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Curriculum vitae

Personal information

Surname(s) / First name(s)	**CRISTEA, Vasile Mircea**
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Telephone(s)	+40 264 593833 ext. 5729
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E-mail(s)	mircea.cristea@ubbcluj.ro
Nationality(-ies)	Romanian

Occupational field

Education and research

Professional experience

Professor

Main activities and responsibilities

Research *field of activity.* Modelling, simulation and development of control algorithms for multivariable, linear and nonlinear chemical processes. Modelling dynamic linear and nonlinear systems using analytical methods. Modelling nonlinear systems using the artificial neural networks. Modelling linear and nonlinear systems with distributed parameters. Applications of artificial intelligence in process engineering and data mining. Sensitivity and controllability studies. Linear and nonlinear model predictive control. Model predictive control of nonlinear system described by artificial neural networks. Fuzzy control. Hardware and software for data acquisition and control for laboratory and industrial applications (National Instruments).

Applications: Simulation and control of catalytic and noncatalytic gas-liquid-solid (bio)reaction processes (such as: fluid catalytic cracking process, calcium carbonate decomposition process in rotary and vertical kiln, drying process of high voltage electric insulators and food products, wine fermentation, biosorption, etc.) and of environmental systems (such as: Biological Waste Water Treatment Plants, prediction effects of accidental river pollution and management of the counteraction measures).

Industrial experience: Design and implementation of new measuring and control systems, maintenance and repairing measuring and control systems for chemical industry, inspecting the fulfilment of the metrological rules for the measuring and control instrumentation. Authorized by the State Metrology as Coordinator of metrological activities in the following domains: weighting (masses), pressure, flow, electrical and physical-chemical measurements, control (for the period of working as Head of the Control and Instrumentation Department at UPSOM Chemical Company).

Education field of activity. *Systems Theory* for chemical engineers, course and seminars/laboratory works (Bachelor level); *Chemical Process Control* course and seminars/laboratory works (Bachelor level); *Advanced Process Control of Chemical Processes* course and seminars/laboratory works (study program Computer Aided Process Engineering, Bachelor level); *Design of control systems* course modules and seminars/laboratory works (program: Advanced Chemical Process Engineering, Master level); *Process Modelling and Artificial Intelligence* course and seminars/laboratory works (study program: Advanced Chemical Process Engineering, Master level);

	Artificial Intelligence with Applications in Process Engineering course and seminars/laboratory works for chemical engineers (study program Computer Aided Process Engineering, Bachelor level), *Modelling and Simulation of Water, Air and Soil Pollution* water course module and associated seminars/laboratory works (study program: Environmental Science, Master level). Development of new long distance teaching and learning methods using the telelaboratory concept. The research and education activities has been concluded in 6 books, 2 textbook and over 90 articles published in journals, conferences and symposiums. (List of Selected Publications in *Annex 2*) The research work contributed to the development of 22 research projects (4 international), among which 7 as director of the project, and additionally as member in the team of 3 projects aimed to the improvement of the higher education system. Habilitation as *PhD Coordinator* in the *Chemical Engineering* field, given by the National Council for Titles, Diplomas and Certificates. Director of the Chemical Engineering Doctoral School. Research supervisor of 6 students for their World Federation of Scientists Scholarships.
Name and address of employer	"Babes-Bolyai" University of Cluj-Napoca, Faculty of Chemistry and Chemical Engineering, 1 Mihail Kogalniceanu Street, RO-400084 Cluj-Napoca, Romania, http://www.ubbcluj.ro/ and http://www.chem.ubbcluj.ro/
Type of business or sector	Education and research
Dates	1994-1998-2014-present
Occupation or position held	**Teaching Assistant, Lecturer, Associate Professor, Professor**
Main activities and responsibilities	Education - Teaching and laboratory works for: Systems Theory, Chemical Process Control, Advanced Chemical Process Control, Computers Programming for Chemistry and Chemical Engineering, Modelling and Simulation of Chemical Processes, Artificial Intelligence with Applications in Chemistry and Chemical Engineering. Research - Modelling, simulation and control using traditional and advanced algorithms applied in Chemistry and Chemical Engineering, - Controllability and observability studies, - Model Predictive Control, Fuzzy Logic Control, Artificial Neural Networks Based Control, - Hardware and software for data acquisition and Control, - Waste Water Treatment Plant Modelling, Simulation and Control.
Name and address of employer	"Babes-Bolyai" University of Cluj-Napoca, Faculty of Chemistry and Chemical Engineering, 1 Mihail Kogalniceanu Street, RO-400084 Cluj-Napoca, Romania, http://www.ubbcluj.ro/ and http://www.chem.ubbcluj.ro/
Type of business or sector	Education
Dates	1986-1989-1994
Occupation or position held	Control Engineer, **Head of the Control and Instrumentation Department** (1989) of SODA PRODUCT WORKS, SODA UPSOM Chemical Works Ocna-Mures
Main activities and responsibilities	Design and putting into operation of new control and measuring systems, maintenance and repairing measuring and control instrumentation, supervising the fulfilment of the metrology regulations for all measuring and control instrumentation in the UPSOM Chemical Works Ocna-Mures plants. Licence as Metrology Activity Coordinator emitted by the National Metrology Authority for the following measuring fields: mass, pressure, flow, level, physical-chemical measurements, electric and electronic measurements. Major projects: Combustion advanced control system for the steam boilers; Feedforward and ratio control systems implemented in the soda manufacturing plant; Supervising, protection and alarming systems for the CO_2 compressors, steam producing boilers, steam turbines (coupled to the electric generators); Various flow measuring systems for liquid, gaseous and steam streams (List of New Control and measuring works performed in SODA Product Chemical Works, presented in *Annex 1*)
Name and address of employer	GHCL UPSOM Chemical Works, 1 M. Eminescu Street, Ocna-Mures, Alba County, Romania
Type of business or sector	Production of Chemicals (soda ash, caustic soda)
Other Work Experience	
Dates	2012-2016

Occupation or position held	**Director of the Chemical Engineering Department**
Name and address of employer	Babes-Bolyai University, 1 M. Kogalniceanu Street, Cluj-Napoca, Romania
Type of business or sector	University management
Dates	2008-2012
Occupation or position held	Head of the Chemical Engineering and Oxide Materials Chair
Name and address of employer	Babes-Bolyai University, 1 M. Kogalniceanu Street, Cluj-Napoca, Romania
Type of business or sector	University management
Dates	2019
Occupation or position held	Director of the Research Centre in the Field of Computer Aided Process Engineering, Accredited by CNCSIS (National Council of the Scientific Research in Higher Education)
Name and address of employer	Babes-Bolyai University, 1 M. Kogalniceanu Street, Cluj-Napoca, Romania
Type of business or sector	Scientific research
Dates	2011 (6 months)
Occupation or position held	Short Term Expert, DOCIS Project, Master Level
Name and address of employer	National Agency for Qualifications in Higher Education and Partnership with the Economic and Social Environment, Bld. Schitu Magureanu, nr. 1, et.3, sector 1 Bucuresti
Type of business or sector	Education
Dates	2009-2010
Occupation or position held	Short Term Expert, DOCIS Project , Bachelor Level
Name and address of employer	National Agency for Qualifications in Higher Education and Partnership with the Economic and Social Environment, Bld. Schitu Magureanu, nr. 1, et.3, sector 1 Bucuresti
Type of business or sector	Education
Dates	2007-2008
Occupation or position held	PHARE Expert, Reform of the professional and technical education in Romania
Name and address of employer	WYG International, Calea Serban Voda, 133, Bucuresti
Type of business or sector	Education
Dates	2005-2008
Occupation or position held	CNCSIS Expert
Name and address of employer	National Council of Scientific Research in Higher Education (CNCSIS)
Type of business or sector	Management of the scientific research (project evaluation)
Dates	September 2006
Occupation or position held	Visiting Professor
Name and address of employer	Universidad Nacional de Ingenieria – Facultad de Ingenieria Quimica y Manufacturera Lima, Peru
Type of business or sector	Education and research
Dates	November-December 2004
Occupation or position held	ERASMUS Visiting Professor
Name and address of employer	Universitat Politecnica de Catalunya, Escola Universitaria de Manresa, Spain
Type of business or sector	Education (course teaching)
Dates	November 2002

Occupation or position held	Visiting Professor
Name and address of employer	Universidad Rovira i Virgili, Tarragona, Spain
Type of business or sector	Education
Dates	April-June 1996
Occupation or position held	Tempus Fellowship
Name and address of employer	Stuttgart University, Institut fur Systemdynamik und Regelungstechnik, Stuttgart
Type of business or sector	Education and research

Education and training

Dates	September 1995 - September 1999
Title of qualification awarded	**PhD**
Principal subjects/Occupational skills covered	Field: Chemical Process Control Title of the PhD thesis: Model Predictive Control of the Fluid Catalytic Cracking Unit Application of advanced model based (predictive) control for complex, multivariable and nonlinear chemical plants
Name and type of organisation providing organisation and training	Gas-Oil University of Ploiesti, Romania
Level in national or international classification	ISCED 6
Dates	1981-1986
Title of qualification awarded	**Dipl. Engineer**
Principal subjects/Occupational skills covered	Specialisation: Control and Computer Science Systems engineering, Computer Engineering.
Name and type of organisation providing organisation and training	Technical University of Cluj-Napoca, Faculty of Electrotechnics
Level in national or international classification	ISCED 5
Dates	1976-1980
Title of qualification awarded	**High school graduate**
Principal subjects/Occupational skills covered	Specialisation: Mathematics-mechanics for chemical industry
Name and type of organisation providing organisation and training	Chemistry Industrial High School (Grupul Şcolar Industrial de Chimie), Ocna-Mureş, Romania
Level in national or international classification	ISCED 3

Other qualifications

Dates	March-May 2008
Qualification awarded /graduated courses	Teaching program “University Management”
Name and type of the education institution/formation provider	Babes-Bolyai University, Centre of University Development
Dates	May 2007
Qualification awarded /graduated courses	FEMLAB/COMSOL Multiphysics Intensivtrainingskurs ”Chemical Engineering” FEMLAB/COMSOL for applications in Chemical Engineering (processes with distributed parameters)
Name and type of the education institution/formation provider	FEMLAB GmbH Zürich, Switzerland

Personal skills and competences

Native tongue **Romanian**

Other language(s)

Self-assessment	Understanding		Speaking		Writing
European level	Listening	Reading	Spoken interaction	Spoken production	
English	B2 Independent user	C2 Proficient user	C1 Proficient user	C1 Proficient user	B2 Independent user
German	B2 Independent user	B2 Independent user	B2 Independent user	B1 Independent user	B2 Independent user
French	B1 Independent user	B2 Independent user	B1 Independent user	B2 Independent user	B1 Basic user
Russian	A2 Basic user	A2 Basic user	A2 Basic user	A2 Basic user	A2 Basic user

Research projects and grants coordinated as director

1. Mathematical Modelling of Biocatalytic Processes in Supercritical Fluids Using Traditional and Advanced Instruments, in collaboration with the University of Maribor, Laboratory for Separation Processes, Faculty of Chemistry and Chemical Engineering, Slovenia; Bilateral Project Slovenia-Romania, 2010-2011; PNII Modul III, Nr. 409;
2. Modelling and Automatic Control by Means of the Artificial Intelligence Instruments for Applications in Chemistry and Process Engineering / Tehnical University Gh. Asachi Iasi-Coordonator, UBB Cluj-Napoca-Partner P1, UPG Ploiesti-P2, Institut. Informatica al Acad. Rom . Iasi-P3, Institut. Chim. Marcomolec. "P. Poni" Iasi-P4, 2007-2010, PNCD II 71-006;
3. Simulation, control and testing platform in mechatronics, CONMEC / Technical University of Cluj-Napoca as Coordinator, SC IPA SA CIFATT Cluj-Napoca-P1, Politehnica University of Timisoara-P2, BBU Cluj-Napoca-P3; 2006-2008; INFOSOC, CEEX 112;
4. Predictive methods for counteracting the effects of accidental pollution in rivers using advanced control based on mathematical modelling, 2006-2007; CNCSIS A 1324;
5. Modern techniques for distance education and experimentation in process Informatics, using the remote-laboratory concept, 2004-2005; CNCSIS A 378;
6. Software for data acquisition and remote control, remote-work and videoconference, applied in the chemical engineering research and education, 2002-2003; CNCSIS A 1259/177;
7. Advanced control algorithms for chemical process control, 2000-2001; CNCSIS AT 46/57.

Social skills and competences

Team work: I worked in the research teams of national research projects, international projects and projects with industrial partners.

Establishing cooperation relationships.

Good communication skills: I have established personal contacts with teaching staff and researchers (professors, researchers, PhD students, students, engineers from industrial companies) from different national, European, South American universities (associated with visits), such as: University Politehnica of Bucharest, University Gh. Asachi of Iaşi, Gas-Oil University of Ploiesti, University Politehnica of Timişoara, Technical University of Civil Engineering of Bucharesti, ETH University of Zurich, University of Stuttgart, University Politecnica de Catalunya Barcelona, University of Lappeenranta, University of Vienna, University Rovira i Virgili Tarragona, Universidad de Ingenieria Lima, University of Veszprem, Universitatea Mendeleev Moscova, etc., or industrial companies/instututes such as: UPSOM SA, Electroceramica Turda, CASIROM Turda, Someş SA Dej, IPA CIFATCluj-Napoca, EMERSON Cluj-Napoca, Rigips Sain-Gobain Turda, National Institute of Hydrology and Water Management Bucharest, INCDTIM Cluj-Napoca, etc.

Education: during the last 10 years I coordinated over 30 bachelor and master thesis of the chemical engineering graduating students.

Organisational skills and competences
Contributions to the institutional development

Systemic approach, identification of solutions for problems with constraints.

Management experience in activities for chemical industry gained during the period (1989-1994), as Head of the Control and Instrumentation Department at Soda Chemical Works, when I was responsible for the activity of over 60 persons.

In the year 2002 I organized and participated as secretary of the organizing committee, to the students admission session at the Faculty of Chemistry and Chemical Engineering, with the occasion of re-structuring the admission system in Babes-Bolyai University.

In the year 2002 I organized the first edition of the chemistry professional contest “Candin Liteanu”

at the Faculty of Chemistry and Chemical Engineering (with over 500 participants).

During the time period 2005-2008 I fulfilled responsibilities as Coordinator of the Image and PR Commission of the Faculty of Chemistry and Chemical Engineering (coordinating the reorganization of the website, preparation of the brochures for presenting the teaching programs, activities for the promotion of the Faculty and University in Romania and abroad).

I have contributed to the development of the new chemical engineering teaching program, Computer Aided Chemical Engineering (Informatics and Engineering of Chemical and Biochemical Processes), the first of its kind in Romania.

I participated as member of the organizing committee to national and international scientific events, such as: CAPE (Computer Aided Process Engineering) Forum 2005, ESCAPE 17 (European Symposium on Computer Aided Process Engineering) 2007 and Anniversary Symposium dedidated to Prof. Liviu Literat 2013.

Member in different commissions: Commission for organizing the Bachelor and Master studies according to the Bologna model (2006-2008); Examination Commission of the graduating students at Bachelor and Master programs (2003-present); Admission Commissions for Bachelor and Master programs (2002, 2010-2014); Accreditation commission ARACIS (Education Quality Assurance), (2007, 2008, 2011, 2012); Member of the Council of the Faculty of Chemistry and Chemical Engineering (2004-present); Member of the Council of the Institute of Master Studies at the BBU (2008-2012).

Expert in the national project "Development of an operational system of qualifications in the Romanian higher education system 2009-2011".

Expert in the project "Quality Assurance in the internationalized master education, development of the national frame for obtaining compatibility with the European higher education space".

2008-2014 Head of the Chemical Engineering and Oxide Materials Science Chair from the Faculty of Chemistry and Chemical Engineering.

2012-2016 Director of the Chemical Engineering Department the Faculty of Chemistry and Chemical Engineering.

Technical skills and competences

My first technical skills have been developed in electrical engineering (design of alarm systems for protection against burgling), then electronics (electronic devices of medium complexity) and process control in chemical engineering (acquired during the working stage at Soda Product Works and Babes-Bolyai University). Later, the skills for modelling, simulation, application of artificial intelligence tools and control of the chemical processes, using specific software tools, completed the first protofolio.

Computer skills and competences

Competences for the use of Microsoft Office Tools and other common software (ChemDraw, ChemOffice, CorelDraw).
Competence for programming in MATLAB and Simulink with Toolboxes (Control System Toolbox, Model Predictive Control Toolbox, Neural Networks Toolbox, Fuzzy Logic Toolbox), COMSOL.

Prizes

Romanian Academy Prize Tudor Tănăsescu in the field of Science and Information Technology, for the work Model Based Control-Case Studies in Process Engineering, 2008.

Silver Medal INVENTICA 2008 with the Excellence Diploma Iasi 2008, Curteanu S., Cristea V.M. et. al., awarded by the Romanian Society of Inventors and the Iasi National Institute of Inventics, for the work Modelling and Control Using Artificial Intelligence Instruments for Chemical and Process Engineering Applications, at the INVENTICA scientific event, 2008.

Merit Diploma for the contribution to the development of the Babes-Bolyai University, 2006.
COMENIUS Prize awarded by Babes-Bolyai University, 2008.
Professor of the Year, Prize awarded by Babes-Bolyai University, 2009.
Professor of the Year, Prize awarded by Babes-Bolyai University, 2010.
Professor of the Year, Prize awarded by Babes-Bolyai University, 2011.
Education Excellence Prize awarded by Babes-Bolyai University, 2017.
Excellence Prize for Innovation and Cultural Services for the Society awarded by Babes-Bolyai University, 2021

Professional Affiliations

Member of the professional organizations
- DECHEMA. Deutsche Gesellschaft fur Chemische Technik und Biotechnologie,
- Societatea de Inginerie Chimică din România, (Romanian Society of Chemical Engineering),
- SRAIT, (Romanian Society of Automatics and Technical Informatics).
- Romanian Delegate Member *in the Computer Aided Process Engineering Party* of the *European Federation of Chemical Engineering*.

Annexes

Annex 1

LIST OF NEW CONTROL AND MEASURING WORKS PERFORMED IN SODA PRODUCT WORKS, 1986 -1994

1. Advanced Combustion Control System for the Lang Steam Boilers, steam production: 45 tons steam/hour, pressure 38 bar, temperature 435 C.
2. Ratio Control System for the lye and lime flows in the ammonia recovery unit, using magnetic flow-meters.
3. Supervising, Counting and Recording System for the feeding system of the lime kilns.
4. Feedforward Level Control for the Lang and Vulcan steam boilers.
5. Pressure and Temperature Control System of the oxygen degassing unit for the steam boilers feed water.
6. Flow Control System for the hydration drum of the quick lime.
7. Supervising, Alarming and Protection System for the AKTR-6 steam turbine (4 MW).
8. Flow Measuring and Integrating systems for: raw, industrial and drinking water; natural gas; superheated steam; lye solutions.
9. Improved Control system for sodium bicarbonate rotary calciner.
10. Level Control for evaporators in caustic soda production unit.

Annex 2

LIST OF SELECTED PUBLICATIONS

Books:

1. Agachi P.S., Cristea M.V., Makhura E.P., Basic Process Engineering Control, Editura Walter De Gruyter GmbH, Berlin, 2-nd Edition, ISBN: 978-3-11-028981-7, e-ISBN: 978-3-11-028982-4, 400 p., 2020.
2. Agachi P.S., Cristea M.V., Csavdári A.A., Szilágyi B., Advanced Process Engineering Control, De Gruyter Publishing House,2-nd Edition, ISBN 978-3-11-030662-0, 2023.
3. Agachi P.S., Zoltan K. Nagy, Cristea M.V., Imre-Lucaci A., Model Based Control - Case Studies in Process Engineering, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, ISBN-10: 3-527-31545-4, 278 p., 2006.
4. Cristea M.V., Agachi S.P., Elemente de Teoria Sistemelor (Elements of Systems Theory), Risoprint, Cluj-Napoca ISBN: 973-656-266-2, 337 p., 2002.

Scientific papers:

1. Mihály N.B., Luca A.L., Simon-Várhelyi M., Cristea V.M., Improvement of air flowrate distribution in the nitrification reactor of the wastewater treatment plant by effluent quality, energy and greenhouse gas emissions optimization via artificial neural networks models, Journal of Water Process Engineering, 54, 103935, 2023.
2. Ilea F.M., Cormos A.M., Cristea V.M., Cormos C.C., Enhancing the post-combustion carbon dioxide carbon capture plant performance by setpoints optimization of the decentralized multi-loop and cascade control system, Energy, 127490, 2023.
3. Boga B., Cristea V.M., Székely I., Lorenz F., Gyulavári T., Pop L.C, Baia L., Pap Z., Steinfeldt N., Strunk J., Experimental data-driven and phenomenological modeling approaches targeting the enhancement of CaTiO3 photocatalytic efficiency, Sustainable Chemistry and Pharmacy, 33, 101045, 2023.
4. Mihály, NB., Simon-Várhelyi, M., Cristea, V.M. Data-driven modelling based on artificial neural networks for predicting energy and effluent quality indices and wastewater treatment plant optimization. Optimization and Engineering, 2022.
5. Timis EC, Hutchins MG, Cristea VM, Advancing understanding of in-river phosphorus dynamics using an advection–dispersion model (ADModel-P), Journal of Hydrology 612,128173, 2022.
6. Simon-Várhelyi M., Tomoiaga C., Brehar M. B., Cristea V.M., Dairy wastewater processing and automatic control for waste recovery at the municipal wastewater treatment plant based on modelling investigations, Journal of Environmental Management, 287, 112316, 2021.
7. Cristea V. M., Burca M. I., Ilea F. M., Cormos A. M., Efficient decentralized control of the post combustion CO2 capture plant for flexible operation against influent flue gas disturbances, Energy, 205 117960, 117960, 2020.
8. Simon-Varhelyi, M., Cristea, V M. Luca, A.V., Reducing energy costs of the wastewater treatment plant by improved scheduling of the periodic influent load, Journal of Environmental Management, Volume: 262 Article number: 110294, DOI: 10.1016/j.jenvman.2020.110294, 2020.
9. Simon-Varhelyi, M., Cristea, V.M. Luca, A.V., Reducing energy costs of the wastewater treatment plant by improved scheduling of the periodic influent load, Journal of Environmental Management, Volume: 262 Article number: 110294, 110294, 2020.
10. Hosu A., Cristea V.M., Cimpoiu C., Analysis of total phenolic, flavonoids, anthocyanins and tannins content in Romanian red wines: Prediction of antioxidant activities and classification of wines using artificial neural networks, Food Chemistry, Vol.150 (1), p.113–118, 2014.
11. Cristea V.M., Counteracting the accidental pollutant propagation in a section of the River Someş by automatic control, Journal of Environmental Management, Vol. 128, p.828–836, 2013.
12. Ostace G.S., Cristea V.M., Agachi P.S., Cost Reduction of the Wastewater Treatment Plant operation by MPC based on modified ASM1 with two-step nitrification/denitrification model, Computers and Chemical Engineering, Vol 15, issue 11, p. 2469-2479, 2011.
13. Cimpoiu C., Cristea V.M., Hosu A., Sandru M., Seserman L., Antioxidant activity prediction and classification of some teas using artificial neural networks, Food Chemistry, Vol. 127, p.1323-1328, 2011.

January 2024 Cristea Vasile Mircea