YU LUO

GSK | Date modified: March 9, 2025

EDUCATION AND TRAINING

University of Delaware, College of Engineering 01/2021
Postdoctoral Researcher, Chemical Engineering

Columbia University, Graduate School of Arts and Sciences 02/2017
Doctor of Philosophy, Chemical Engineering

Columbia University, Fu Foundation School of Engineering and Applied Science 05/2012
Master of Science, Chemical Engineering
Full GPA

National University of Singapore, Faculty of Engineering 06/2011
Bachelor of Engineering, Chemical Engineering
First Class Honors

TECHNICAL STRENGTHS

Coding	Python, R, MATLAB, JavaScript, SQL, Lisp, HTML, LaTeX
Modeling	SIMCA, Simulink, COMSOL, NetLogo, Aspen HYSYS
Creative	Photoshop/GIMP, Illustrator/Inkscape, After Effects, FL Studio, Premiere Pro

EXPERIENCE

GSK, Biopharmaceutical Drug Substance Development 02/2021–Present
Principal Investigator, Chemometrics & Process Modeling Expert *King of Prussia, PA*

- **Managers**: Dr. Sameer Talwar and Dr. Diana Ritz
- **Recipient of the 2025 Martin Sinacore Young Investigator Award (external)**
- **Recipient of the 2023 Gill Lord Exceptional Impact Award**
- **Consistently recognized as a top performer (multi-year recipient of the IPTc Award)**
- Led a matrix team to industrialize and expand applications of Raman spectroscopy
- Collaborated across the organization on advanced process control initiatives
- Contributed to the lifecycle management and industrialization of digital and modeling applications
- Mentored junior scientists in chemometrics, statistical analysis, and process modeling
- Deployed multiple PAT and advanced process control applications in commercial manufacturing
- Developed and implemented a seed train transfer time forecasting tool for multiple commercial products
- Demonstrated Raman-based glucose control in a 1000-L bioreactor for the first time
- Served as the model owner for multiple development and commercial PAT/modeling applications
- Enhanced process productivity systematically and substantially using designs of dynamic experiments
- Productionized designs of dynamic experiments to optimize dynamic conditions in process development
- Automated workflows for Raman data processing, model development, and documentation
- Analyzed omics data algorithmically to interpret cell metabolic responses to external stimuli

University of Delaware, Chemical and Biomolecular Engineering 06/2017–01/2021
Postdoctoral Researcher *Newark, DE*

- **Advisors**: Prof. Babatunde A. Ogunnaike and Prof. Kelvin H. Lee
- Specialized in modeling and control of different biological processes using systems engineering techniques
- Developed a hybrid mAb glycosylation model in close collaboration with Janssen (J&J Pharmaceuticals)
- Designed and implemented a model-based mAb glycosylation control system (CMU/JHU collaboration)
- Developed a cell signaling model for optimal control–based cancer treatment (UVA collaboration)
- Developed a kinetics-based, data-driven COVID-19 model for optimal control–based rational mitigation
- Supervised an undergraduate project on modeling cell culture dynamics and parameter estimation
- Presented research at invited seminars and at CCE, ACS, GRC, CSBC, and AIChE conferences

Columbia University, Chemical Engineering 09/2011–05/2017
Doctoral Student (2011–2016) and Postdoctoral Researcher (01–05/2017) *New York, NY*

- **Advisors**: Prof. Venkat Venkatasubramanian and Prof. Garud Iyengar (Operations Research)
- Specialized in managing systemic risk and modeling social dynamics via systems engineering and AI
- Developed a control-theoretic opinion dynamics model, validated via human-subject experiments
- Developed an optimal control–based framework for improving multi-stakeholder decision-making
- Developed an open data–driven, early-warning system to predict and prevent mining accidents
- Developed an income distribution model using statistical mechanics and population game theory
- Developed systemic financial risk models with executives from Prudential Finance and PNC Bank
- Developed an agent-based model to understand high-frequency trading and its market impact
- Identified vulnerabilities in financial networks using process hazard analysis techniques
- Led multiple interdisciplinary research projects and supervised graduate and undergraduate teams
- Received extensive training in computer science and operations research

PUBLICATIONS

15. Anastasia Nikolakopoulou, Yu Luo, and Zach Hatzenbeller. Towards "tighter" titer: Model predictive control in fed-batch bioreactors. *American Control Conference*, 2025. In review

14. Yu Luo, Duane A. Stanton, Rachel C. Sharp, Alexis J. Parrillo, Kelsey T. Morgan, Diana B. Ritz, and Sameer Talwar. Efficient optimization of time-varying inputs in a fed-batch cell culture process using design of dynamic experiments. *Biotechnology Progress*, page e3380, 2023

13. Yu Luo, Varghese Kurian, Liqing Song, Evan A. Wells, Anne Skaja Robinson, and Babatunde A. Ogunnaike. Model-based control of titer and glycosylation in fed-batch mAb production: Modeling and control system development. *AIChE Journal*, 69(4):e18075, 2023

12. Yu Luo, Johanna Vappiani, Keegan Orzechowski, Pramthesh Patel, Daniel Sevin, and Juan Aon. Metabolic rewiring revealed by cell-specific rate analyses from nontargeted exometabolomics during simultaneous consumption of glucose and lactic acid in a cho fed-batch process. *Journal of Biotechnology*, 359:161–175, 2022

11. Yu Luo, Varghese Kurian, and Babatunde A. Ogunnaike. Bioprocess systems analysis, modeling, estimation, and control. *Current Opinion in Chemical Engineering*, 33:100705, 2021

10. Yu Luo, Robert J. Lovelett, J. Vincent Price, Devesh Radhakrishnan, Kristopher Barnthouse, Ping Hu, Eugene Schaefer, John Cunningham, Kelvin H. Lee, Raghunath B. Shivappa, and Babatunde A. Ogunnaike. Modeling the effect of amino acids and copper on monoclonal antibody productivity and glycosylation: A modular approach. *Biotechnology Journal*, 16(2):2000261, 2021

9. Evan Wells, Liqing Song, Madison Greer, Yu Luo, Varghese Kurian, Babatunde A. Ogunnaike, and Anne S. Robinson. Media supplementation for targeted manipulation of monoclonal antibody galactosylation and fucosylation. *Biotechnology and Bioengineering*, 117(11):3310–3321, July 2020

8. Venkat Venkatasubramanian and Yu Luo. How much income inequality is fair? Nash bargaining solution and its connection to entropy. In Anindya Chakrabarti, Lukas Pichl, and Taisei Kaizoji, editors, *Network Theory and Agent-Based Modeling in Economics and Finance*, pages 159–174. Springer, Singapore, December 2019

7. Yu Luo, Garud Iyengar, and Venkat Venkatasubramanian. A one-third advice rule based on a control-theoretic opinion dynamics model. *IEEE Transactions on Computational Social Systems*, 6(3):576–581, June 2019

6. Venkat Venkatasubramanian, Yu Luo, and Zhizun Zhang. Control of complex sociotechnical systems: importance of causal models and game theory. *Computers & Chemical Engineering*, 123:1–11, April 2019

5. Yu Luo, Garud Iyengar, and Venkat Venkatasubramanian. Social influence makes self-interested crowds smarter: an optimal control perspective. *IEEE Transactions on Computational Social Systems*, 5(1):200–209, March 2018

4. Garud Iyengar, Yu Luo, Shivaram Rajgopal, Venkat Venkatasubramanian, and Zhizun Zhang. Towards a financial statement based approach to modeling systemic risk in insurance and banking. *Columbia Business School Research Paper*, 17(177), July 2017. Available at SSRN. **Featured by the "SSRN Top Ten List" in Banking and Insurance, Risk Management and Analysis in Financial Institutions, Risk Management, and Financial Crises categories**

3. Yu Luo, Garud Iyengar, and Venkat Venkatasubramanian. Soft regulation with crowd recommendation: coordinating self-interested agents in sociotechnical systems under imperfect information. *PLoS ONE*, 11(3):e0150343, March 2016

2. Venkat Venkatasubramanian, Yu Luo, and Jay Sethuraman. How much inequality in income is fair? A microeconomic game theoretic perspective. *Physica A: Statistical Mechanics and its Applications*, 435:120–138, October 2015. **Featured by the "ScienceDirect Top 25 List of Most Downloaded Articles"**

1. Richard Bookstaber, Paul Glasserman, Garud Iyengar, Yu Luo, Venkat Venkatasubramanian, and Zhizun Zhang. Process systems engineering as a modeling paradigm for analyzing systemic risk in financial networks. *The Journal of Investing*, 24(2):147–162, May 2015

PRESENTATIONS

30. Yu Luo, Zach Hatzenbeller, Duane Stanton, Alexis Parrillo, Jared Balaich, Sameer Talwar, and Diana Ritz. A less-traveled path for data in bioporcess development: From dynamic experiments to dynamic process models. In *Cell Culture Engineering XVIII*, Cancun, Mexico, June 2023. Poster presentation

29. Yu Luo, Duane Stanton, Rachel Sharp, Kelsey Morgan, and Alexis Parrillo. How to win "20 questions" in process development using a design ofdynamic experiments. In *IFPAC 2023*, North Bethesda, MD, June 2022. Oral presentation

28. Yu Luo. What does the cell say? How to be a better "listener" and "motivate" cells to work harder through advanced data analytics and modeling approaches. In *GSK BPD Science Symposium (Internal)*, King of Prussia, PA, November 2021. Oral presentation

27. Yu Luo. Model-based control of biological processes: systems engineering in biomanufacturing. In *Chemical Engineering Future Faculty Seminar Series*, Santa Barbara, CA, December 2020. Oral presentation

26. Yu Luo, Varghese Kurian, Janine Buonato, Matthew J. Lazzara, and Babatunde A. Ogunnaike. Model-based approach for multivariate signaling regulation of epithelial-mesenchymal transition in pancreas cancer cells. In *AIChE Annual Meeting*, San Francisco, CA, November 2020. Oral presentation

25. Yu Luo. Model-based control of biological processes: systems engineering in biomanufacturing and cancer treatment. In *AIChE Annual Meeting*, San Francisco, CA, November 2020. Poster presentation

24. Yu Luo. Model-based control of biological processes: systems engineering in biomanufacturing and cancer treatment. GSK, King of Prussia, PA, October 2020. Invited seminar

23. Yu Luo, Varghese Kurian, Janine Buonato, Matthew J. Lazzara, and Babatunde A. Ogunnaike. Model-based approach for multivariate signaling regulation of epithelial-mesenchymal transition in pancreas cancer cells. In *CSBC Annual Investigators Meeting*, Bethesda, MD, September 2020. Poster presentation

22. Yu Luo, Devesh Radhakrishnan, Evan Wells, Deepro Banerjee, Liqing Song, Varghese Kurian, Anne S. Robinson, and Babatunde A. Ogunnaike. Control of glycosylation and titer in fed-batch monoclonal antibody production. In *Cell Culture Engineering XVII*, Tucson, AZ, April 2020. Poster presentation (rescheduled due to COVID-19)

21. Yu Luo, Devesh Radhakrishnan, Evan Wells, Deepro Banerjee, Liqing Song, Varghese Kurian, Anne S. Robinson, and Babatunde A. Ogunnaike. Control of glycosylation and titer in fed-batch monoclonal antibody production. In *ACS National Meeting & Expo*, Philadelphia, PA, March 2020. Oral presentation (rescheduled due to COVID-19)

20. Yu Luo. Smart biomanufacturing and smarter crowds: a process systems engineering + artificial intelligence approach. Purdue University, West Lafayette, IN, January 2020. Invited seminar

19. Yu Luo. Smart biomanufacturing and smarter crowds: a process systems engineering + artificial intelligence approach. Clemson University, Clemson, SC, January 2020. Invited seminar

18. Yu Luo, Devesh Radhakrishnan, Anne S. Robinson, and Babatunde A. Ogunnaike. Control of glycosylation and titer in fed-batch monoclonal antibody production. In *AIChE Annual Meeting*, Orlando, FL, November 2019. Oral presentation

17. Yu Luo. Systems approach to advanced decision-making in chemical engineering, biomanufacturing, and society. In *AIChE Annual Meeting*, Orlando, FL, November 2019. Poster presentation

16. Yu Luo. Systems and advanced decisions: from biomanufacturing to opinion dynamics applications. Imperial College London, London, U.K., June 2019. Invited seminar

15. Yu Luo. Systems and advanced decisions: from biomanufacturing to opinion dynamics applications. Clarkson University, Potsdam, NY, June 2019. Invited seminar

14. Yu Luo, J. Vincent Price, Robert J. Lovelett, Devesh Radhakrishnan, Kristopher Barnthouse, Eugene Schaefer, John Cunningham, Ping Hu, Kelvin H. Lee, and Babatunde A. Ogunnaike. Multiscale modeling of antibody production and glycosylation for improved upstream process design. In *ACS National Meeting & Expo*, Orlando, FL, April 2019. Oral presentation

13. Yu Luo. Systems and advanced decisions: from biomanufacturing to opinion dynamics applications. Stevens Institute of Technology, Hoboken, NJ, March 2019. Invited seminar

12. Yu Luo. Systems and advanced decisions: from biomanufacturing to opinion dynamics applications. University of Waterloo, Waterloo, ON, Canada, March 2019. Invited seminar

11. Yu Luo, J. Vincent Price, Robert J. Lovelett, Devesh Radhakrishnan, Kristopher Barnthouse, Eugene Schaefer, John Cunningham, Ping Hu, Kelvin H. Lee, and Babatunde A. Ogunnaike.

Multiscale modeling of antibody production and glycosylation for improved upstream process design. In *Biotherapeutics and Vaccines Development (Gordon Research Conference)*, Galveston, TX, January 2019. Poster presentation

10. Yu Luo, J. Vincent Price, Robert J. Lovelett, Devesh Radhakrishnan, Kristopher Barnthouse, Eugene Schaefer, John Cunningham, Ping Hu, Kelvin H. Lee, Raghunath B. Shivappa, and Babatunde A. Ogunnaike. Multiscale modeling of monoclonal antibody (mAb) production and glycosylation in a Chinese hamster ovary (CHO) cell culture process. In *AIChE Annual Meeting*, Pittsburgh, PA, October 2018. Oral presentation

9. Yu Luo. Process systems engineering and artificial intelligence for advanced manufacturing: including applications to biopharmaceuticals. In *AIChE Annual Meeting*, Pittsburgh, PA, October 2018. Poster presentation

8. Yu Luo, J. Vincent Price, Robert J. Lovelett, Devesh Radhakrishnan, Kristopher Barnthouse, Eugene Schaefer, John Cunningham, Ping Hu, Kelvin H. Lee, Raghunath B. Shivappa, and Babatunde A. Ogunnaike. Multiscale modeling of monoclonal antibody (mAb) production and glycosylation in a CHO cell culture process. In *AMBIC Semiannual Meeting*, Fremont, CA, June 2018. Poster presentation

7. Yu Luo, J. Vincent Price, Robert J. Lovelett, Devesh Radhakrishnan, Kristopher Barnthouse, Eugene Schaefer, John Cunningham, Ping Hu, Kelvin H. Lee, Raghunath B. Shivappa, and Babatunde A. Ogunnaike. Multiscale modeling of monoclonal antibody (mAb) production and glycosylation in a CHO cell culture process. In *Cell Culture Engineering XVI*, Tampa, FL, May 2018. Poster presentation

6. Yu Luo, Garud Iyengar, and Venkat Venkatasubramanian. Control with soft feedback in social systems: mathematical principles, empirical evidence, and applications. In *AIChE Annual Meeting*, Minneapolis, MN, November 2017. Oral presentation

5. Yu Luo, Ashutosh Nanda, Shivaram Rajgopal, Vinay Ramesh, Zhizun Zhang, Catherine Zhao, and Venkat Venkatasubramanian. A data-driven early warning system for mining accidents. In *Global Congress on Process Safety*, San Antonio, TX, March 2017. Oral presentation

4. Yu Luo, Garud Iyengar, and Venkat Venkatasubramanian. The control of self-interested agents: learning from nature's wisdom of crowds. In *AIChE Annual Meeting*, San Francisco, CA, November 2016. Oral presentation. **Finalist and travel grant recipient for the AIChE CAST Division Director's Student Presentation Award**

3. Yu Luo, Richard Bookstaber, Paul Glasserman, Garud Iyengar, Zhizun Zhang, and Venkat Venkatasubramanian. Process systems engineering beyond chemical plants: signed digraph as a modeling tool for analyzing systemic risk in financial networks. In *AIChE Annual Meeting*, San Francisco, CA, November 2016. Oral presentation

2. Yu Luo. Process systems engineering beyond chemical plants. In *AIChE Annual Meeting*, San Francisco, CA, November 2016. Poster presentation

1. Yu Luo, Garud Iyengar, and Venkat Venkatasubramanian. Soft regulation: coordinating distributed self-interested agents in sociotechnical systems. In *AIChE Annual Meeting*, Atlanta, GA, November 2014. Oral presentation

TEACHING

Managing Systemic Risk in Complex Systems (Graduate) Spring 2016
Student Lecturer Columbia University

Managing Systemic Risk in Complex Systems (Graduate) Fall 2015
Student Lecturer Columbia University

Molecular Phenomena (Undergraduate) Spring 2012
Teaching Assistant Columbia University

Thermodynamics (Undergraduate) Fall 2011
Teaching Assistant Columbia University

PROFESSIONAL SERVICE

Various Research Journals and Conferences 12/2012–Present
Reviewer

- *Computers and Chemical Engineering.* **Recognized as an outstanding reviewer**
- *AIChE Journal*
- *Biotechnology and Bioengineering*
- *Biotechnology Journal*
- *Canadian Journal of Chemical Engineering*
- *Chemical Engineering Research and Design*
- *Frontiers Physiology*
- *IEEE Conference on Decision and Control (CDC)*
- *IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems (DYCOPS)*
- *MDPI Physics*
- *Metabolic Engineering Communications*
- *Scientific Reports*

AIChE 11/2014–Present
Member, Session Chair

- Severed as session chair for the Pharmaceutical Discovery, Development, and Manufacturing Forum

Columbia University, Center for the Management of Systemic Risk 12/2012–05/2017
Webmaster, Event Assistant, Graphic Designer

- Designed print media, assisted organizing three university-level symposia