Mariana Monteiro

✉ m.monteiro21@imperial.ac.uk   in mariana-monteiro   ⌗ marianaipmonteiro
⌂ https://profiles.imperial.ac.uk/m.monteiro21

Education

2021–25	**Ph.D.**, Chemical Engineering, Imperial College London, London, United Kingdom
2017-19	**M.Sc.**, Chemical Engineering, Instituto Superior Tecnico, Lisbon, Portugal
2017-18	**Exchange Semester**, Chemical Engineering, Eindhoven University of Technology, Eindhoven, The Netherlands
2014-17	**B.Sc.** Chemical Engineering, Instituto Superior Tecnico, Lisbon, Portugal

Research Experience

2026   **Research Associate**, Kontoravdi Lab, (Advisor: Prof. Cleo Kontoravdi), Imperial College London, United Kingdom

- Conducted research sponsored by GlaxoSmithKline (GSK).

- Developed metabolism-informed bioprocess models for mammalian cell cultures, spanning fed-batch to continuous modes, using physics-informed recurrent neural network models and validated them with industrial datasets.

2021–2025   **Ph.D. Student**, Kontoravdi Lab, (Advisor: Prof. Cleo Kontoravdi), Imperial College London, United Kingdom

- Conducted research co-sponsored by the Biotechnology and Biological Sciences Research Council (BBSRC) and GlaxoSmithKline (GSK).

- Developed metabolism-informed bioprocess models for mammalian cell cultures, spanning fed-batch to continuous modes, using physics-informed recurrent neural network models and validated them with industrial datasets.

- Applied Reinforcement Learning (RL) for glycosylation control in mammalian cells using custom Gym environments, Soft Actor-Critic (SAC) agents, and Pyomo for environment dynamics and optimisation constraints.

- Designed and solved convex programs for uncovering latent cellular objectives using CVXPY.

- Integrated mechanistic and data-driven modelling using tools such as PyTorch, JAX, and COBRApy.

| 2024 | **Global Fellows Research Placement**, Process-Energy-Environmental Systems Engineering (PEESE) Lab, (Advisor: Prof. Fengqi You), Cornell University, United States of America |

- Developed a bilevel optimisation framework for targeted metabolic network reduction using Gaussian Process Regression and Gurobi.

Teaching

Imperial College London

2026	Invited Lecturer, **Modelling of Biological Systems**. Taught workshop of bioprocess modelling in Python.
2023-2024	Teaching Assistant, **Dynamic Behaviour of Process Systems**. Supported and mentored group projects using gPROMS ModelBuilder.
2023-2024	Teaching Assistant, **Process Optimization**. Delivered weekly tutorial lectures using GAMS and graded exams.
2022-2024	Teaching Assistant, **Advanced Process Design**. Delivered lectures on process design and chemical engineering fundamentals. Supported, mentored and evaluated group projects.
2022-2024	Teaching Assistant, **Process Design**. Supported, mentored, and evaluated group projects using ASPEN Plus.

1st Metabolic and Bioprocess Modeling for Animal Cells Course - ESACT

| 2023 | Co-developed and delivered a python **tutorial** on bioprocess modeling, parameter estimation, global sensitivity analysis and optimization for academic and industrial participants. |

Awards & Honors

2024	**Best Poster Prize**, *Discovering Cellular Objectives through Differentiable Optimization*, Conference on Constraint-Based Reconstruction and Analysis (COBRA) 2024
2024	**Best Presentation Prize**, *Generalizing cell culture models from fed-batch to continuous using metabolic knowledge*, Sargent Centre Annual Consortium Meeting 2024
2023	**Best Presentation Prize**, *Hybrid Kinetic-Stoichiometric model of fed-batch reactor*, European Society for Animal Cell Technology UK (ESACT UK) 2023

Grants

2025	Awarded **Conference Bursary worth $2215**, Cell Culture Engineering (CCE) 2025
2024	Awarded **Conference Bursary worth £500**, European Society for Animal Cell Technology (ESACT) 2024
2024	Awarded **Global Fellows Fund & Turing Scheme grant worth £1090**
2023	Awarded **Conference Bursary worth $2000**, Cell Culture Engineering (CCE) 2023
2023	Awarded **Conference Bursary worth £375**, European Society for Animal Cell Technology UK (ESACT UK) 2023

| 2022 | Awarded **Travel Bursary worth £500**, Institution of Chemical Engineers (IChemE) 2022 |

Work Experience

Process Systems Enterprise (now: Siemens PSE), London, United Kingdom

| 2019-2021 | **Applications Engineer** |

- Developed and implemented models in the gPROMS Digital Applications Platform (gDAP) for PSE clients, including controller tuning for a polymerization reactor and testing integrated optimization models for oil production plants.

- Designed and delivered internal and external training courses.

Supervisory & Mentoring Experience

Graduate

| 2024 | Supervised an MSc student on their research project focusing on cellular objectives. |
| 2023 | Supervised two MSc students on their research projects involving the modeling of continuous cultures and the application of graph neural networks to model cellular behavior. |

Undergraduate

| 2024 | Supervised two BSc students on their research projects exploring transfer learning from fed-batch to continuous cultures. |

Academic Service

Journal Reviewer

2025	Journal of Process Control (Elsevier)
2024	Computational and Structural Biotechnology Journal (Elsevier)
2023	34th European Symposium on Computer Aided Process Engineering /15th International Symposium on Process Systems Engineering (Elsevier)

Student Representative

| 2022-2024 | Sargent Centre for Process Systems Engineering Student Representative at Imperial College London. Organized monthly events to foster collaboration within the research community, including social gatherings and career development sessions. |

Seminar Coordinator

2022-2024   Co-organizer of the first Chemical Engineering Control Club at Imperial College London. Hosted multiple sessions featuring leading researchers in the field, attracting over 40 attendees per event.

Selected Media Coverage

2024   Genetic Engineering & Biotechnology News, Adding Metabolism to Models of Bioprocessing

Publications
G Google Scholar

Talks

[T1] **M. Monteiro**, S. Bediako, Tecson R., G. Nierode, P. Kotidis, and C. Kontoravdi. *Leveraging Metabolic Models To Transfer Knowledge From Fed-Batch To Continuous Cultures*. Invited DEQ Talk (Instituto Superior Tecnico, Lisbon, Portugal). Jan. 2026.

[T2] **M. Monteiro**, F. You, and C. Kontoravdi. *Bilevel Optimisation for Targeted Metabolic Network Reduction*. 14th IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems (Bratislava, Slovakia). June 2025.

[T3] **M. Monteiro**, S. Bediako, G. Nierode, P. Kotidis, and C. Kontoravdi. *Generalizing Cell Culture Models from Fed-Batch to Continuous Using Metabolic Knowledge*. AIChE Annual Meeting (San Diego, CA, USA). Oct. 2024.

[T4] **M. Monteiro**, J. Morrissey, M. Mowbray, and C. Kontoravdi. *Discovering Cellular Objectives through Differentiable Optimization*. AIChE Annual Meeting (San Diego, CA, USA). Oct. 2024.

[T5] **M. Monteiro** and C. Kontoravdi. *Bioprocess Control: A Shift in Methodology Towards Reinforcement Learning*. ESCAPE (Florence, Italy). June 2024.

[T6] **M. Monteiro**, S. Fadda, and C. Kontoravdi. *Bioprocess Control Using Stoichiometric Models of Metabolism*. AIChE Annual Meeting (Orlando, FL, USA). Nov. 2023.

[T7] **M. Monteiro** and C. Kontoravdi. *Hybrid dynamic model of monoclonal antibody production using CHO cells*. ESCAPE (Athens, Greece). June 2023.

[T8] **M. Monteiro** and C. Kontoravdi. *Hybrid Kinetic-Stoichiometric model of fed-batch reactor*. ESACT-UK (Nottingham, UK). Jan. 2023.

[T9] **M. Monteiro** and C. Kontoravdi. *Hybrid Kinetic-Stoichiometric Model of CHO Cell Fed-Batch Process*. AIChE Annual Meeting (Phoenix, AZ, USA). Nov. 2022.

Posters

[P1] **M. Monteiro**, S. Bediako, R. Tecson, G. Nierode, P. Kotidis, and C. Kontoravdi. *Leveraging Metabolic Models to Transfer Knowledge from Fed-Batch to Continuous Cultures*. Cell Culture Engineering (Tucson, AZ, USA). Apr. 2025.

[P2] **M. Monteiro**, R. Chiplunkar, M. Mowbray, and C. Kontoravdi. *Advancing Kinetic Parameter Estimation: A Metabolism-Informed Variational Bayesian Inference Approach*. AIChE Annual Meeting (San Diego, CA, USA). Nov. 2024.

[P3] **M. Monteiro**, J. Morrissey, M. Mowbray, and C. Kontoravdi. *Discovering Cellular Objectives through Differentiable Optimization*. COBRA (San Diego, CA, USA). Oct. 2024.

[P4] **M. Monteiro**, S. Fadda, and C. Kontoravdi. *Reinforcement Learning Based Control of Fed-Batch Production Reactor*. AIChE Annual Meeting (Orlando, FL, USA). Nov. 2023.

[P5] **M. Monteiro** and C. Kontoravdi. *Hybrid dynamic model of monoclonal antibody production using CHO cells*. Cell Culture Engineering (Cancun, Mexico). Apr. 2023.

Journal Articles

[J1] **M. Monteiro**, F. Konstantinos, and C. Kontoravdi. "From titer to quality: Exploring reinforcement learning for bioprocess control in silico". In: *Computers & Chemical Engineering* 205 (2026), p. 109452.

[J2] M. Sarkis, **M. Monteiro**, A. Bernardi, R. Chiplunkar, C Kontoravdi, and Maria M. Papathanasiou. "Sustainable by design: A first attempt on bioprocessing". In: *Computers & Chemical Engineering* 205 (2026), p. 109454.

[J3] **M. Monteiro**, S. Fadda, and C. Kontoravdi. "Towards advanced bioprocess optimization: A multiscale modelling approach". In: *Computational and Structural Biotechnology Journal* 21 (2023), pp. 3639–3655.

Peer-reviewed Conference Proceedings

[C1] **M. Monteiro**, F. You, and C. Kontoravdi. "Bilevel Optimisation for Targeted Metabolic Network Reduction". In: *IFAC-PapersOnLine*. Vol. 59. 6. 14th IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems (DYCOPS 2025). Elsevier, 2025, pp. 271–276.

[C2] **M. Monteiro** and C. Kontoravdi. "Bioprocess Control: A Shift in Methodology Towards Reinforcement Learning". In: *Computer Aided Chemical Engineering*. Vol. 53. Elsevier, 2024, pp. 2851–2856.

[C3] **M. Monteiro** and C. Kontoravdi. "Hybrid dynamic model of monoclonal antibody production using CHO cells". In: *Computer Aided Chemical Engineering*. Vol. 52. Elsevier, 2023, pp. 375–380.

Working papers

[W1] **M. Monteiro**, J. Morrissey, M. Mowbray, and C. Kontoravdi. *CellTarget: A convex optimisation approach to discover cellular objectives*. Under Revision @ npj Systems Biology and Applications. 2025.

[W2] J Morrissey, **M. Monteiro**, C. Kontoravdi, and Betenbaugh M. *Inferring the Metabolic Objectives of Mammalian Cells via Inverse Modeling of Fluxomics and Metabolomics*. Under Revision @ Cell Systems. 2025.