

## Dustin Sands

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### EDUCATION

**University College London** (London, UK) 2012-2016  
Masters of Engineering, Chemical with Biochemical Engineering (with Honours)  
American citizen studying abroad

### EXPERIENCE

**Takeda** (Cambridge, MA) December 2020-Present  
*Machine Learning and Manufacturing Data Automation Research Investigator [Cell Therapy Oncology]*

- Technical lead on entire-process simulation tool that models operational timings and quality attributes with applications in process optimization, device comparisons, supply chain forecasting, and operational scheduling
- Core team member of In-Silico CMC and contributor to global In-Silico CMC Playbook
- Modeling lead for upstream predictive control project utilizing a digital twin and hybrid modeling
- Skills Developed: Python, Machine Learning, Project Management, Simio, Hybrid Modeling

**Researcher** (Sunnyvale, CA) March 2020-December 2020

- Studied and developed machine learning methods and how they can be applied to bioprocess development
- Created an Upstream Cell Culture Simulator; <https://portfolio.dustinsands.com/cc-sim>
- For current projects, see <https://workshop.dustinsands.com>
- Skills Developed: System-Level simulations, cyber-physical systems, machine learning (supervised and reinforcement), python, macroscopic modeling, git

**Boehringer Ingelheim** (Fremont, CA) January 2019-March 2020  
*Scientist I [Bioprocess Engineering and Cell Culture]*

- Characterized and assessed new technologies for a next-gen biomanufacturing platform
- Lead, designed, analyzed, and presented experiments with primarily lab scale reusable bioreactors for perfusion processes. Experiments included scaledown / scaleup, process characterization studies, offline models, and designing novel perfusion bioreactor systems
- Developed process analytical technology for multiparameter control
- Skills / Equipment: Bioreactors (SUBs and reusable) at 2L to 1000L scales, cGMP, cGDP, aseptic technique, shake flasks, Python, Tensorflow, Keras, Visual Basic, SIMCA, TruBio / DeltaV

**Nanofluidics Lab, UCL** (London, UK) September 2015-March 2016  
*Project Manager*

- Master's Thesis: "Development of an Analytical Method for the Online Detection of Biocatalyst Reaction Rates in Continuous-Flow Synthesis."
- Skills / Equipment: Liquid handling, photospectrometer, automation, serial dilutions, and data analysis

### RELEVANT SKILLS

**Lab Techniques and Hardware Experience** Proficiency with current lab hardware such as the Tecan Freedom Evo, reusable and single-use bioreactors (lab and pilot plant scale), perfusion (ATF and TFF) and wave reactors, shake flasks, aseptic technique, centrifuges, micro-, ultra-, and nano-filtration, USD devices, spectroscopy (UV-vis, fluorescent), particle sizing, and other common assays.

**Python** Creations include a Cell Culture Simulator and a Hanabi agent trained through Reinforcement Learning. Keras, Tensorflow, numpy, static typing, and many other common packages

**Other Knowledge** C/C++, Supervised, Unsupervised, and Reinforcement Machine Learning, MATLAB, GAMS, L<sup>A</sup>T<sub>E</sub>X, HTML, Word, PHP, SIMCA, Simio  
With a focus on cryptography, the blockchain, and state-based probability.