

NAME	POSITION TITLE
Gatica, Jorge E.	Professor and Graduate Program Director Department of Chemical and Biomedical Engineering Cleveland State University

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	YEAR(S)	FIELD OF STUDY
Southern National University (UNS, Bahía Blanca) / Argentina	B.A.	1978	Chemistry
Southern National University (UNS, Bahía Blanca) / Argentina	B.S.	1979	Chemical Engineering
Southern National University (UNS, Bahía Blanca) / Argentina Thesis: "Experimental Design in Chemical Kinetics"	M.S.	1984	Chemical Engineering
State University of New York (SUNY) at Buffalo Dissertation: "Secondary Flows in Chemically Reacting Systems"	Ph.D.	1989	Chemical Engineering

A. Positions and Honors

Positions and Employment

09/04 - current	Professor , Department of Chemical & Biomedical Engineering / CSU
09/97 – 09/04	Associate Professor , Department of Chemical & Biomedical Engineering / CSU
09/92 - 09/97	Assistant Professor , Department of Chemical Engineering / CSU
06/89 - 09/92	Research Associate , Lab. for Ceramic & Reaction Eng. / University at Buffalo (SUNY)
11/86 - 12/88	Teaching Assistant , Chemical Engineering / University at Buffalo (SUNY)
01/83 - 12/84	Lecturer , Southern National University (UNS, Bahía Blanca) / Argentina
04/82 - 12/84	Advanced Research Fellow , CONICET-Plapiqui / Argentina
04/80 - 12/84	Teaching Assistant , Southern National University (UNS, Bahía Blanca) / Argentina
04/80 - 04/82	Initiation Research Fellow , CONICET-Plapiqui / Argentina
06/79 - 04/80	Research Assistant , Southern National University (UNS, Bahía Blanca) / Argentina

Other Experience and Professional Memberships

American Institute of Chemical Engineers

Associate Member (1990-2000), Member (2000-current), Session Chairman, Annual Meeting, (1990-current)

American Ceramic Society

American Society for Engineering Education

North Central Executive Board (2000-2002), Regional Meeting Program Chair (2000-2001)

Biomedical Engineering Society

Cleveland Engineering Society

CACHE, Corp. (Computer-Aided Chemical Engineering Education), CSU Representative (1992-current)

Sigma Xi, The Scientific Research Society

Professional Engineer License

Fundamentals of Engineering, Engineering Intern Certification (1999)

Associate Editor, *Combustion Science and Technology*

Esperanza, Inc. (Non-Profit Organization for the Advancement of Hispanics)

Executive Board Member, (January 2001-January 2004)

Hispanic Services Coalition, Academic Development Team (June 2005 – current)

Honors

Distinguished Faculty Advisor (Cleveland State University) 2004.

Merit Recognition Award, Extraordinary Achievements in Teaching, Creative Activities, and Contributions to the Profession, (Cleveland State University) 2002, 2004, 2006, 2007.

Best Teacher Award (University Center for Teaching and Learning, Cleveland State University) 1999-2000

B. Publications

More than 50 Peer-reviewed Publications

Recent Publications

- Koppaka, S.S., M.A. Puchowicz, J.C. LaManna and J.E. Gatica "Investigation of Ketosis on Activated Neuronal Metabolism," *NeuroSci. Res. J.*, submitted (2007).
- Marealle, F.P., L.S. McFadden and J.E. Gatica "Use of Thermodynamic Constraints in Model Formulation for Metabolic Pathways," *Chem. Eng. Comm.*, submitted (2007).
- Kaliappan, D., J.J. Stafford, D. Magness, M. Puchowicz, J.C. LaManna and J.E. Gatica "A Multi-compartment Model for Metabolic Dynamics in Mammalian Brains," *Annals of the Biomed. Eng. Soc.*, submitted (2007).
- Nagarajan, A., C. Garrido, W. Morales and J.E. Gatica "Catalytic Reactions as Mechanisms of High-temperature Lubrication," *Chem. Eng. Comm.*, submitted (2007).

5. Gupta, A.D, A. E. Bruzas and J.E. Gatica "Application of Interactive Instructional Computer Modules in Engineering Laboratory Environments," *ASEE Journal of Engineering Education*, submitted (2007).
6. Morales, W., J. E. Gatica, R.F. Handschuh and T.L. Krantz "Vapor-Mist Phase Lubrication of an Enclosed Gearbox" *Tribol. Trans., In Press* (2007).
7. Androjna, C., J.E. Gatica, J.M. Belovich and K.A. Derwin "Oxygen diffusion through natural extracellular matrices: Implications for estimating critical thickness values in tendon tissue engineering," *Tissue Eng., In Press* (2007).
8. Koppaka, S.S., M.A. Puchowicz, J.C. LaManna and J.E. Gatica "Effect of Alternate Energy Substrates on Mammalian Brain Metabolism during Ischemic Events," *Adv. Exp. Med. Biol., In Press* (2007).
9. Hlavacek, V., J.A. Puszynski, H.J. Viljoen and J.E. Gatica "Model Reactors and their Design Equations," Chapter in *Ullmann's Encyclopedia of Industrial Chemistry*, vol. B4, *In Press* (2007)
1. Colombo, M.A., F. Mele, M.R. Hernández, J.E. Gatica and J. Luz Silveira "Optimización Termoeconómica y Ambiental de Ingenios Azucareros," XXII Inter-American Congress of Chemical Engineering, Buenos Aires, Argentina (2006).
10. Nagarajan, A., C. Garrido, W. Morales and J.E. Gatica "Phosphate Reactions as Mechanisms of High-Temperature Lubrication," *NASA/TM-2006-214060* (2006).
11. Colombo, M.A., M.R. Hernández, J.E. Gatica and S. Ungarala "Interactive Teaching Applications Using Client-server MATLAB Environments," *Proceedings of the 4th Mercosur Congress on Process Systems Engineering*, Rio de Janeiro, Brazil (2005)
12. Colombo, M.A., M.R. Hernández, J.E. Gatica and J.L. Silveira "A New Approach for the Thermo-Economical Optimization of Co-Generation Systems," *Proceedings of the 4th Mercosur Congress on Process Systems Engineering*, Rio de Janeiro, Brazil (2005)
13. Sofalvi, S., J.F. Llapa, J.T. Reye, W. Morales and J.E. Gatica "Protective and Conversion Coatings by Chemical Vapor Deposition," *Proceedings of the 7th World Congress of Chemical Engineering*, Glasgow, Scotland (2005).
14. Reye, J.T., W. Morales and J.E. Gatica "Formulating Precursors for Coating Metals and Ceramics," *NASA Technology Briefs*, March 2005.
15. Reye, J.T., L. S. McFadden, J. E. Gatica and W. Morales "Conversion Coatings for Aluminum Alloys by Chemical Vapor Deposition Mechanisms," *NASA/TM-2004-212905* (2004).
16. Gorla, R.S.R, J.E. Gatica, B. Ghorashi, P. In-Eure and L.W. Byrd "Heat Transfer in a Thin Liquid Film in the presence of Electric Field," *Chem. Eng. Comm.*, **191**(5), pp. 718-731(2004)
17. Bartels, M., M.N. Pedernera, N.S. Schbib, D.O. Borio and J.E. Gatica "Formulation of Reduced-Order Models for the Dynamic and Stability Analyses of Autothermal Radial Flow Reactors," *International Journal of Chemical Reaction Engineering*, **1**(A43) (2003).
18. Sangsuwan, P., J. A. Orejas, S. N. Tewari and M. Singh, and J.E. Gatica "Reaction-bonded Silicon Carbide by Reactive Infiltration," *Ind. Eng. Chem. & Res.*, **40**, pp. 5191-5198 (2003).
19. McFadden, L.S., [with C. Garrido, J.T. Reye, W. Morales and J.E. Gatica] "Study of Catalytic Reactions as Mechanisms of High-Temperature Lubrication," *Lubrication Engineering*, **58**(12), pp. 34-36, 2002.
20. Gorla, R.S.R, J.E. Gatica, B. Ghorashi and P. In-Eure "Heat Transfer in a Thin Liquid Film in the presence of Electric Fields for Non-Isothermal Interfacial Condition," *Int. J. Fluid Mechanics Res.*, **29**(2), pp. 1-12 (2002).

B. Presentations

More than 120 Presentations at Regional, National and International Symposia

Recent Presentations

1. Koppaka, S., M.A. Puchowicz, J.C. LaManna and J.E. Gatica "Effect of Alternate Energy Substrates on the Activated Neuronal Metabolism, 2006 Annual BMES Meeting, Chicago, IL (2006).
2. Gatica, J.E. "Modeling Metabolic Processes in Mammalian Brain Tissue: Analysis of hypoxia and ischemia," 2006 International Symposium on Oxygen Transport to Tissue (ISOTT), Louisville, KY (2006).
3. Nagarajan, A., C. Garrido, W. Morales and J.E. Gatica "Catalytic Reactions as Mechanisms of High-temperature Lubrication," *2005 Annual AIChE Meeting*, Cincinnati, OH (2005).
4. Koppaka, S., N. Spassil, M.A. Puchowicz, J.C. LaManna and J.E. Gatica "Metabolic Pathways in Mammalian Brain Tissue: Coupling and Compartmentalization of the TCA Cycle Dynamics," *Annual BMES Meeting*, Baltimore, MD (2005).
5. Kaliappan, D., J.J. Stafford, J.E. Gatica, M.A. Puchowicz, D. Magness and J.C. LaManna "Modeling Metabolic Dynamics in the Brain," *Annual BMES Meeting*, Philadelphia, PA (2004).
6. McFadden, L.S. and J.E. Gatica "Parameter Estimation in Metabolic Pathways using Thermodynamic Constraints," *Annual BMES Meeting*, Philadelphia, PA (2004).
7. Sofalvi, S., J.T. Reye, W. Morales. A.T. Riga & J.E. Gatica "Protective and Conversion Coatings by Chemical Vapor Deposition Method," *2003 National AIChE Meeting*, San Francisco, CA (2003).
8. Bartels, M., M.N. Pedernera, S.N. Schbib, D.O. Borio, and J.E. Gatica "Formulation of Reduced-Order Models for Stability and Dynamic Analysis of Autothermal Radial Flow Reactors." "*Chemical Reaction Engineering IX: Chemical Reactor Engineering: Meeting the Challenges for New Technology*" Quebec, Canada (June 29, 2003).
9. Gupta, A.D, A. E. Bruzas and J.E. Gatica "Application of Interactive Instructional Computer Modules in Engineering Laboratory Environments," *Proceedings of the National ASEE Meeting*, Nashville, TN (June 2003).

10. Garrido, C., L. McFadden, W. Morales and J.E. Gatica " Study of Catalytic Reactions as Mechanisms of High-Temperature Lubrication," *2002 National AIChE Meeting*, Indianapolis, IN (2002).
11. Bartels, M., M.N. Pedernera, D.O. Borio and J.E. Gatica "Formulation of Lumped-parameter Models for the Stability Analysis of Radial Flow Reactors," *2002 National AIChE Meeting*, Indianapolis, IN (2002).
12. Reye, J.T., L. McFadden, W. Morales, and J.E. Gatica "Surface Modification of Aluminum by CVD Mechanism Using Aryl Phosphates," *2002 National AIChE Meeting*, Indianapolis, IN (2002).
13. Bartels, M., M.N. Pedernera, S.N. Schbib, Z.Z. Chen, S. Ungarala and J.E. Gatica "Control & Stability Analysis of Auto-thermal Radial Flow Reactors using Reduced-Order Models," *2002 National AIChE Meeting*, Indianapolis, IN.

D. Research Support

Ongoing Research Support

1. P50 GM66309 Saidel, G.M. (PI); J.M. Belovich and J.E. Gatica (PI's for CSU subcontract)

NIH

"Center for Modeling Integrated Metabolic Systems"

This center grant has the aim of developing a comprehensive mathematical model of metabolism in humans, based on detailed models of metabolism and transport in each of the major organ systems (liver, heart, muscle, and brain) and the integration of these models. The model is developed with and corroborated by in vivo data. My role is to develop the mathematical model for mammalian brain tissue.

Funding (2006-2008) \$ 226,479

Gatica effort: 20% effort for FY 07

2. Pre-Award Gatica, J.E. (PI) 10/06 - 09/08

NASA, Glenn Research Center

"Coatings for High-temperature Wear and Friction Control: Characterization and Deposition Mechanisms"

This project is an on-going research seeking extension to metal working operations, underground power generation, conversion coatings, and emergency no-oil alternatives is currently being evaluated. Two major issues with this project rest with the experimental setup for wear and friction (at ex-AMC facilities): continuous lubrication (in a vapor-mist form), and thermal management. These issues require the replacement/repair of analytical facilities. Research during the next academic year will focus on identifying optimum compositional formulations for both ferric and non-ferric metals. An experimental setup is being tested for reliability/reproducibility.

Funding (2006-2008) Equipment (\$ 75,000)

Gatica effort: 20% effort for FY 07

Recent Completed Research Support

- "Center for Modeling Integrated Metabolic Systems (MIMS)," with G.M. Saidel and J.M. Belovich (Case Western Reserve University, Cleveland State University, and University Hospitals) \$ 194,770 (2005-2006, NIH).
- "Deposition and Characterization of Thin Films on Metallic Substrates," \$ 20,600 (2003-2005, NASA John Glenn Research Center at Lewis Field)
- "Community Partnerships for HOPE (Hispanic Opportunities for Professional Education)," with Esperanza, Inc. and ACE Program (Fenn College of Engineering), \$ 50,000 (2003-2004, Cleveland State University-Gund Foundation-Cleveland Foundation: "President's Initiative Program").
- "Java-based Multi-media Modules for Computer-aided Instruction," \$ 5,000 (Spring 2003, University Center for Teaching & Learning: "Teaching Enhancement Awards").
- "Study of Homogeneous Catalytic Effects in Solutions of Organic Phosphates and Transition Metals," \$45,790 (2002-2003, NASA John Glenn Research Center at Lewis Field).
- "Web-based Distribution and Management of Virtual Industrial Scenarios," \$ 5,000 (Summer 2002, University Center for Teaching & Learning: "Teaching Enhancement Awards").
- "Development of Web-based coursework in Manufacturing & Engineering Management," with J.M. Belovich, B. Ghorashi, P. Petersen, D.B. Shah & S. Ungarala, \$ 107,000 (2002-2004, Ohio Learning Network/U. Cincinnati).
- "Teaching "statistics in laboratory" through Interactive Tutorials," with D.B. Shah, \$ 5,000 (Spring 2002, University Center for Teaching & Learning: "Teaching Enhancement Awards").
- "Development of a Dynamic Interactive Data-base for Course and Program Assessment," \$ 1,560 (Spring 2002, Cleveland State University -George Gund Foundation: "Assessment Grants Program").

E. Courses Taught and other Teaching Activities Undergraduate

Calculus and Analytical Geometry
 Programming for Engineers (Fortran 77/90/95, ANSI C, C++, JAVA)
 Numerical Methods for Engineers
 Transport Phenomena
 Process Control
 Chemical Reactor Design
 Statistical Analysis of Experimental Data (Statistics in the Lab)
 Process Modeling and Simulation
 Advanced Materials Processing

 Graduate

Advanced Reactor Design
 Mathematical Methods in Chemical Engineering
 Nonlinear Phenomena in Chemical Engineering
 Advanced Numerical Methods
 Advanced Materials Processing
 Advanced Heat Transfer
 Thermodynamics & Chemical Kinetics in Environmental Engineering
 Internet-based Education (Web Education)

GRADUATE STUDENTS

Dissertation and Thesis Advisor.

More than 30 students have graduated under my supervision, presently advising 7 graduate students

Dissertation and Thesis Committee Member

Served in more than 20 Thesis and Dissertation Committees.

Advisor Senior Independent Studies

Advised more than 20 Senior Engineering (Independent Study) Students

Honors Advisor

Invited Workshop Leader (with G. Saidel, M. Cabrera, H. Brunengraber, W. Stanley, M. Nasca, M. Puchowicz and J.M. Belovich "Workshop on Modeling Metabolic Dynamics," Case Western Research Univ. (June 2003, June 2004).

Invited Workshop Leader (with J.M. Belovich) "Principles of Design & Operation of Bioreactors," Ohio Aerospace Institute-NASA John Glenn Research Center (June 2003).

Invited Workshop Leader "Transforming Science and Engineering Education through Interactive Technologies," Visiting Professor, Faculty Workshop, National University of Tucumán, S.M. de Tucumán, Argentina.

Invited Graduate Program Lecturer "Thermodynamics and Chemical Kinetics in Environmental Engineering," Visiting Professor, Graduate Program, Southern National University, Bahía Blanca, Argentina.

Undergraduate and Graduate Academic Advisor, Chemical and Biomedical Engineering (1992-current).

Mentor for High-School minority students interested in Engineering (1995-current).

ACE Program, SEED (ACS) Project, and Partnerships for HOPE Project

Mentor for Hispanic Science and Engineering students (2001-current)

Host for High-School students interested in Engineering (1994-current).

Coordinator for several WWW-based projects (1996-current).

Coordinator for International Academic Exchange Programs with Foreign Universities

- Universidad Nacional del Sur (UNS, Bahía Blanca – Argentina, In Process).

<http://www.uns.edu.ar/>

- Feng Chia University (FCU, Taichung – Taiwan, In Process)

<http://en.fcu.edu.tw/>

- Universidad Nacional de Tucumán (UNT, 2001-current, Tucumán, Argentina).

<http://www.unt.edu.ar/>

- Universidad Nacional de Río Cuarto (UNRC, Córdoba – Argentina, 2000-current)

<http://www.ing.unrc.edu.ar/>

- Chung Yuan Christian University (CYCU, Chung-Li –Taiwan, 2000-current)

http://www.cycu.edu.tw/cycu_e/cycuwebsite/index.htm