

## EDUCATION

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**University of Washington: Ph.D. in Bioengineering** 2017 - 2023

Thesis: Representing neurological systems using graph theory and recurrent neural network models in Python

GPA: 3.91/4.00

**University of Wisconsin-Madison: B.S. in Biomedical Engineering** 2013 - 2017

Certificates: Honors in Research, International Engineering, Biology in Engineering

GPA: 3.94/4.00

**Universitat Politècnica de València** 2016

Focus: Biotechnology, Biomedical Engineering

## RESEARCH

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**Identification of anxiety signatures in the dentate gyrus and basolateral amygdala** 2022 - Present

University of Washington, Sauro Lab (collaboration with Bruchas Lab)

Analyzing neural activity collected from the anxiety circuit (dentate gyrus and basolateral amygdala) in live and behaving mice during exposure to anxiety-provoking stimuli with graph theory and recurrent neural network models.

**carnn: Python package for building recurrent neural network models of calcium imaging data** 2021 - Present

University of Washington, Sauro Lab (collaboration with Bruchas Lab)

Developing a Python package to readily construct recurrent neural network models of neural dynamics collected using calcium imaging in live and behaving mice.

**cagraph: Python package for graph theory analysis of calcium imaging data** 2020 - 2023

University of Washington, Sauro Lab (collaboration with Bruchas Lab)

Developed a Python package that uses graph theory to study dynamic changes in functional connectivity of neuronal networks with graphs constructed from calcium imaging data of neural activity in live and behaving mice.

**Evolving oscillators and turning point bifurcations in biological models** 2018 - 2019

University of Washington, Sauro Lab

Developed stochastic global and gradient-based optimization algorithms and objective functions for the optimization to achieve Hopf or turning point bifurcations of biological models in Python, and assessed oscillator frequency in randomly-generated mass-action networks using the parameter optimization module .

**Optimized targeting of peptides to the spinal cord after injury** 2018

University of Washington, Sellers Lab Rotation

Increased the valency of the targeted axonal import peptide (TAXI) to improve cargo delivery to the nervous system and tested the localization of glycosaminoglycan-binding peptide to the lesion site of mice following spinal cord injury.

**Central nervous system-targeting and multi-valent amyloid inhibitors** 2018

University of Washington, Daggett Lab Rotation

Conjugated an amyloid inhibitor peptide to a targeted axonal import peptide to improve central nervous system delivery, and synthesized dendrimer containing the amyloid inhibitor peptide to increase valency.

## Genetically-encoded fluorescent sensors for neurotransmitters

2017

University of Washington, Berndt Lab Rotation

Designed genetically-encoded sensors for neurotransmitters implicated in neurological disorders (gamma aminobutyric acid and serotonin) and performed molecular biology techniques to begin sensor production.

## *In vitro* biomimetic model of early stage ovarian cancer

2016 - 2017

University of Wisconsin, Kreeger Lab

Constructed a model of early-stage ovarian cancer in a microfluidic device and recapitulated extracellular matrix changes to analyze effects on cell invasiveness.

## Cell signaling in high grade serous ovarian cancer cell lines

2015

University of Wisconsin, Kreeger Lab

Analyzed the effects of growth factor stimulation on cancer biomarkers in immortalized ovarian cancer cell lines using partial least squares regression.

## PUBLICATIONS

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**V. L. Porubsky**, E. T. Zhang, S. C. Piantadosi, M. R. Bruchas, H. M. Sauro. “cagraph: a Python package for constructing functional graphs of neural dynamics collected with calcium imaging.” (*manuscript in preparation*)

**V. L. Porubsky**, H. M. Sauro. “A practical guide to reproducible modeling for signaling networks.” *Methods in Molecular Biology*. 2023. DOI: 10.1007/978-1-0716-3008-2\_5

J. Shin, **V. L. Porubsky**, H. M. Sauro, “Standards, dissemination, and best practices in systems biology.” *Current Opinion in Biotechnology*. 2023. DOI: 10.1016/j.copbio.2023.102922

**V. L. Porubsky**, A.P. Goldberg, A. K. Rampadarath, D. P. Nickerson, J. R. Karr, H. M. Sauro, “Best practices for making reproducible biochemical models.” *Cell Systems*. 2020. DOI: 10.1016/j.cels.2020.06.012

**V. L. Porubsky**, L. P. Smith, H. M. Sauro, “Publishing reproducible dynamic kinetic models.” *Briefings in Bioinformatics*. 2020. DOI: 10.1093/bib/bbaa152

D. Sellers, J. Y-Tan, J. Pineda; D. Peeler, **V. L. Porubsky**, B. Olden, S. Salipante, S. Pun, “Targeting ligands deliver drug cargo into the central nervous system along autonomic neurons.” *ACS Nano*. 2019. DOI: 10.1021/acsnano.9b01515

**V. L. Porubsky** and H. M. Sauro, “Application of Parameter Optimization to Search for Oscillatory Mass-Action Networks Using Python.” *Processes*. 2019. DOI: 10.3390/pr7030163

A. Fleszar, A. Walker, **V. Porubsky**, W. Flanigan, D. James, P. Campagnola, P. Weisman, P. Kreeger. “The extracellular matrix of ovarian cortical inclusion cysts modulate invasion of fallopian tube epithelial cells.” *APL Bioengineering*. 2018. DOI: 10.1063/1.5022595

D. Bourgeois, K. Kabarowski, **V. Porubsky**, and P. Kreeger. “High-grade serous ovarian cancer cell lines exhibit heterogeneous responses to growth factor stimulation.” *Cancer Cell International*. 2015. DOI: 10.1186/s12935-015-0263-4

## ORAL PRESENTATIONS

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**V. L. Porubsky.** Representing neurological systems using graph theory and recurrent neural network models in Python. *University of Washington Department of Bioengineering Ph.D. Dissertation Defense*. June 12, 2023.

**V. L. Porubsky.** Representing neurological systems using graph theory and recurrent neural network models in Python. *Center for Reproducible Biomedical Modeling Tutorial Series*. March, 2023.

**V. L. Porubsky.** Mechanisms of fear context encoding in the dentate gyrus using recurrent neural networks. *University of Washington Neurobiology of Addiction, Pain, and Emotion Center Computing Seminar*. October, 2022.

**V. L. Porubsky** and J. Shin. Creating reproducible biochemical modeling workflows in Python. *International Conference on Systems Biology and COMBINE 2022*. October, 2022.

**V. L. Porubsky.** A practical guide to reproducible modeling. *Modelling Cell Development & Regeneration Discussion Group*. May, 2021.

**V. L. Porubsky.** A reproducible biomodeling workflow tutorial. *2020 COMBINE Conference*. October, 2020.

**V. L. Porubsky.** Center for Reproducible Biomedical Modeling outreach progress. *NIH P41 External Advisory Board Meeting*. January, 2020.

**V. L. Porubsky.** Tellurium and libRoadRunner tutorial for the COMBINE & de.NBI Modeling Workshop. *20th International Conference on Systems Biology*. October, 2019.

**V. L. Porubsky.** Tellurium and libRoadRunner model simulation tutorial. *Center for Reproducible Biomedical Modeling Seminar Series*. October, 2019.

**V. L. Porubsky.** Elucidating aggressive behavior and pathogenesis of high-grade serous ovarian cancer. *University of Wisconsin-Madison Honors in Research Thesis Defense*. May 2017.

**V. L. Porubsky.** Micro-scale model to understand the role of fallopian tube epithelial cells in ovarian cancer. *University of Wisconsin-Madison Undergraduate Research Symposium*. April 2017.

## POSTER PRESENTATIONS

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**V. L. Porubsky.** Mechanisms of fear context encoding in the dentate gyrus and basolateral amygdala using graph theory and recurrent neural network models. *International Conference on Systems Biology*. October, 2022.

**V. L. Porubsky.** Parameter optimization to find bifurcations in biochemical reaction networks. *University of Washington Department of Bioengineering Recruitment*. February, 2019.

**V. L. Porubsky.** Outreach to foster reproducible biomedical modeling. *University of Washington Department of Bioengineering Annual Retreat*. September, 2018.

## TEACHING

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### UW BIOE Nepal Study Abroad

Aug. - Sept. 2022

University of Washington - Teaching Assistant

Taught students the principles of bioengineering design and mentored teams to identify problems which could be met with bioengineering solutions in a clinical setting at Dhulikhel Hospital and Salambu Outreach clinic in Nepal.

### Network Modeling Summer School

July 2020, 2021, 2022, 2023

University of Washington – instructor, lead organizer

Developed curriculum and co-taught 100+ attendees during a week-long summer school on network modeling, covering topics of automated data aggregation, model simulation, and using Docker containers.

(<https://reproduciblebiomodels.org/dissemination-training/workshops/>)

### BIOEN 336: Bioengineering Systems and Control

January 2020

University of Washington – invited lecturer

Lectured on introductory Python and kinetic modeling with modeling package, Tellurium.

### BIOEN 599 A: Computational Modeling for Medical Applications

Sept. - Dec. 2019

University of Washington – Teaching Assistant

Lectured on best practices in reproducible biochemical modeling, evaluated course assignments and exams, assisted in planning lecture material and homework, met students weekly for supplemental instruction.

## AWARDS

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University of Washington Department of Bioengineering Chair's Award	2023
University of Washington Department of Bioengineering Service Award	2023
HARMONY Hackathon 2020: travel grant (\$1000)	2020
INCOME Hackathon 2020: travel grant (\$1000)	2020
NSF Graduate Research Fellowship Program: Honorable Mention	2018
Hilldale Undergraduate Research Fellowship (\$3000 stipend, \$1000 research)	2016-2017
Benjamin A. Gilman International Scholarship (\$5000)	2016

## LEADERSHIP

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### UW Bioengineering Events & Awards Committee

2022 – 2023

University of Washington – lead student organizer

I led a group of faculty, graduate students, and undergraduates to organize events in Bioengineering department, with the aim to build an inclusive community, foster discussion, and provide a network of support within our department.

### UW Computational Biology and Modeling Journal Club

2019 – 2022

University of Washington – founder, organizer, discussion leader

Founded and led a monthly journal club to unite multiple UW Bioengineering labs and increase breadth of understanding in computational biology and modeling.

### Center for Reproducible Biomedical Modeling Outreach

2018 – 2023

Center for Reproducible Biomedical Modeling – Head of Outreach

Led the outreach efforts for the Center for Reproducible Biomedical Modeling. Invited 40+ speakers and hosted 30+ seminars, tutorials, and workshops on reproducible computational systems biology.

Seminar: <https://reproduciblebiomodels.org/dissemination-training/seminar/>

Tutorial: [https://github.com/vporubsky/COMBINE\\_reproducible\\_biomodeling\\_workflows](https://github.com/vporubsky/COMBINE_reproducible_biomodeling_workflows)

## STUDENTS MENTORED

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Francesca Wang (undergraduate)	2023
Sri Varshitha Pinnaka (undergraduate)	2023
Janis Shin (graduate rotation)	2021
Megan Freer (undergraduate)	2018 - 2020
Zhou Renjie (undergraduate)	2019 - 2020
Kateka Seth (undergraduate)	2019
Lillian Tatka (graduate rotation)	2019
Luke Zhu (graduate rotation)	2019

## PUBLIC ENGAGEMENT WITH SCIENCE

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**Cancer Game** 2018, 2019

Celgene and SoundBio Lab - volunteer

Introduced junior high school students from underserved communities to DNA, genetic variation, and cancerous mutations through an interactive role-based research game.

**Fun with Computer Models** 2019

UW Engineering Discovery Days - volunteer

Introduced elementary school students to computer models and simulations.

## CLINICAL VOLUNTEERING

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**Inpatient/Outpatient Program Assistant** October 2019 - March 2020\*

Bailey-Boushay House - volunteer

Provided compassionate care by listening to and engaging with individuals requiring long-term care or impacted by homelessness during weekly four-hour volunteer shifts.

\*Volunteer services were suspended due to the COVID-19 pandemic