Arno Strouwen

Curriculum Vitae
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Research Interest

How to design informative experiments for biological systems with noisy dynamics and with incomplete knowledge of the model structure?

Research Experience

2022–current **Computer Scientist**, JuliaHub
- Documentation **CI/CD** of https://docs.sciml.ai

2022–current **Self Employed**, Strouwen Statistics BV
- Scientific computing consultancy in the Julia programming language.
- Focused on optimal data gathering strategies.

2021–2022 **Postdoc Statistician**, The Janssen Pharmaceutical Companies of Johnson & Johnson
- **Model Based Design of Experiment**: designing **10x accelerated stability studies** to precisely predict the **shelf life** of pharmaceutical drugs and vaccines.
- **Bayesian Optimization**: automizing **high-throughput experiments** to optimize the manufacturing conditions of pharmaceutical drugs and vaccines.
- **Probabilistic Programming**: Bayesian Non-linear **mixed effect modelling** of powder flowability.

2016–2021 **Ph.D. Fellow**, KU Leuven Internal Research Fund
- **Metabolism of Pear During Hypoxia**: responsible for designing optimal experiments to study respiration and fermentation characteristics of pear fruit.

2016–2020 **Ph.D. Fellow Strategic Basic Research**, Research Foundation Flanders
- **Optimal Experimental Design for Dynamic Systems:** Developing novel robust experimental design methodology for dynamic systems with both measurement and process noise.

Education

2022-2023 **Coursework Master of Statistics and Data Science**, UHasselt, Belgium
- **Deep Learning with Neural Networks**, Databases, Topological Data Analysis

2016–2021 **Ph.D. in Bio-science engineering**, KU Leuven, Belgium
- **Thesis:** "*Optimal Design of Dynamic Experiments in Bioscience Engineering*" under supervision of **Prof. Peter Goos** and **Prof. Bart Nicolaï**

2014–2016 **M.Sc. in Bioscience-engineering**, *Bio-nanotechnology*, magna cum laude, KU Leuven, Belgium
- **Thesis:** "*Towards a Coarse-Grained Model of the Acto-Myosin Cortex*"

2011–2014 **B.Sc. in Bioscience-engineering**, *Bio-systems engineering*, cum laude, KU Leuven, Belgium
- **Thesis:** "*Mechanical Properties of Joly red, Jonagold and Kanzi apples*"

Skills

Programming **Julia**, JMP; *Basic knowledge: R, Python, Matlab*

Statistics **Experimental Design**, Bayesian Statistics, Information Theory, Time Series Analysis, Regression, Generalized Linear Model, Ordinal Data, Anova, Blocked Experiment, Split-Plot experiment, Multivariate Statistics, Bayesian Filtering, Kalman Filtering, Uncertainty Quantification, Probabilistic Programming, Deep Learning, Neural Networks, Gaussian processes, and Machine Learning

Bio-Engineering **Bio-process Control**, Computational Biology, Post Harvest, Nano Technology, Systems Biology, Computational Fluid Dynamics and Discrete Element Method

Mathematics **Dynamic Systems**, Differential Equations, Optimization, Control Theory, Interval Arithmetic, Differentiable Programming, and Scientific Computing

Peer Reviewed Publications

2022 **Robust Dynamic Experiments for the Precise Estimation of Respiration and Fermentation Parameters of Fruit and Vegetables.**
Arno Strouwen, Bart Nicolaï and Peter Goos
PLOS Computational Biology, 18 (1).

2021 **D- and I-optimal design of multi-factor industrial experiments with ordinal outcomes.**
Karel Van Brantegem, Arno Strouwen and Peter Goos
Chemometrics and Intelligent Laboratory Systems, 221.

2019 **A Note on the Output of a Coordinate-Exchange Algorithm for Optimal Experimental Design**
Arno Strouwen and Peter Goos
Chemometrics and Intelligent Laboratory Systems, 192.

2019 **Optimizing Oxygen Input Profiles for Efficient Estimation of Michaelis-Menten Respiration Models.**
Arno Strouwen, Bart Nicolaï and Peter Goos
Food and Bioprocess Technology, 12 (5), 769-780.

Invited Presentations

2022 **Model Based Experimental Design for Accelerated Small Molecule Stability Studies**
Non Clinical Statistics Conference, Louvain-la-Neuve Belgium

2019 **Bayesian Filtering Techniques for Optimal Experimental Design**
University of Southampton Seminar

2019 **Optimal Experimental Design for Post Harvest Storage**
University of Southampton Seminar

2019 **Efficient Dynamical Experimentation for Post Harvest Storage**
National Symposium of Applied Biological Sciences, Ghent, Belgium

2018 **Towards More Efficient Experimentation in Post Harvest Storage**
Marine Research Institute, Spanish Research Council (IIM-CSIC) Seminar

2018 **Optimizing an Oxygen Input profile to Estimate Michaelis-Menten Respiration Parameters**
ENBIS Spring Meeting on Design of Experiments for Quality of Products and Sustainability in Agri-Food Systems, Florence, Italy

2017 **Optimal Design of Experiments for Non-Linear Models using JMP**
KU Leuven Seminar

Research Visits

November 2019 **Aalto University**, Helsinki, Finland
Visit to the Sensor Informatics and Medical Technology research group of **Professor Simo Särkkä** to learn about Bayesian filtering of hidden Markov-models

October 2019 **University of Southampton**, Southampton, United Kingdom
Visiting **Professors Dave Woods** and **Antony Overstall** to learn about Gaussian processes for probabilistic numerics

February 2018 **Marine Research Institute of the Spanish Research Council**, Vigo
Visit to the Bio-process Engineering group of **Professor Julio Banga** to learn about global optimization and sensitivity analysis of dynamic systems

Teaching Experience

2022-2023 **Substitute for Professor Goos**, KU Leuven
Teaching the course Experimental Planning and Data Modelling

2022 **Daily Supervisor for summer PhD intern**, Johnson & Johnson
Surrogate modelling for chemical reaction optimization

2020-2021 **Daily Supervisor for Master thesis**, KU Leuven
Non-Linear Mixed Effect Respiration and Fermentation Models using **Pumas** software

2018-2019 **Daily Supervisor for Master thesis**, *Karel Van Brantegem*, KU Leuven
Optimal Experimental Design Techniques for **Ordinal Data**

2017 **Daily Supervisor for Bachelor thesis**, KU Leuven
Optimal Experimental Design Techniques for Michaelis-Menten Kinetics

2017-2019 **Teaching Assistant**, KU Leuven
Computer exercise classes for the course **Univariate Data and Modelling** in the **R programming language**