

Edilson Fernandes de Arruda (Short Curriculum Vitae)

ORC ID: 0000-0002-9835-352X, **SCOPUS ID:** 57204790284, **ResearcherID:** T-8718-2018.
<https://www.southampton.ac.uk/people/5y7cpb/doctor-edilson-arruda>

Education

DSc in Electrical Engineering: 2002-2006, University of Campinas, Brazil. *Supervisor:* Professor João Bosco Ribeiro do Val
PDEE-PhD International Internship Program, December 2003 to November 2004. Funding body: CAPES-Brazil
Visiting scholar under the Department of Biostatistics & Computational Biology, University of Rochester, USA, as part of my doctorate. Supervisor: Prof. Anthony Almudevar.
MSc in Electrical Engineering: 2000-2002, University of Campinas, Brazil. *Supervisor:* Professor João Bosco Ribeiro do Val
BSc in Electrical Engineering: 1995-2000, Federal University of Mato Grosso, Brazil.

Employment

Postdoctoral Fellowship (Systems and Control), 2006-2009, National Laboratory for Scientific Computation, Petrópolis RJ, Brazil. *Supervisor:* Professor Marcelo Dutra Fragoso (frag@lncc.br).

Assistant Professor, 2009-2011, School of Engineering, **Pontifical Catholic University of Rio Grande do Sul - PUCRS,** Porto Alegre RS, Brazil. UG and PGR teaching and supervision

Assistant (2011-2019) and Associate (2019) Professor. Luiz Coimbra Institute – Graduate School and Research in Engineering, **Federal University of Rio de Janeiro,** Rio de Janeiro RJ, Brazil. UG and PGR teaching and supervision

Research Associate (Postdoctoral Fellowship), 2019-2020. Cardiff University, Cardiff School of Mathematics. Cardiff, UK. *Activities:* Research activities on the project “Analysis and Modelling of a Single Cancer Pathway Diagnostics Phase”, funded by Cancer Research UK. *Supervisor:* Professor Paul Harper (harper@cardiff.ac.uk)

Lecturer, 2020 and ongoing, Southampton Business School, University of Southampton, Lecturer in Business Analytics and Management Science. UG and PGT teaching, PGR supervision

Recent Research Grants

Developing Policy Inputs for Faster Economic Recovery While Promoting Disaster Preparedness via Artificial Intelligence (in collaboration with the Digital University of Kerala, India). December 2021 to July 2021. *Award:* £15,000. Funding body: British Council India. Role: **Principal Investigator**

Analysis and Modelling of a Single Cancer Pathway Diagnostics Phase. April 2019 to October 2020. *Award:* £135,563. Grant Holder: Professor Paul Harper, Cardiff University. Funding body: Cancer Research UK. Role: **Named researcher**

Modelling of Offshore Energy Systems. January 2018 to January 2022. *Award:* 8 Million BRL. Funding body: Petróleo Brasileiro S.A. Role: Co-investigator (**lead of the Multi-Criteria Decision Analysis team**)

PhD Supervision:

- 8(eight) concluded DSc. Supervisions since 2014, seven at the Industrial Engineering Program, Alberto Luiz Coimbra Institute-Graduate School and Research in Engineering, Federal University of Rio de Janeiro and one at the Southampton Business School, University of Southampton. All of them in the field of Operational Research

Selected recent publications

1. England, T.; Harper, P.; Crosby, T.; Gartner, D.; Arruda, E.F.; Fley, K.; Williamson, I. J. Modelling lung cancer diagnostic pathways using discrete event simulation. *Journal of Simulation*, DOI: 10.1080/17477778.2021.1956866, 2021.
2. Arruda, E.F.; Das, S. S.; Dias, C.M.; Pastore, D.H. Modelling and optimal control of multi strain epidemics, with application to COVID-19. *PLoS One*, v. 16, p. e0257512, DOI:10.1371/journal.pone.0257512, 2021.
3. Soares, H.L.F.; Arruda, E.F.; Bahiense, L.; Gartner, D.; Amorim Filho, L. Optimisation and control of the supply of blood bags in hemotherapeutic centres via Markov Decision Process with discounted arrival rate. *Artificial Intelligence in Medicine* v. 104, p. 101791, DOI: 10.1016/j.artmed.2020.101791, 2020.
4. Arruda, E.F.; Harper, P.; England, T.; Gardner, D. Aspland, E. Ourique, F. Crosby, T. Resource optimization for cancer pathways with aggregate diagnostic demand: a perishable inventory approach. *IMA Journal of Management Mathematics*, v. 32, p. 221-236, 10.1093/imaman/dpaa014, 2020.
5. Siqueira, C.L.; Arruda, E.F.; Bahiense, L.; Barh, G.L.; Motta, G.R. Long-Term Integrated Surgery Room Optimization and Recovery Ward Planning, with a Case Study in the Brazilian National Institute of Traumatology and Orthopedics (INTO), DOI: 10.1016/j.ejor.2016.09.021, 2018.

Description of the research group

This project will be conducted in the Department of Decision Analytics and Risk, part of the [Centre for Operational Research, Management Science and Information Science](#) (CORMSIS). It is a partnership involving the [Centre for Healthcare Analytics](#) and the University Hospital Southampton. The research group is focused on healthcare modelling and optimisation and is interested in the application of operational research and data analytics to challenging real-world problems in the field of healthcare. The objective is to model and understand the complex systems involved in healthcare provision and their impact on patient pathways, with a view to optimise the use of resources and improve patient outcomes.

Description of the work to be carried out by the student.
Project: Integrated elective surgery scheduling and bed planning with an application to the University Hospital Southampton

This project will be developed in partnership with the University Hospital Southampton and aims to develop a mathematical programming method for the scheduling of elective and emergency surgeries at the hospital. The model output will be a tactical weekly surgery allocation plan, considering resources related to the surgical centre, such as the availability and type of operating theatres and medical teams along the week. It will also consider the integration of the surgical centre with downstream resources, such as intensive and semi-intensive care beds, as well as the available beds in the ward where patients recover from surgery. Considering the whole patient trajectory, from referral to hospital discharge, the model will help allocate upstream and downstream resources to ensure patient flow and avoid surgery cancellations due, for example, to the lack of post-surgical beds. Additional challenges that can be considered include uncertain surgery times, as well as uncertainty in the length of stay in the recovery centre.

The project will build upon the teams' previous experience with surgery scheduling and bed allocation problems (e.g., Siqueria et al. 2018), whilst including new characteristics and challenges that will render the model more realistic and useful for decision support at the partner hospital.