

Sebastian Bernasek

Data Scientist | Chemical Engineer

San Francisco Bay Area

☎ 630-624-9699 | ✉ sbernasek@gmail.com | 🏠 sbernasek.com | 📱 sebastianbernasek | 🌐 sbernasek

Summary

Chemical engineer turned data scientist with 5 years computational biology research and 3 years work experience as a process design engineer.

Skills

Data Engineering

Relational databases
Web scraping
Structured text & NLP
Feature selection
Dimensionality reduction

Analysis

Hypothesis testing
Bayesian inference
Unsupervised learning
Networks & Time series
Visualization

Computer Vision

Feature extraction
Image segmentation
Feature classification
Spatial analysis
Quantitative microscopy

Modeling

Stochastic processes
Dynamical systems
Nonlinear regression
Classification
Agent-based models

Coding

Python & Cython
Package development
REST APIs
Git, LaTeX, HTML/CSS
Unix shell, OSX/Ubuntu

Education

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

2014 - 2019

- Center Scholar, NSF-Simons Center for Quantitative Biology
- Dissertation combines data science and chemical engineering to explore how cells make reliable decisions.

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 & Consulting

Present

Took a year off to explore the world, helping out some friends along the way:

- Built a database of 5k+ targeted B2B sales leads using a combination of web-scraping, commercial APIs, and machine learning.
- Demystified a sales pipeline by using unstructured text profiles to predict client outcomes.
- Automated PDF content extraction and parsing routines that will annually save hundreds of hours of tedious labor.

Researcher at Northwestern University *Evanston, IL*

2014 - 2019

- Published in high profile journals including *Cell* and *PLOS Computational Biology*.
- Developed and deployed several simulation and analysis frameworks for the broader research community.

Day to day life entailed:

- Exploratory analysis of image and time series data.
- Developing creative strategies to derive insight from noisy experiments.
- Frequent collaboration with wet labs to design more valuable experiments.
- Brainstorming & hackathons for data-driven projects of all flavors.
- Communicating complex ideas to diverse audiences.
- Lots of academic reading, writing, grant writing, and peer review.
- Co-teaching undergraduate chemical engineering courses and data science bootcamps.
- Mentoring graduate, undergraduate, and high school students in formulating their own research.

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 executives and investors with technical analysis.

Research Assistant at UC Santa Barbara *Santa Barbara, CA*

2011 - 2012

- Conducted first ever dynamic measurement 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.

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

Under Revision

Expected 2020

Fly-QMA: Automated analysis of mosaic imaginal discs in *Drosophila*.

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

Published in PLOS Comp. Biology

2020

Repressive gene regulation synchronizes neural development with cellular metabolism.

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

Published in Cell

2019

Quantitative analysis of cell fate decisions.

Sebastian Bernasek

Doctoral Dissertation

2019

Direct measurement of interaction forces between charged multilamellar vesicles.

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

Published in Soft Matter

2014

Patents

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

Sebastian Bernasek & Co-inventors

LanzaTech

Filed 2019

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

Sean Simpson and Sebastian Bernasek

LanzaTech

Filed 2014

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

Sean Simpson and Sebastian Bernasek

LanzaTech

Granted 2017

Software

FlyQMA

Python package for automated mosaic analysis of *Drosophila* imaginal discs. Facilitates high-throughput segmentation, bleedthrough correction, and annotation of raw microscope images in order to accelerate experimental pipelines while improving reproducibility.

On PyPI

FlyEye Analysis

Python platform for analyzing gene expression dynamics in the developing fly eye. Ascribes quantitative rigor to a popular experimental technique by supporting dynamic analysis, spatial analysis, model fitting, and visualization of the resultant trends.

On PyPI

TFBinding

Python package for simulating the statistical mechanics of cooperative binding events between transcription factors and their target promoters. Leverages a novel and highly-parallelizable microstate enumeration algorithm to dramatically outperform the existing state of the art in terms of both memory footprint and simulation scale.

On GitHub

GeneSSA

A python framework for exact stochastic simulation of Markov processes, with a particular emphasis on gene regulatory networks. Simulates many classes of large networks faster and more efficiently than all other available software.

On GitHub

Mentorship

Simran Khunger *High school student*

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

Summer 2017

Darshan Patel *Chemical engineering undergraduate*

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

Summer 2016

Teaching

Chemical Engineering Methods and Analysis

Spring 2018

Reaction Engineering and Kinetics	<i>Spring 2017</i>
Process Engineering and Design	<i>Spring 2016</i>
Data Science Bootcamp	<i>Summer 2015</i>
Reaction Engineering and Kinetics	<i>Spring 2015</i>