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 offers two exciting discoveries:
- Harmful genetic mutations can be suppressed by slowing metabolism. Published in *Cell*.
- Cell fate decisions may be executed via ratiometric sensing. 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 explore 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 core process modeling framework used to guide all strategic decisions.
- Identified suitable technology partners, ultimately leading to $10M+ in 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. *In Press*

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