Sebastian **Bernasek**

Data Scientist | Chemical Engineer

San Francisco Bay Area

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Skills

Coding
Python & Cython
Matlab, Mathematica
Linux/Unix, OSX
Git, LaTeX, Adobe CS

Modeling
Stochastic processes
ODE/PDE systems
Machine learning
Agent-based modeling

Analysis
Hypothesis testing
Bayesian inference
Time series
Networks

Computer Vision
Image segmentation
Feature classification
Spatial analysis
Quantitative microscopy

Process Engineering
Design & optimization
Opex/Capex estimation
Life cycle analysis, GREET
Process simulation, HYSYS

Education

Ph.D. in Chemical and Biological Engineering • 4.0 *Northwestern University* *2014 - 2019*

Dissertation made two exciting discoveries:
- Harmful genetic mutations can be suppressed by slowing metabolism. Published in *Cell*.
- Cells can use ratiometric sensing to make reliable fate decisions. Manuscript under review.

B.S. in Chemical Engineering • 3.8 • High Honors *University of California, Santa Barbara* *2008 - 2012*

- Exchange student at Imperial College London throughout 2010/2011.

Experience

Personal Development *Present*

Took a year off to pursue some personal projects while exploring the world.

Graduate Student at Northwestern University *Evanston, IL* *2014 - 2019*

Developed novel computational methods to study how cell types are defined during the formation of the fruit fly eye:
- *FlyEye Analysis*: computer vision tools for measuring fruit fly gene expression dynamics.
- *FlyQMA*: computer vision tools for high-throughput quantification and analysis of microscopy data.
- *TFBinding*: platform for statistical mechanical modeling of transcription factor DNA binding.
- *GeneSSA*: framework for rapid stochastic simulation of biochemical reaction networks.

Day to day life entailed:
- Exploratory analysis of image and time series data.
- Brainstorming & hackathons for many other data science projects, both social and biological.
- Frequent collaboration to facilitate experimental design and data collection.
- Lots of reading, writing, presentations, and constructive criticism.
- Co-teaching several undergraduate chemical engineering courses and a data science bootcamp.
- Mentoring graduate, undergraduate, and high school students.

Process Engineer at LanzaTech *Chicago, IL* *2012 - 2014*

- Invented three processes for converting waste gases to lipid products. One patent granted, two more applications pending.
- Designed and built the company's core process modeling framework.
- Identified promising technology partners, ultimately leading to major investments.
- Modeled refinery-scale processes to predict and optimize economic and life-cycle performance.
- Advised corporate leadership and investors with technical analysis.

Research Assistant at UC Santa Barbara *Santa Barbara, CA* *2011 - 2012*

- Obtained first ever dynamic measurements of interaction forces between vesicles. Published in *Soft Matter*

Summer Intern at UL Air Quality Sciences *Atlanta, GA* *Summer 2011*

Publications

Ratio-based sensing of two transcription factors regulates the transit to differentiation. *Under Revision*

*Sebastian Bernasek**, J.F. Lachance*, N. Peláez*, R. Bakker, H. Navarro, L. Amaral, N. Bagheri, I. Rebay, R. Carthew *Expected 2020*

Fly-QMA: Automated analysis of mosaic imaginal discs in Drosophila. *Published in PLOS Comp. Biology*

Sebastian Bernasek, N. Peláez, R. Carthew, N. Bagheri, L. Amaral *2020*

Repressive gene regulation synchronizes neural development with cellular metabolism. *Published in Cell*

J. Cassidy*, *Sebastian Bernasek**, R. Bakker, R. Giri, N. Peláez, B. Eder, A. Bobrowska, N. Bagheri, L. Amaral, R. Carthew *2019*

Quantitative analysis of cell fate decisions. *Doctoral Dissertation*

Sebastian Bernasek *2019*

Direct measurement of interaction forces between charged multilamellar vesicles. *Published in Soft Matter*

J. Frostad, M. Seth, *Sebastian Bernasek*, L.G. Leal *2014*

Patents

US Patent App. 62/872,869, Methods for Optimizing Gas Utilization. *LanzaTech*

Sebastian Bernasek & Co-inventors *Filed 2019*

US Patent App. 14/927,950, Fermentation process for the production of lipids. *LanzaTech*

Sean Simpson and *Sebastian Bernasek* *Filed 2014*

US Patent 9,783,835, Method for producing a lipid in a fermentation process. *LanzaTech*

Sean Simpson and *Sebastian Bernasek* *Granted 2017*

Mentorship

Simran Khunger *High school student* *Summer 2017*

Project: Designing synthetic benchmarks for 3D segmentation of cell membranes in the larval *Drosophila* eye.

Darshan Patel *Chemical engineering undergraduate* *Summer 2016*

Project: Probing tradeoffs between efficiency and robustness via in silico evolution of GRN topologies.

Teaching

Chemical Engineering Methods and Analysis *Spring 2018*

Reaction Engineering and Kinetics *Spring 2017*

Process Engineering and Design *Spring 2016*

Data Science Bootcamp *Summer 2015*

Reaction Engineering and Kinetics *Spring 2015*