

# PAULINA QUINTANILLA

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## QUALIFICATIONS

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### PhD in Earth Science and Engineering

DEPARTMENT OF EARTH SCIENCE AND ENGINEERING, IMPERIAL COLLEGE LONDON  
Thesis: *Dynamic physics-based flotation models for effective predictive control*

Nov 2022  
London, United Kingdom

### BEng and MSc in Chemical Engineering

DEPARTMENT OF CHEMICAL ENGINEERING, UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA  
Thesis: *Analysis of the effect of pressure and porosity on diffusion-controlled leaching*

Jan 2017  
Valparaíso, Chile

## WORK EXPERIENCE

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### – RESEARCH –

#### Postdoctoral Researcher in Process Systems Engineering

DEPARTMENT OF CHEMICAL ENGINEERING, IMPERIAL COLLEGE LONDON

Dec 2022 - now  
London, United Kingdom

- Currently researching global sensitivity analysis and machine learning tools for mixed-integer linear programming model for supply chain optimisation for personalised leukaemia treatments.
- Collaborating on applying design space quantification to flotation (mineral processing).

#### Co-founder and Developer of *BubbleAnalyser* software

INDEPENDENT PROJECT

Jan 2021 – now

- *BubbleAnalyser* is the first open-source software for bubble size measurements using image analysis. More information on our website: [www.bubbleanalyser.com](http://www.bubbleanalyser.com)

#### Research Assistant in Froth Flotation

DEPARTMENT OF EARTH SCIENCE AND ENGINEERING, IMPERIAL COLLEGE LONDON

Nov 2022 - Dec 2022  
London, United Kingdom

- Evaluated the effect of changes in feed particle size in a model predictive control strategy. This research resulted in one conference paper to be presented at the International Federation of Automatic Control (IFAC) World Congress in Yokohama, Japan, July 2023.

#### Research Assistant in Process Systems Engineering

DEPARTMENT OF CHEMICAL ENGINEERING, UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA

Aug 2017 – Aug 2018  
Santiago, Chile

- Project: “Including stochastic information in Real-Time Optimisation (RTO) for process supervision”.
- Set up and instrumented the Laboratory of Optimisation in the Department of Chemical Engineering.

### – TEACHING –

#### Guest Lecturer in Mining Geology and Engineering

DEPARTMENT OF EARTH SCIENCE AND ENGINEERING, IMPERIAL COLLEGE LONDON

Dec 2022  
London, United Kingdom

- Delivered theoretical and practical class in Mineral Processing and Flowsheet Design for the "Mining Geology and Engineering" module. Assisted with student exercise sets evaluation, marking of exam papers, and feedback to students after their exam. Lectured 3 hours, 45+ students (3<sup>rd</sup> year UG).

#### Graduate Teaching Assistant (GTA)

DEPARTMENT OF EARTH SCIENCE AND ENGINEERING, IMPERIAL COLLEGE LONDON

Feb 2019 – Oct 2022  
London, United Kingdom

Assisted with student questions, demonstrations, and project marking. Worked in the Earth Science and Engineering Department.

Modules:

- **Data Science and Machine Learning with Python** | Winter term 21/22, 40 students (final year UG & MSc).
- **Mathematics for Geoscientists** | Autumn term 19/20 & 20/21, 20 students (1<sup>st</sup> year UG).
- **Mining Geology and Engineering** | Autumn term 19/20 & 20/21, 70 students (3<sup>rd</sup> year UG).
- **Mineral Processing** | Winter term 20/21, 33 students (final year UG).
- **Excel and Statistics workshop** | Winter term 20/21, 50 students (1<sup>st</sup> year UG).
- **Mining Water and Waste Management** | Winter term 19/20, 40 students (final year UG & MSc).
- **GTA Coordinator** | Apr 2021 - Oct 2022. Responsible for allocating Teaching Assistance (TA) work for undergraduate and some MSc modules, liaising with TAs and lecturers.

#### Guest Lecturer in Process Control and Statistics

DEPARTMENT OF CHEMICAL ENGINEERING, UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA

Mar 2018 – Aug 2018  
Santiago, Chile

Developed module plans, delivered lectures and tutorials, and designed course projects and final exam papers. Assessed course projects and examination papers. Provided laboratory assistance and supported students during office hours. Modules:

- **Seminar on Process Control.** Covered key concepts and applications in chemical engineering processes. Lectured 40 hours, 10 students (final year UG and MSc).
- **Analysis and Design of Industrial Experiments.** Focused on applied statistics for practical industry scenarios. Lectured 48 hours, 45+ students (3<sup>rd</sup> year UG).

#### **Undergraduate Teaching Assistant (UTA)**

UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA

**Mar 2012 – Jun 2016**

*Valparaíso, Chile*

Course planning, lecturing theory and tutorials, course projects and final exam paper design, evaluation of course projects, student exercises and examination papers. Worked for Chemical Engineering, Mathematics and Physics Departments. Modules:

- **Transport Phenomena** | 4 semesters 2013-2015, 100+ students (3<sup>rd</sup> year UG).
- **Reactor Design** | 1 semester 2015, 30+ students (4<sup>th</sup> year UG).
- **Mass Transfer** | 1 semester 2015, 30+ students (4<sup>th</sup> year UG).
- **Design and Analysis of Industrial Experiments** | 1 semester 2014, 40+ students (3<sup>rd</sup> year UG).
- **Heat Transfer** | 2 semesters 2014, 80+ students (3<sup>rd</sup> year UG).
- **Physics III** (waves theory, fluid mechanics, thermodynamics) | 3 semesters 2013-2014, 300+ students (2<sup>nd</sup> year UG).
- **Mathematics III** (multivariable calculus & vector spaces) | 1 semester 2012, 60+ students (2<sup>nd</sup> year UG).

### **– SUPERVISION –**

#### **Assistant Supervisor of two MSc in Chemical Engineering Theses**

DEPARTMENT OF CHEMICAL ENGINEERING, UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA

**Mar 2023 – now**

*Santiago, Chile*

- Projects: "Development of a supervisory system based on dynamic real-time optimisation for a SAG mill controlled by an expert system" and "Development of a model-based predictive control system for copper leaching "

#### **Assistant Supervisor of MSc in Applied Computational Science Thesis**

DEPARTMENT OF EARTH SCIENCE AND ENGINEERING, IMPERIAL COLLEGE LONDON

**Mar 2022 – Sept 2022**

*London, United Kingdom*

- Project: "Bubble Analyser - Identification and characterisation of bubbles using Machine Learning".

#### **Assistant Supervisor of two final year UG projects**

DEPARTMENT OF CHEMICAL ENGINEERING, UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA

**Mar 2018 – Aug 2018**

*Santiago, Chile*

- Projects: "Incorporation of disturbance estimation in real-time optimisation systems for process supervision" and "Implementation of nested modifier adaptation for real-time optimisation under disturbances".

### **– INDUSTRY –**

#### **Junior Engineer**

WOOD PLC

**Jan 2018 – Mar 2018**

*Santiago, Chile*

- Designed a petroleum storage facility, and assisted with developing emergency response strategies.

#### **Industrial Intern (Chemical Engineering)**

EMPRESA NACIONAL DEL PETRÓLEO (REFINERY INDUSTRY)

**Jun 2016 – Sep 2016**

*Concón, Chile*

- Run simulations using ASPEN Hysys to analyse a heat exchanger circuit.
- Performed mass balances for different areas of the process, and assisted in KPI analysis.

#### **Industrial Intern (Chemical Engineering)**

INACAL, CEMENTOS Bío Bío (LIME AND CEMENT INDUSTRY)

**Jan-Feb 2014 and Jan-Feb 2016**

*Copiapó, Chile*

- Worked in the Technical Advice Department and Control Laboratory. Investigated the effect of temperature on lime neutralisation capacity according to ASTM and DIN norms. Run chemical tests to characterise limestone samples.

### **RECENT OUTREACH & VOLUNTEER EXPERIENCE**

#### **Member of Equality, Diversity and Culture Committee**

DEPARTMENT OF CHEMICAL ENGINEERING, IMPERIAL COLLEGE LONDON

**April 2023 - now**

*London, United Kingdom*

#### **Member of Postdoc Committee**

DEPARTMENT OF CHEMICAL ENGINEERING, IMPERIAL COLLEGE LONDON

**Jan 2023 - now**

*London, United Kingdom*

#### **ICHEME Meeting coordinator and newsletter editor**

INSTITUTE OF CHEMICAL ENGINEERS, LONDON AND SOUTH EAST COAST MEMBER GROUP

**Jan 2021 - now**

*London, United Kingdom*

#### **Speaker in Inspiring Chemical Engineering – How to stand out [\[Link\]](#)**

INSTITUTE OF CHEMICAL ENGINEERS (ICHEME)

**Feb 2023**

*London, United Kingdom*

**STEM for Britain finalist 2022 – Engineering category.**

HOUSES OF PARLIAMENT

**March 2022***London, United Kingdom***Ambassador of SCI [\[Link\]](#)**

SOCIETY OF CHEMICAL INDUSTRY (SCI)

**Jan 2020 - Nov 2022***London, United Kingdom***Volunteer at the Exhibition Road Imperial Festival**

IMPERIAL COLLEGE LONDON

**June 2019***London, United Kingdom***RESEARCH GRANTS**

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**IOM3 Grants to Support Knowledge Exchange**

INSTITUTE OF MATERIALS, MINERALS AND MINING

**2023***London, United Kingdom*

- Awarded one of the eight grants of **£500** to participate in the 2023 IFAC World Congress, Japan.

**SCI Messel Scholarship**

SOCIETY OF CHEMICAL INDUSTRY

**2020***London, United Kingdom*

- Awarded one of the three annual SCI scholarships of **£5,000** over two years to support my studies.

**Mining Club Award**

INSTITUTE OF MATERIALS, MINERALS AND MINING

**2020***London, United Kingdom*

- Grant of **£4,100** to perform experiments at Universidad Técnica Federico Santa María, Santiago, Chile.

**Imperial College Trust bursary**

IMPERIAL COLLEGE LONDON

**2019***London, United Kingdom*

- Grant of **£350** to participate in the 18th IFAC MMM in Stellenbosch, South Africa.

**IOM<sup>3</sup> Travel bursary**

INSTITUTE OF MATERIALS, MINERALS AND MINING

**2019***London, United Kingdom*

- Grant of **£1,000** to participate in the 18th IFAC MMM in Stellenbosch, South Africa.

**PhD Scholarship**

NATIONAL RESEARCH AND DEVELOPMENT AGENCY (ANID)

**2018***Santiago, Chile*

- Full scholarship for PhD research abroad (~ **£160,000**).

**Master's Scholarship**

UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA

**2016***Valparaíso, Chile*

- Full scholarship for MSc degree, including fees and living costs (~ **£20,000**).

**AWARDS**

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**MEI Young Person's Award 2021 [\[Link\]](#)**

MINERALS ENGINEERING INTERNATIONAL

**2022***London, United Kingdom***ICHEME Global Awards 2022 - Young Researcher finalist**

INSTITUTE OF CHEMICAL ENGINEERS (ICHEME)

**2022***London, United Kingdom***1<sup>st</sup> Place Best Poster Award**

SOCIETY OF CHEMICAL INDUSTRY

**2022***London, United Kingdom***SCI Scholar 2020 [\[Link\]](#)**

SOCIETY OF CHEMICAL INDUSTRY

**2020***London, United Kingdom***2<sup>nd</sup> Place Best Poster Award**

ESE PHD CONFERENCE, IMPERIAL COLLEGE LONDON

**2019***London, United Kingdom***Award to the Best Chemical Engineering Graduate**

NATIONAL ENGINEERING COLLEGE

**2017***Valparaíso, Chile***Award to the Best Chemical Engineering Graduate**

UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA

**2017***Valparaíso, Chile***Honour List for Outstanding Undergraduate Academic Achievement**

UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA

**2012 – 2016***Valparaíso, Chile*

## EVIDENCE OF ESTEEM

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### Associate of the Institute of Materials, Minerals and Mining (AIMMM)

INSTITUTE OF MATERIALS, MINERALS AND MINING

Apr 2023 - now

London, United Kingdom

### Postdoc Symposium 2023 - Organisation & chair afternoon session

DEPARTMENT OF CHEMICAL ENGINEERING, IMPERIAL COLLEGE LONDON

Apr 2023

London, United Kingdom

### Towards Net Zero Seminar - Chair one session

DEPARTMENT OF CHEMICAL ENGINEERING, IMPERIAL COLLEGE LONDON

Mar 2023

London, United Kingdom

### Process Mineralogy 22' - Chair technical session

MINERALS ENGINEERING INTERNATIONAL

Nov 2022

Sitges, Spain

### Reviewer

2019 - now

JOURNALS:

Minerals Engineering (Elsevier), International Federation of Automatic Control (Elsevier), International Journal of Mining Science and Technology (Elsevier), Minerals (mdpi).

## CONTINUING PROFESSIONAL DEVELOPMENT

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### Short courses

IMPERIAL COLLEGE LONDON

2019 - 2022

London, United Kingdom

- **Teaching:** Introduction to Learning and Teaching, Introduction to Assessment and Feedback for Learning.
- **Coding:** R Programming, Introduction to C++ , Profiling and Optimisation in Python, Introduction to SPSS.
- **Writing:** Advanced Academic Writing, Writing a Research Paper, Preparing a grant application, Literature Review papers, EndNote.

### Multidisciplinary Optimization and Machine Learning for Engineering Design

VIA SELECTION PROCESS BY INSTITUT TEKNOLOGI BANDUNG (INDONESIA)

Jul - Aug 2021

Online

### Circular Economy Entrepreneurship in System Integrated Metals Processing

VIA SELECTION PROCESS BY AALTO UNIVERSITY SCHOOL OF CHEMICAL ENGINEERING (FINLAND)

Apr - Sept 2020

Online

### Introduction to Optimisation

CENTRE FOR PROCESS SYSTEMS ENGINEERING, IMPERIAL COLLEGE LONDON

June 2019

London, United Kingdom

## ADDITIONAL SKILLS & EXTRA INFORMATION

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- **Languages:** English: Full professional proficiency, Spanish: Native proficiency
- **Computer skills:** Matlab (including GUI), Python (including Pyomo, Scikit-learn, Seaborn, Pandas), CasADi (nonlinear programming package), GitHub/GitLab, InTouch Wonderware (control software), Inkscape (design software),  $\LaTeX$ .
- **Nationalities:** Chilean and Spanish (EU pre-settled status completed).
- **PhD supervisors:** Dr Pablo Brito-Parada (✉), Prof Stephen Neethling (✉), and Dr Daniel Navia (✉).

## LIST OF PUBLICATIONS

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**Corresponding author** of all the following papers, except numbers (7) and (10). The latest number of citations and h-index can be found in my [Google Scholar](#).

### – SCIENTIFIC PEER-REVIEWED JOURNALS –

(1) **Quintanilla P**, Navia D, Neethling S.J., Brito-Parada P.R. (2023). Economic model predictive control for a rougher froth flotation cell using physics-based models, Minerals Engineering, Vol: 196, 108050. DOI:/10.1016/j.mineng.2023.108050

(2) **Quintanilla P**, Navia D, Moreno F, Neethling S.J., Brito-Parada P.R. (2023). A methodology to implement a closed-loop feedback-feedforward level control in a laboratory-scale flotation bank using peristaltic pumps, MethodsX, Vol: 10, 102081. DOI:/10.1016/j.mex.2023.102081

(3) **Quintanilla P**, Mesa D, Reyes F. (2022). Bubble Analyser — An open-source software for bubble size measurement using image analysis, Minerals Engineering, Vol: 180, 107497. DOI:/10.1016/j.mineng.2022.107497

(4) **Quintanilla P**, Neethling SJ, Mesa D, Navia D and Brito-Parada P.R. (2021). A dynamic flotation model for predictive control incorporating froth physics. Part II: Model calibration and validation, Minerals Engineering, Vol: 173, 107190. DOI: [10.1016/j.mineng.2021.107190](https://doi.org/10.1016/j.mineng.2021.107190)

(5) **Quintanilla P**, Neethling SJ, Navia D and Brito-Parada P.R.(2021). A dynamic flotation model for predictive control incorporating froth physics. Part I: Model development, Minerals Engineering, Vol: 173, 107192. DOI:/[10.1016/j.mineng.2021.107192](https://doi.org/10.1016/j.mineng.2021.107192)

(6) **Quintanilla P**, Neethling SJ and Brito-Parada P.R. (2021). Modelling for froth flotation control: A review, Minerals Engineering, Vol: 162, 106718. DOI: [/10.1016/j.mineng.2020.106718](https://doi.org/10.1016/j.mineng.2020.106718)

(7) Navia D, Puen A, **Quintanilla P**, Briceño L, Bergh L. (2019). On dealing with measured disturbances in the modifier adaptation method for real-time optimization, Computers & Chemical Engineering, Vol: 128, Pages: 141-163. DOI:/[10.1016/j.compchemeng.2019.06.004](https://doi.org/10.1016/j.compchemeng.2019.06.004)

### – CONFERENCE PROCEEDINGS –

(8) **Quintanilla P**, Navia D, Neethling S.J., Brito-Parada P.R. (2023). Evaluation of Changes in Feed Particle Size within an Economic Model Predictive Control Strategy for Froth Flotation, IFAC World Congress 2023. *In Press*.

(9) **Quintanilla P**, Neethling S.J., Brito-Parada P.R. (2021). Development and Validation of a Dynamic Model for Flotation Predictive Control Incorporating Froth Physics, Materials Proceeding, Vol: 5, no. 1:13. DOI:/[10.3390/materproc2021005013](https://doi.org/10.3390/materproc2021005013)

(10) Navia D, Puen A, **Quintanilla P**, Bergh L, Briceño L, de Prada C. (2018). A Proposal to Include the Information of Disturbances in Modifier Adaptation Methodology for Real Time Optimization, Computer Aided Chemical Engineering Vol: 43, Pages 1081-1086. DOI:/[10.1016/B978-0-444-64235-6.50189-3](https://doi.org/10.1016/B978-0-444-64235-6.50189-3)

### CONFERENCES AND SEMINARS

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**Presenter** for all the following oral presentations and posters:

### – ORAL PRESENTATIONS –

(1) **Seminario de Ingeniería Química (Chemical Engineering Seminar) - Universidad Técnica Federico Santa María (invited)**, Online, December 2022. *Navigating the Chemical Engineering Landscape - My personal journey and research insights*.

(2) **Society of Chemical Industry - College of Scholars Day (invited)**, London, United Kingdom, November 2022. *Optimising mineral process systems*.

(3) **Towards Net Zero Seminars (invited)**, Department of Chemical Engineering, Imperial College London, London, United Kingdom, November 2022. *Optimising mineral process systems – The transition to green energy will need bubbles!*

(4) **Society of Chemical Industry - Annual General Meeting (invited)**, London, United Kingdom, July 2022. *Optimising mineral process systems – The transition to green energy will need bubbles!*

(5) **Imperial College ResearchFest! (invited)**, July 2022. *Optimising mineral process systems – The transition to green energy will need bubbles!*

(6) **Flotation 21'**, November 2021. *Development and validation of a dynamic flotation model for flotation predictive control incorporating froth physics*.

(7) **Society of Chemical Industry - College of Scholars Day (invited)**, November 2021. *Development and validation of a dynamic flotation model for flotation predictive control incorporating froth physics*.

(8) **Procemin - Geomet 2021**, October 2021. *Validation and implementation of a dynamic flotation model for predictive control including froth physics*.

(9) **Advances in the Digitalisation of the Process Industries**, IChemE, October 2021. *Development and validation of a dynamic model for flotation predictive control incorporating froth physics*.

(10) **International Conference in Raw Materials and Circular Economy**, Athens, Greece, September 2021. *Development and validation of a dynamic flotation model for flotation predictive control incorporating froth physics*.

(11) **Webinar series with Technical University Munich's (TUM) 'Chemical Process Engineering Lab'**, November 2020. *Developing flotation dynamic models for predictive control*.

(12) **Society of Chemical Industry - College of Scholars Day (invited)**, November 2020. *Development and validation of a dynamic flotation model for flotation predictive control incorporating froth physics.*

(13) **International Federation of Automatic Control Conference - Mining, Mineral and Metal Processing**, Stellenbosch, South Africa, August 2019. *Dynamic physics-based flotation models for effective predictive control: State-of-the-art.*

#### **– POSTER PRESENTATIONS –**

(14) **Society of Chemical Industry - Annual General Meeting**, London, United Kingdom, July 2022. *Optimising mineral process systems – The transition to green energy will need bubbles!*. Received 1st place in Best Poster Award.

(15) **STEM for Britain competition**, London, United Kingdom, March 2022. *Optimising mineral process systems – The transition to green energy will need bubbles!*

(16) **ESE PhD conference**, Earth Science and Engineering Department, Imperial College London, United Kingdom, June 2019. *Dynamic physics-based flotation model for effective predictive control*. Received 2nd place for Best Poster Award.