

MARIANA MONTEIRO

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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**, Papathanasiou Lab, (Advisor: [Dr. Maria Papathanasiou](#)),
current Imperial College London, United Kingdom

- Development of algorithms and optimisation strategies for sustainable development manufacturing and distribution of cell-based therapeutics.

2026 **Research Associate**, Kontoravdi Lab, (Advisor: [Prof. Cleo Kontoravdi](#)), Imperial College London, United Kingdom | Sponsored by GlaxoSmithKline (GSK)

- Developed a machine learning framework for predicting cell clone suitability for continuous biomanufacturing from fed-batch culture data.
- Developed CODOmics, a Inverse Reinforcement Learning approach to infer cellular objectives informed by multiomic data.

2021–2025 **Ph.D. Student**, Kontoravdi Lab, (Advisor: [Prof. Cleo Kontoravdi](#)), Imperial College London, United Kingdom | Co-sponsored by Biotechnology and Biological Sciences Research Council (BBSRC) and GlaxoSmithKline (GSK)

- Built a metabolism-informed bioprocess model for mammalian cell cultures, spanning fed-batch to continuous modes, using physics-informed recurrent neural network models; validated with industrial datasets.
- Developed CellTarget, an inverse optimisation algorithm that infers intracellular objective functions from fluxomics data by implementing implicit differentiation of convex Flux Balance Analysis problems.
- Designed a hybrid Reinforcement Learning framework for bioprocess control, to optimise nutrient feeding strategies for dual-objective titer and glycosylation targets.

- 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 metabolic network reduction

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 Modelling for Animal Cells Course - ESACT

- 2023 Co-developed and delivered a python tutorial on bioprocess modelling, parameter estimation, global sensitivity analysis and optimisation 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

- 2026 Awarded **Conference Bursary worth £500**, Biological Control Systems 2026
- 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

2026 Journal of Process Control (Elsevier)
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)

Ambassador for the Portuguese Association of Researchers and Students in the UK (PARSUK)

2026 Promoted collaboration between Portuguese and British research institutes.

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

 [Google Scholar](#)

Journal Articles

- [J1] **M. Monteiro**, K. Flevaris, 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. Monteiro**, J. Morrissey, and C. Kontoravdi. “CellTarget: a convex optimisation approach to discover cellular objectives”. In: *npj Systems Biology and Applications* 12 (2026).
- [J3] 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.
- [J4] **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] 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.

Presentations

Invited Talks

- [I1] **M. Monteiro** and K. Flevaris. *Bioprocess Systems Modelling & Control*. Synthetic Biology Society (Imperial College London, London, UK). Feb. 2026.
- [I2] **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*. DEQ Talk (Instituto Superior Tecnico, Lisbon, Portugal). Jan. 2026.

Talks

- [T1] **M. Monteiro**, J. Morrissey, and C. Kontoravdi. *CellTarget: A convex optimisation approach to discover cellular objectives*. 10th Conference on Constraint-Based Reconstruction and Analysis (COBRA2026) (Potsdam, Germany). Mar. 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.
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