- Hemanth, D. Jude, **Balas, Valentina Emilia** (Eds.), *Biologically Rationalized Computing Techniques For Image Processing Applications*, ISBN 978-3-319-61316-1, © 2018, Available Formats: Hardcover, Softcover, eBook
- Floroiu D.**, *Sistem suport de decizii pentru analiza performanței în sistemul preuniversitar*, Ed. Edmunt, 2019
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- Paraschiv N.**, *Programarea aplicațiilor de timp real – Sinteze*, Editura Universitatii Petrol – Gaze, Ploiești, 2018.
- Oprea, M.**, Cărbureanu M., *Programare orientate pe obiecte – Îndrumar de laborator*, Ed. UPG Ploiești, 2018, 161 pagini, ISBN 978-973-719-728-3.

Articole publicate in reviste sau in volume ale conferintelor

- Asad, Muhammad Usman; Farooq, Umar; Gu, Jason; **Balas, Valentina E.**; Abbas, Ghulam; Balas, Marius; Muresan, Vlad - *An enhanced state convergence architecture incorporating disturbance observer for bilateral teleoperation systems*, INTERNATIONAL

JOURNAL OF ADVANCED ROBOTIC SYSTEMS, Volume: 16, Issue: 5, Article Number: 1729881419880052, DOI: 10.1177/1729881419880052 ,Published: SEP 2019

2. Asad, Muhammad Usman; Farooq, Umar; Gu, Jason; Abbas, Ghulam; Liu, Rong; **Balas, Valentina E.** - *A composite state convergence scheme for bilateral teleoperation systems*, IEEE-CAA JOURNAL OF AUTOMATICA SINICA, Volume: 6, Issue: 5, Pages: 1166-1178, DOI: 10.1109/JAS.2019.1911690,

Published: SEP 2019.

3. Tahir, Umair; Abbas, Ghulam; Glavan, Dan Ovidiu; **Balas, Valentina E.** ; Farooq, Umar; Balas, Marius M.; Raza, Ali; Asad, Muhammad Usman ; Gu, Jason - *Design of Three Phase Solid State Transformer Deployed within Multi-Stage Power Switching Converters*, APPLIED SCIENCES-BASEL, Volume: 9, Issue: 17, Article Number: 3545, DOI: 10.3390/app9173545 , Published: SEP 1 2019

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Articole prezentate la conferințe

1. N. Antonescu, M. Stan, L. Avram, **A. C. Stan**, *Siguranță și mediu în producția offshore a petrolului și a gazului*, *The 13th edition of the Academic Days of the Academy of Technical Sciences Conference – ZASTR 2018*, Oct 2018, Ploiesti, Romania.

Contracte

1. Contract de cercetare științifică Nr. 9542/22.12.2017 cu titlul *Modelarea, simularea, experimentarea și validarea unor metode avansate de soft computing în domeniul controlului cladirilor inteligente*, contract derulat în 2018, între Universitatea Aurel Vlaicu Arad și SC Conact Plus SRL Arad, valoare 40.000 lei, Director de proiect – **Valentina E. Balas, Membru, Mihaela Popa**
2. Contract de cercetare științifică Nr. 10/16.07.2019, cu titlul *Promovarea agriculturii în mediul urban: modele matematice și soluții concrete*, între Universitatea Aurel Vlaicu Arad și SC Conact Plus SRL Arad, valoare 10.000 \$, Director de proiect – Marius M. Balas, Membri: **Valentina E. Balas, Mihaela Popa**, contract derulat în 2019 și 2020.

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