

Benjamin D. Pedigo

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📄 [bdpedigo.github.io](https://github.com/bdpedigo)

I am a PhD Student and NSF Graduate Research Fellow in the Department of Biomedical Engineering at Johns Hopkins University. My research is in the [NeuroData](#) lab where I am advised by [Dr. Joshua T. Vogelstein](#) and co-advised by [Dr. Carey E. Priebe](#). My work focuses on using statistical and computational techniques to help understand [nanoscale connectomes](#). Currently, I am collaborating with [Dr. Marta Zlatic](#) and [Dr. Albert Cardona's](#) groups to analyze the first nanoscale connectome of the *Drosophila* larva brain. I also collaborate with Microsoft Research on the development of [graspologic](#), a Python package for statistical analyses of networks.

Education & Training

- 08/18 – now **PhD Student**, *Department of Biomedical Engineering*, Johns Hopkins University.
Highlighted courses: Neuro Data Design, Matrix Theory, Sparse Representations in Machine Learning, Neuroscience and Cognition, Probability and Statistics.
- 09/14 – 06/18 **Undergraduate Student**, *Department of Bioengineering*, University of Washington.
Highlighted courses: Neural Coding and Computation, Neural Engineering, Neural Tech Studio, Computational Methods of Data Analysis, Data Structures and Algorithms, High Performance Scientific Computing.

Positions Held

Current Position

- 08/18 – now **PhD Student**, *Department of Biomedical Engineering*, Supervised by Dr. Joshua T. Vogelstein and co-supervised by Dr. Carey E. Priebe, Johns Hopkins University.
Research: Analysis of nanoscale connectomes, network statistics, Python network data science.

Previous Positions

- 06/20 – 08-20 **Research Intern**, *Team Essex*, Supervised by Weiwei Yang and Dr. Chris White, Microsoft Research.
Research: Network embedding and visualization techniques, network traversal embeddings.
- 06/17 – 09/17 **Computational Neuroanatomy Intern**, *Neural Coding Group*, Supervised by Dr. Nuno da Costa, Allen Institute for Brain Science.
Research: Nanoscale connectomes, quality control for image alignment, Python development.
- 07/16 – 06/18 **Undergraduate Researcher**, *Center for Sensorimotor Neural Engineering*, Supervised by Dr. Chet Moritz and Dr. Sarah Mondello, University of Washington.
Research: Optogenetic spinal cord stimulation after spinal cord injury.
- 07/15 – 07/16 **Undergraduate Researcher**, *Department of Biology*, Supervised by Dr. Emily Carrington and Dr. Matthew N. George, University of Washington.
Research: Biomechanical properties of marine mussel attachments.

Awards & Honors

- 2020 **NSF Graduate Research Fellowship**.
- 2018 **Summa Cum Laude**, University of Washington.
Top 0.5% of graduating class.
- 2017 **Levinson Emerging Scholars Award**, University of Washington.
- 2017 **UW Institute for Neuroengineering Undergraduate Fellowship**, University of Washington.
- 2016 **Center for Sensorimotor Neural Engineering Undergraduate Fellowship**, University of Washington.
- 2016 **Mary Gates Research Scholarship**, University of Washington.

2015 **Mary Gates Research Scholarship**, University of Washington.
2014 - 2018 **Dean's List**, University of Washington.

Publications and Preprints

[†] denotes equal contribution

- [1] J. Chung, E. Bridgeford, J. Arroyo, **B. D. Pedigo**, A. Saad-Eldin, V. Gopalakrishnan, L. Xiang, C. E. Priebe, and J. T. Vogelstein. *Statistical Connectomics*. Aug. 2020. DOI: [10.31219/osf.io/ek4n3](https://doi.org/10.31219/osf.io/ek4n3). URL: osf.io/ek4n3.
- [2] V. Gopalakrishnan, J. Chung, E. Bridgeford, **B. D. Pedigo**, J. Arroyo, L. Upchurch, G. A. Johnson, N. Wang, Y. Park, C. E. Priebe, and J. T. Vogelstein. *Multiscale Comparative Connectomics*. 2020. arXiv: [2011.14990](https://arxiv.org/abs/2011.14990) [q-bio.NC].
- [3] A. S. Charles, B. Falk, N. Turner, T. D. Pereira, D. Tward, **B. D. Pedigo**, J. Chung, R. Burns, S. S. Ghosh, J. M. Kebschull, et al. "Toward Community-Driven Big Open Brain Science: Open Big Data and Tools for Structure, Function, and Genetics". In: *Annual Review of Neuroscience* 43 (2020).
- [4] T. L. Athey, **B. D. Pedigo**, T. Liu, and J. T. Vogelstein. *AutoGMM: Automatic and Hierarchical Gaussian Mixture Modeling in Python*. 2019. arXiv: [1909.02688](https://arxiv.org/abs/1909.02688) [cs.LG].
- [5] J. Chung[†], **B. D. Pedigo**[†], E. W. Bridgeford, B. K. Varjavand, H. S. Helm, and J. T. Vogelstein. "GraSPy: Graph Statistics in Python." In: *Journal of Machine Learning Research* 20.158 (2019), pp. 1–7.
- [6] J. T. Vogelstein, E. W. Bridgeford, **B. D. Pedigo**, J. Chung, K. Levin, B. Mensh, and C. E. Priebe. "Connectal coding: discovering the structures linking cognitive phenotypes to individual histories". In: *Current opinion in neurobiology* 55 (2019), pp. 199–212.
- [7] M. N. George, **B. D. Pedigo**, and E. Carrington. "Hypoxia weakens mussel attachment by interrupting DOPA cross-linking during adhesive plaque curing". In: *Journal of The Royal Society Interface* 15.147 (2018), p. 20180489.

Poster Presentations

- [1] **B. D. Pedigo**, M. Winding, M. Zlatic, A. Cardona, C. E. Priebe, and J. T. Vogelstein. "A quantitative comparison of a complete connectome to artificial intelligence architectures". In: *From Neuroscience to Artificially Intelligent Systems (NAISys)*, Cold Spring Harbor Laboratory, NY, USA, Nov. 2020.
- [2] **B. D. Pedigo**, J. Chung, E. W. Bridgeford, B. Varjavand, C. E. Priebe, and J. T. Vogelstein. "GraSPy: an Open Source Python Package for Statistical Connectomics". In: *Max Planck/HHMI Connectomics Meeting*, Berlin, Germany, Apr. 2019.
- [3] **B. D. Pedigo**, S. E. Mondello, A. E. Fishedick, and C. T. Moritz. "Optimization of optogenetic stimulation for spinal cord injury rehabilitation". In: *UW Undergraduate Research Symposium*, Seattle, WA, USA, May 2018.
- [4] **B. D. Pedigo**, S. E. Mondello, A. E. Fishedick, and C. T. Moritz. "Investigation of optogenetic-induced damage to the rat spinal cord". In: *Center for Sensorimotor Neural Engineering Summer Symposium*, Seattle, WA, USA, Aug. 2017.
- [5] **B. D. Pedigo**, S. E. Mondello, A. E. Fishedick, and C. T. Moritz. "Optimization of optogenetic spinal cord stimulation". In: *UW Undergraduate Research Symposium*, Seattle, WA, USA, May 2017.
- [6] **B. D. Pedigo**, M. N. George, and E. Carrington. "Effects of environmental factors on *Mytilus* mussel adhesion". In: *UW Undergraduate Research Symposium*, Seattle, WA, USA, May 2016.

Software

graspologic, github.com/microsoft/graspologic, Co-lead developer/maintainer.

A Python package for statistical analysis of network data, co-developed by NeuroData lab and Microsoft Research. Formerly known as GraSPy.

Mentoring

Summer '19 **Kareef Ullah**, *High School Summer Intern*, BME, JHU.
Summer '19 **Kiki Zhang**, *High School Summer Intern*, BME, JHU.

Teaching

Fall/Spring 2020/2021 **NeuroData Design I & II**, EN.580.237/437/637, Team Lead.
Johns Hopkins University
Fall/Spring 2019/2020 **NeuroData Design I & II**, EN.580.237/437/637, TA.
Johns Hopkins University
Spring 2018 **Biomedical Signals and Sensors**, BIOEN 316, TA.
University of Washington
Spring 2017 **Biomedical Signals and Sensors**, BIOEN 316, TA.
University of Washington

Service

2017 - 2018 **President and Founder**, Synaptech, University of Washington.
Student organization for undergraduates in neural engineering
2017 - 2018 **Undergraduate Representative**, Center for Sensorimotor Neural Engineering, University of Washington.
2017 - 2018 **President**, Bird Club, University of Washington.
2016 - 2017 **Treasurer**, Bird Club, University of Washington.
2017 - 2018 **Mentor**, BioExpo, Northwest Association for Biomedical Research.

Languages and Tools

Proficient **English, Python (NumPy, Pandas, Scikit-learn, SciPy, Seaborn, Matplotlib), Git, MATLAB, \LaTeX .**
Inproficient **R, C++, Java, Blender, HTML.**