

Bîldea Costin Sorin

Associate Professor

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Education and training

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| Dates | 1997 - 2001 |
| Title of qualification awarded | PhD in Chemical Engineering |
| Principal subjects/occupational skills covered: | PhD thesis: "Integration of Design and Control by Nonlinear Analysis" |
| Name and type of organisation providing education and training | University of Amsterdam, Amsterdam, The Netherlands |
| Level in national or international classification | |
| Dates: | 1990 - 1997 |
| Title of qualification awarded | Engineer |
| Principal subjects/occupational skills covered | |
| Name and type of organisation providing education and training | University Politehnica of Bucharest, Faculty of Automatics and Computers |
| Level in national or international classification | |
| Dates: | 1983 - 1988 |
| Title of qualification awarded | Engineer |
| Principal subjects/occupational skills covered | |
| Name and type of organisation providing education and training | University Politehnica of Bucharest, Faculty of Industrial Chemistry |
| Level in national or international classification | |

Professional experience

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| Dates | 2007 - |
| Occupation or position held | Associate professor |
| Main activities and responsibilities | Research in the field of Chemical Engineering and Process Control. Lectures, seminars, laboratories, projects for different courses in the field of Chemical Engineering. Supervising research activities of PhD students, MSc and Bachelor graduation thesis. |
| Name and address of employer | University Politehnica of Bucharest, Faculty of Applied Chemistry and Materials Science |
| Type of business or sector | Education / Research |
| Dates | 2001 - 2007 |
| Occupation or position held | Assistant professor |
| Main activities and responsibilities | Research in the field of Chemical Engineering and Process Control. Lectures, seminars, laboratories, |

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| | projects for different courses in the field of Chemical Engineering. Supervising research activities of PhD students, MSc and Bachelor graduation thesis. |
| Name and address of employer | Delft University of Technology, Department of Chemical Engineering, Delft, The Netherlands |
| Type of business or sector | Education / Research |
| Dates | 1997 - 2001 |
| Occupation or position held | Researcher |
| Main activities and responsibilities | Research in the field of Chemical Engineering and Process Control. Supervising research activities of PhD students, MSc and Bachelor graduation thesis. |
| Name and address of employer | University of Amsterdam, Department of Chemical Engineering, Amsterdam, The Netherlands |
| Type of business or sector | Education / Research |
| Dates | 1990 - 1997 |
| Occupation or position held | Assistant professor |
| Main activities and responsibilities | Lectures, seminars, laboratories, projects for different courses in the field of Chemical Engineering. Supervising MSc and Bachelor graduation thesis. Research in the field of Chemical Engineering. |
| Name and address of employer | University Politehnica of Bucharest, Faculty of Industrial Chemistry |
| Type of business or sector | Education / Research |
| Dates | 1988 - 1990 |
| Occupation or position held | Engineer |
| Main activities and responsibilities | Supervision of technological process. Research of anti-glare screens |
| Name and address of employer | Cathode-Ray Tube Factory, Bucharest |
| Type of business or sector | Electrotechnics |

Academic and research interests

I am teaching the Process Dynamics and Process Control courses and several projects / seminars / laboratories classes. Currently, I am supervising a group of 16 students (3rd and 4th year undergraduate, Master and PhD) doing research activities in several field of chemical engineering.

We are carrying on research activities in the field of **Process Systems Engineering**. Process Systems Engineering focuses on defining needs and required functionalities, and integrating efforts to ensure that various parts of a chemical plant. It is an inter-disciplinary approach and spans the whole system lifecycle. The main goal of the research is to develop a methodology for integrated design of chemical processes, with emphasis on integrating design with process dynamics and control, together with enabling techniques. Case studies of practical significance are presented in the book: Dimian, A.C., Bildea C.S., *Chemical Process Design - Computer-Aided Case Studies*, Wiley-VCH, Weinheim, 2008

Our research pointed out that interaction between reaction and separation through recycles leads to complex nonlinear behavior. Thus, phenomena that are characteristic to **nonlinear systems**, such as state multiplicity, instability, sustained oscillations and unfeasibility, often occur in chemical plants. Designing a chemical plant while considering only the nominal operating point and neglecting these phenomena can easily lead to un-safe situations when the plant is subject to disturbances or the design parameters are uncertain. Our research aims to explain when and why these dangerous situations are likely to occur. Moreover, guidelines to integrated design and control are given, with the goal of ensuring safe design and operation of chemical plants.

We recently started investigation of plantwide systems **coupling exothermic and endothermic reactions**, with focus on interaction between process design and process control. The theoretical results, which were applied to several case studies (combined hydrogenation / dehydrogenation processes), clearly demonstrate that process intensification might lead to controllability difficulties, which should be properly addressed by integration of process design and control.

Catalytic distillation is a well-established process intensification technique. On the other hand, cyclic operation of distillation units leads to key benefits such as increased column throughput, lower energy requirements and higher separation performance. Current research aims to achieve further process integration, namely **cyclic operation of catalytic distillation columns**. We are developing first principle models and a methodology for reliable design. Applications to case studies of industrial relevance include olefins metathesis and di-methyl-ether production.

Teaching activity

| Ciclu studii | Denumire specializare | Cod disciplina din planul de invatamant | Titlu disciplina | Tip activitate |
|--------------|--|--|--|------------------------|
| Licenta | Ingineria si Informatica Proceselor Chimice si Biochimice | UPB.11.S.08.O.513 | Automatizarea proceselor chimice și biochimice | Curs, Lucrari, Proiect |
| Licenta | Ingineria si Informatica Proceselor Chimice si Biochimice | UPB.11.S.08.O.510 | Reactoare Chimice si biochimice | Proiect, Lucrari |
| Licenta | Ingineria si Informatica Proceselor Chimice si Biochimice | UPB.11.S.08.O.516 | Activitate proiect licență | Indrumare |
| Master | Ingineria Proceselor Chimice | UPB.11.S.10.O.209 | Dinamica proceselor chimice | Curs, Lucrari |
| Master | Ingineria Proceselor Chimice | UPB.11.S.11.O.204 | Automatizarea proceselor chimice si biochimice | Curs, Seminar, Lucrari |
| Master | Ingineria Proceselor Chimice | UPB.11.T.09.O.206 UPB.11.T.10.O.210 UPB.11.T.11.O.206 UPB.11.T.12.O.207 | Cercetare stiintifica | Indrumare |

Publications (selective):

Books

- Dimian, A.C., Bildea C.S., *Chemical Process Design - Computer-Aided Case Studies*, Wiley-VCH, Weinheim, 2008
- Kiss,A.A., Bildea, C.S., Reactive absorption for biodiesel production, in H. Huang and S. Ramaswamy (eds), *Separation and Purification Technologies in Biorefineries*, John Wiley & Sons, 2013.

Articles (see <https://www.researcherid.com/rid/B-3075-2010> for the full list)

- Vlad, E., Bildea, C.S., Bozga, G., Robust, Optimal Design of Glycerol Etherification Process, *Chemical Engineering & Technology*, 36(2), 251 - 258, 2013.
- Lita, I., Bildea, C.S., Kiss, A.A., Modeling, Design and Control of Cyclic Distillation Systems, *Procedia Engineering*, 42, 1311 - 1322, 2012.
- Kiss, A.A., Bildea, C.S., A review of biodiesel production by integrated reactive separation technologies, *Journal of Chemical Technology and Biotechnology*, 87, 861 - 879, 2012.
- Vlad, E., Bildea, C.S., Bozga, G., Design and Control of Glycerol - tert-butyl Alcohol Etherification Process, *The Scientific World Journal*, Article ID 180617, 2012.
- A. A. Kiss, C. S. Bildea, A control perspective on process intensification in dividing-wall columns, *Chemical Engineering And Processing*, 50 (3), 281-292, 2011.
- Bildea, C.S. Kiss, A.A., Dynamics and Control of a Biodiesel Process by Reactive Absorption, *Chemical Engineering Research and Design*, 89 (2A), 187-196, 2011.
- Altimari, P., Bildea, C.S., Integrated design and control of plantwide systems coupling exothermic and endothermic reactions, *Computers & Chemical Engineering*, 33 (4), 911-923, 2009.

Research projects

- *Modeling and design of cyclic distillation systems*, CTTIP – AkzoNobel (The Netherlands), 2012.
- *Design of separation systems using Residue Curve Maps*, CTTIP – AkzoNobel (The Netherlands), 2011
- *New Mesoporous Aluminosilicate Materials For Controlled Release Of Biologically-Active Substances*, EU Sectorial Operational Programme “Increase of Economic Competitiveness” (POS-CCE), 2010 - 2013.
- *A Nonlinear Approach To Conceptual Design And Safe Operation Of Chemical Processes*, PN II - Idei, 2008.

Other information

"Nicolae Teclu" prize of the Romanian Academy (2009), for the set of publications "Design, control and automation in industrial process engineering"

68 ISI papers, Hirsch index 11

Researcher profile <https://www.researcherid.com/rid/B-3075-2010>