Thomas Donoghue, PhD

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Languages: English (native), French (proficient), Spanish (intermediate)

Areas of Specialization

Cognitive Neuroscience - Electrophysiology - Periodic & Aperiodic Activity - Data Science

Education

2014 - 2020
PhD, Cognitive Science - Advisor: Prof. Bradley Voytek
University of California, San Diego, La Jolla, California, USA
Thesis: Measuring and Investigating Periodic and Aperiodic Neural Activity

2011 - 2014
Bachelors of Arts and Sciences (BA&Sc) Honors Cognitive Science
McGill University, Montreal, Quebec, Canada
Major: Cognitive Science. Minor: Philosophy. Graduated First Class Honors with Distinction

Research Experience

3/2021 - present
Postdoctoral Research Scientist - Advisor: Prof. Joshua Jacobs
Columbia University, Department of Biomedical Engineering
Investigations of human electrophysiology, with intracranial recordings and single units.

10/2020 - 2/2021
Postdoctoral Scholar - Advisor: Prof. Bradley Voytek
UC San Diego, Department of Cognitive Science, Cognitive & Neural Dynamics Lab
Developing software tools for the analysis of electrophysiological recordings.

9/2014 - 9/2020
Graduate Student Researcher - Advisor: Prof. Bradley Voytek
UC San Diego, Department of Cognitive Science, Cognitive & Neural Dynamics Lab
Mechanisms of neural communication using human electrophysiological recordings.

5/2013 - 6/2014
Research Assistant - Advisor: Prof. Sylvain Baillet
Montreal Neurological Institute, Department of Neurology & Neurosurgery
Functional connectivity during sleep, using magnetoencephalography and polysomnography.

9/2012 - 9/2014
Research Assistant - Advisor: Prof. Kris Onishi
McGill University, Department of Psychology - McGill Infant Development Cluster (MIDC)
Psycholinguistics & Developmental Psychology: language perception & statistical learning.

Additional Training

2018
Methods In Neuroscience at Dartmouth (MIND), *Dartmouth College,* Hanover, NH, USA
Short course.Topic: Narratives & Natural Contexts. Competitive application (~20% acceptance).

2017
Neurohackweek, *eScience Institute*, University of Washington, Seattle, WA, USA
Project-based course on neuro- & data science. Competitive application (~25% acceptance).

2016
Advanced Scientific Programming in Python, *G-Node & CINN,* Reading, England, UK
Short course on scientific programming. Competitive application (9.9% acceptance).

Preprints & Articles Currently Under Review

*Shared first-authorship. Underlined are students or research assistants under my direct supervision.

in-review **Donoghue T**, <u>Maesta-Pereira S</u>, <u>Han CZ</u>, Qasim SE, Jacobs J. spiketools: a Python package for analyzing single unit neural activity. *Journal of Open Source Software.*

preprint Kopčanová M, Tait L, **Donoghue T**, Stothart G, Smith L, Flores Sandoval AA, Buss S, Shafi M, Pascual-Leone A, Fried PJ, Benwell CSY. Resting-state EEG signatures of Alzheimer's disease are driven by periodic but not aperiodic changes. *bioRxiv.*
DOI: 10.1101/2023.06.11.544491. <u>LINK</u>

preprint He W, **Donoghue T**, Sowman PF, Seymour RA, Brock J, Crain S, Voytek B, & Hillebrand A. Co-Increasing Neuronal Noise and Beta Power in the Developing Brain. *bioRxiv.*
DOI: 10.1101/839258. <u>LINK</u>

Journal Articles (Peer Reviewed)

*Equal contribution. Underlined are students or research assistants under my direct supervision.

2023 **Donoghue T***, Cao R*, <u>Han CZ*</u>, Holman C, Brandmeir NJ, Wang S, Jacobs J. Single neurons in the human medial temporal lobe flexibly shift representations across spatial and memory tasks. *Hippocampus, 33*(5), 600-615. DOI: 10.1002/hipo.23539. <u>LINK</u>

2023 <u>Han CZ*</u>, **Donoghue T***, Cao R, Kunz L, Wang S, Jacobs J. Using multi-task experiments to test principles of hippocampal function. *Hippocampus, 33*(5), 646-657.
DOI: 10.1002/hip.23540. <u>LINK</u>

2022 **Donoghue T,** Schaworonkow N & Voytek B. Methodological considerations for studying neural oscillations. *European Journal of Neuroscience, 55*(11-12), 3502-3527.
DOI: 10.1111/ejn.15361. <u>LINK</u>
    Project website: <u>oscillationmethods.github.io</u>

2022 **Donoghue T**, Voytek B, & Ellis S. Course Materials for Data Science in Practice. *Journal of Open Source Education, 5*(51), 121. DOI: 10.21105/jose.00121. <u>LINK</u>

2022 **Donoghue T** & Voytek B. Automated meta-analysis of the event-related potential (ERP) literature. *Scientific Reports, 12*(1). DOI: 10.1038/s41598-022-05939-9. <u>LINK</u>
    Project website: <u>erpscanr.github.io</u>

2022 Ostlund BD, **Donoghue T**, Anaya B, Gunther KE, Karalunas SL, Voytek B, Pérez-Edgar KE Spectral parameterization for studying neurodevelopment: How and why. *Developmental Cognitive Neuroscience, 54,*101073. DOI: 10.1016/j.dcn.2022.101073. <u>LINK</u>

2021 Waschke L, **Donoghue T**, Fiedler L, Smith S, Garrett DD, Voytek B & Oblesser J. Modality-specific tracking of attention and sensory statistics in the human electrophysiological spectral exponent. *eLife.* DOI: 10.7554/eLife.70068. <u>LINK</u>

2021 **Donoghue T**, Voytek B, & Ellis S. Teaching Creative and Practical Data Science at Scale. *Journal of Statistics and Data Science Education, 29*(sup1), S27-S39.
DOI: 10.1080/10691898.2020.1860725. <u>LINK</u>

2020 **Donoghue T***, Haller M*, Peterson EJ*, Varma P, <u>Sebastian P</u>, Gao R, Noto T, Lara AH, Wallis JD, Knight RT, Shestyuk A & Voytek B. Parameterizing Neural Power Spectra into Periodic and Aperiodic Components. *Nature Neuroscience, 23.* DOI: 10.1038/s41593-020-00744-x. <u>LINK</u>
    Media coverage: <u>Quanta Magazine</u>; reprinted in <u>Wired</u>

2020	**Donoghue T**, <u>Dominguez J</u> & Voytek B. Electrophysiological Band Ratio Measures Conflate Periodic and Aperiodic Activity. *eNeuro, 7*(6). DOI: 10.1523/eneuro.0192-20.2020. <u>LINK</u>
2019	Robertson MM, Furlong S, Voytek B, **Donoghue T**, Boettiger CA, & Sheridan MA. EEG Power Spectral Slope Differs by ADHD Status and Stimulant Medication Exposure in Early Childhood. *Journal of Neurophysiology, 122*(6)*.* DOI: 10.1152/jn.00388.2019. <u>LINK</u>
2019	**Donoghue T**. LISC: A Python Package for Scientific Literature Collection and Analysis. *Journal of Open Source Software, 4*(41), 1674. DOI: 10.21105/joss.01674. <u>LINK</u>
2019	Cole S, **Donoghue T**, Gao R & Voytek B. NeuroDSP: A Package for Neural Digital Signal Processing. *Journal of Open Source Software, 4*(36), 1272. DOI: 10.21105/joss.01272. <u>LINK</u>

Book Chapters

2023	**Donoghue T** & Watrous A. How can we differentiate narrow-band oscillations from aperiodic activity? In *Intracranial EEG: A Guide for Cognitive Neuroscientists.* (p. 351-364) Springer, Cham. DOI: 10.1007/978-3-031-20910-9_22. <u>LINK</u> [OA Preprint - <u>LINK</u>]

Conference Proceedings (Peer Reviewed Papers - Selected)

Underlined are students or research assistants under my direct supervision.

2019	**Donoghue T**, Gao R, Waschke L & Voytek B. A Simulation-Based Comparison of Methods for Analyzing Aperiodic Neural Activity. *Cognitive Computational Neuroscience*. <u>LINK</u>
2018	<u>Fox W</u>, **Donoghue T**. Confidence Levels in Scientific Writing: Automated Mining of Primary Literature and Press Releases. *Proceedings of the Cognitive Science Society.* <u>LINK</u>
2017	Gao R, **Donoghue T** & Voytek B. Automated Generation of Cognitive Ontology via Web Text-Mining. *Proceedings of the Cognitive Science Society.* <u>LINK</u>

Conference Presentations

12/2022	**Investigators Workshop Presenter:** Extracting neural signals from noise. *American Epilepsy Society Meeting*, Nashville, TN, USA. Award: funding provided to attend the conference. Website: <u>https://aessignalworkshop.github.io/</u>
11/2022	**Short Talk:** Single neurons in the human medial temporal lobe engage in distinct aspects of different tasks. *Human Single Neuron Meeting*, Los Angeles, CA, USA.
11/2018	**NanoSymposium Presentation:** Parameterizing Neural Power Spectra *Society for Neuroscience Conference*, San Diego, CA, USA.
1/2016	**Research Talk:** The Effect of Oscillatory Phase on Perception and Cognition *Temporal Dynamics of Learning Centre - All Hands Meeting*, San Diego, CA, USA.

Interactive Workshops

6/2023	**A practical guide to EEG analysis tools used in neuroscience of consciousness & cognition** *Association for the Scientific Study of Consciousness*, New York, NY, USA Co-developed & presented as part of an interactive workshop on software tools for neural data analysis.
6/2023	**Advanced topics in the Analysis of Neural Electrophysiology Data Decomposing Rhythmic & Broadband Components** *The 36th New England Statistics Symposium,* Boston, ME, USA Co-developed & presented as part of an interactive workshop on software tools for neural data analysis.

3/2019	**New Methods for Analyzing Periodic Oscillations and Aperiodic 1/f in Electrophysiology**

Cognitive Neuroscience Society Conference, San Francisco, CA, USA.
Developed & lead an interactive workshop covering software tools for neural data analysis.

2013 - 2015	**Brainstorm Software for M/EEG Analyses**

Assisted with interactive workshops for the [Brainstorm](#) toolbox [3 workshops].

Research Presentations (Invited)

3/2022 -	**Separating periodic and aperiodic activity to investigate physiology, cognition, & disease**

Cognitive Brown Bag, Center for Cognitive Neuroscience, Dartmouth University [in person - 3/2022]
Psychology Seminar Series, Psychology Department, University of Salzburg [virtual - 3/2022]

2020 -	**Investigating Periodic & Aperiodic Neural Activity** (Guest Talks - University & Companies)

University: invited talks to group meetings & journal clubs (virtual) [8 talks up to 03/2022]
Company: Friday Talk Series, Beacon Biosignals (virtual) [10/2021]

08/2018	**Fitting Oscillations & One-Over F and Other Things** (Invited Seminar - Company)

Interaxon, Toronto, Canada

Conference Abstracts & Posters (Selected)

Underlined are students or research assistants under my direct supervision.

2023	Ameen MS, Jacobs J, Hoedlmoser K, **Donoghue T.** The temporal dynamics of aperiodic activity trail changes in sleep structure. *Society for Neuroscience*, Washington DC, USA. [UPCOMING]
2023	**Donoghue T**, Maesta Pereira S, Qasim SE, Patel A, Azab H, Smith EH, Mathura R, Myers J, Anand A, Adkinson J, Davis TS, Shofty B, Kurth-Nelson Z, Rey HG, Rolston JD, Behrens TEJ, Botvinick M, Sheth SA, Jacobs J. Conjunctive encoding in human place and time cells and their relation to spatial memory. *Society for Neuroscience*, Washington DC, USA. [UPCOMING]
2023	Azab H, …., Donoghue T, …. Sheth SA. Single neuron representations of sequential task structure emerge rapidly in human anterior cingulate and entorhinal cortex. *Society for Neuroscience*, Washington DC, USA. [UPCOMING]
2023	Park S, **Donoghue T**, Jacobs J, Lee SA. Aperiodic and periodic intracranial EEG correlates of aging and age-related spatial memory decline. *Society for Neuroscience*, Washington DC, USA. [UPCOMING]
2023	Han CZ, **Donoghue T**, Kunz L, Jacobs J. Human single neuron correlates of spatial navigation and memory performance. *Society for Neuroscience*, Washington DC, USA. [UPCOMING]
2023	Zhang W, **Donoghue T**, Qasim SE, Jacobs J. Variability across methods in the identification & characterization of place cells in humans data. *Society for Neuroscience*, Washington DC, USA. [UPCOMING]
2022	**Donoghue T**, Kleen JK, Voytek B, Jacobs J. Methodological considerations for examining spectral features in epilepsy. *American Epilepsy Society Meeting*, Nashville, TN, USA. [LINK](#)
2022	Maesta Pereira S*, **Donoghue T***, Qasim SE, Patel A, Azab H, Smith EH, Mathura R, Myers J, Anand A, Adkinson J, Davis TS, Shofty B, Kurth-Nelson Z, Rey HG, Rolston JD, Behrens TEJ, Botvinick M, Sheth SA, Jacobs J. Conjunctive encoding in human place and time cells. *Human Single Neuron Meeting*, Los Angeles, CA, USA. [LINK](#) Also presented at: *Society for Neuroscience,* San Diego, CA, USA.

2022   **Donoghue T***, Cao R*, <u>Han CZ*</u>, Holman C, Brandmeir NJ, Wang S, Jacobs J. Single neurons in the human medial temporal lobe engage in distinct aspects of different tasks. *Human Single Neuron Meeting,* Los Angeles, CA, USA. <u>LINK</u>
    Also presented at: *Society for Neuroscience,* San Diego, CA, USA.

2021   **Donoghue T**, Qasim SE, Patel A, Azab H, Smith EH, Mathura R, Myers J, Anand A, Atkinson J, Rey HG, Rolston JD, Behrens TEJ, Botvinich M, Sheth SA, Jacobs J. Human single neuron activity encodes future trajectories. *Society for Neuroscience*, Virtual.

2020   **Donoghue T** & Voytek B. Considerations for Detecting & Measuring Neural Oscillations. *LiveM/EEG (Cutting EEG)*, Virtual Conference. <u>LINK</u>

2019   <u>Farnan T</u>, **Donoghue T**, Voytek B. Evaluating Spectral Estimation Methods for Time-Resolved Measurement of Aperiodic Activity. *Society for Neuroscience*, Chicago, IL, USA. <u>LINK</u>

2019   <u>Zhang F</u>, **Donoghue T**, Voytek B. Comparing the Effects of Pre-Stimulus Periodic and Aperiodic Activity on Post-Stimulus Event Related Potentials. *Society for Neuroscience*, Chicago, IL, USA. <u>LINK</u>

2019   Waschke L, **Donoghue T**, Smith S, Voytek B, & Obleser J. Tracking of 1/f Stimulus Characteristics in the Human EEG. *Society for Neuroscience*, Chicago, IL, USA.

2019   **Donoghue T**, Gao R, Waschke L, Voytek B. A Simulation-Based Comparison of Methods for Analyzing Aperiodic Neural Activity. *Cognitive Computational Neuroscience,* Berlin, Germany. <u>LINK</u>

2019   <u>Dominguez J</u>, **Donoghue T**, Voytek B. Electrophysiological Frequency Band-Ratio Measures Conflate Changes in Periodic and Aperiodic Features. *Cognitive Neuroscience Society*, San Francisco, CA, USA. <u>LINK</u>

2018   <u>Mdanda L</u>, **Donoghue T**, Voytek B. Parameterization of Periodic and Aperiodic Human Electrophysiology Reveals Greater Between- Than Within-Subject Variability. *Society for Neuroscience*, San Diego, CA, USA. <u>LINK</u>

2018   **Donoghue T**, <u>Sebastian P</u>, Voytek B. Topographical Analysis of Electrophysiological 1/f and Oscillations Reveals Patterns of Spatial Variation. *Biomag,* Philadelphia, PA , USA. <u>LINK</u>

2018   **Donoghue T**, <u>Sebastian P</u>, Noto T, Haxby S, Voytek B. Integrating Human Electrophysiology, Gene Expression and Functional Data. *Neuroinformatics*, Montreal, QC, Canada. <u>LINK</u>

2018   <u>Fox W</u>, **Donoghue T**. Confidence Levels in Scientific Writing: Automated Mining of Primary Literature and Press Releases. *Cognitive Science,* Madison, WI, USA. <u>LINK</u>

2018   **Donoghue T** & Voytek B. Alpha Power and 1/f Slope Provide Independent Decoding of Visual Spatial Attention. *Cognitive Neuroscience Society*, Boston, MA, USA. <u>LINK</u>

2018   Gao R, **Donoghue T,** Voytek B. Defining Cognition: Automated Generation of Cognitive Ontology by Text-Mining Literature. *Cognitive Neuroscience Society*, Boston, MA, USA.

2017   Waschke L, **Donoghue T,** Obleser J, Voytek B. Attention-Modulated Tracking of 1/f Stimulus Characteristics in Human EEG. *Signals & Noise in the Auditory Pathway*, Lübeck, Germany.

2017   **Donoghue T** & Voytek B. Assessing approaches for estimating the electrophysiological 1/f background spectrum. *Society for Neuroscience*, Washington DC, USA. <u>LINK</u>

2017   **Donoghue T** & Voytek B. Automated meta-analysis of event-related potentials and their correlates by text-mining. *Cognitive Neuroscience Society*, San Francisco, CA, USA. <u>LINK</u>
    Award: graduate student award winning poster including a 500$ travel award

2016   **Donoghue T**, <u>Fox W</u>, <u>Kim A</u>, Voytek B. The relation of oscillatory-phase to visual perception depends on attention & location of stimuli. *Society for Neuroscience*, San Diego, CA. <u>LINK</u>

2016   <u>Sebastian P</u>, **Donoghue T**, Noto T, Haxby S, Voytek B. Data mining to generate novel hypotheses for the genetic underpinnings and functional roles of cortical oscillations. *Society for Neuroscience*, San Diego, CA, USA. <u>LINK</u>

2016   **Donoghue T**, <u>Sebastian P</u>, Voytek B. Automated Analysis of Resting State Cortical Oscillatory Characteristics using Magnetoencephalography. *Biomag,* Seoul, South Korea. <u>LINK</u>

2015   Gougelet R, **Donoghue T,** Piper M, Althoff A, Urbach TP, Voytek B. Influencing Visual Target Detection with Oscillatory Phase-Specific Stimulus Presentation. *Society for Neuroscience*, Chicago, IL, USA. <u>LINK</u>

Honors & Awards

2022   **Trainee Professional Development Award, Society for Neuroscience (SfN)**
Merit based award for SfN conference registration and travel funds (1000$).

2017 - **Travel Awards, UC San Diego, Graduate Student Association (GSA)**
2019   Travel awards for conferences, from the GSA (2X) and from departmental funds.

1/2016 **Small Grants Award, Temporal Dynamics of Learning Centre (TDLC)**
2,200$ USD funding for an EEG project on the temporal dynamics of perceptual learning.

3/2014 **Owens Scholar Award, Johns Hopkins University** (*declined*)
18 000$ USD additional funding over 3 years offered with admission to Johns Hopkins.

11/2013 **Samuel de Champlain Quebec Program for International Collaboration**
Funds provided by my research supervisor (Dr. Baillet) for travel to NeuroSpin in France.

Academic Activities: Reviewing

*Includes article co-reviewed with a research supervisor. #Includes code review.

Journal Articles (Ad-Hoc Reviewer)
The American Journal of Psychiatry (1X); Behavior Research Methods (1X); Biological Psychology (1X); Brain and Behavior (1X); Cerebral Cortex (1X); Clinical Neurophysiology (1X); Cognitive Neurodynamics (1X); Developmental Cognitive Neuroscience (1X); eLife (1X); eNeuro (1X); European Archives of Psychiatry and Clinical Neuroscience (1X); European Journal of Neuroscience (2X); F1000 Research (1X); Human Brain Mapping (*1X); Imaging Neuroscience (1X); Journal of Neurophysiology (*2X); Journal of Neural Engineering (1X); Journal of Neuroscience (2X); Journal of Open Source Education (#3X); Journal of Open Source Software (#4X); Mindfulness (1X); Nature Communications (1X); Neurobiology of Aging (*2X); Neurobiology of Disease (1X); NeuroImage (5X); Open Journal of Signal Processing (1X); PLoS Computational Biology (3X); PLoS Biology (1X); Psychophysiology (1X); ReScienceC (#1X); SoftwareX (1X);

Conference Proceedings
Affective Computing & Intelligent Interaction (ACII 2019: 1 paper); Cognitive Computational Neuroscience (CCN 2019: 6 papers);

Books
Columbia Press (1X);

Research Mentorship

Students under my direct mentorship. Awards are where I supervised the application and project.

PhD Students:

Mohamed Ameen	11/2022 - *current*	
Weija Zhang	09/2022 - *current*	
Sandra Maesta Pereira	09/2021 - *current*	
Zhixian (Claire) Han	09/2021 - *current*	

Masters Student Research Assistants:

Tyler Farnan	01/2019 - 03/2021	

Undergraduate Research Assistants:

Fenglin (Allen) Zhang	01/2019 - 03/2021	
Julio Dominguez	06/2018 - 01/2020	TRELS Scholarship
Luyanda Mdanda	10/2016 - 01/2020	HDSI Undergrad Fellowship
Meyhaa Buvanesh	04/2019 - 06/2019	
Lakshmi Menon	04/2019 - 09/2019	
Fiona Cisternas	01/2019 - 06/2019	HDSI Undergrad Fellowship
Priyadarshini Sebastian	10/2015 - 06/2018	FISP Trainee Award
Aeri Kim	10/2015 - 12/2016	
Will Fox	06/2015 - 06/2018	

Computational Skills & Contributions

Languages Fluent in **Python**, **shell** scripting (bash) & **git**, intermediate in **Matlab** and **R**.

Packages **specparam** (formerly 'fooof'): Spectral Parameterization ([Github](#) - [PYPI](#) - [Documentation](#))
Lead Developer - Python package for parameterizing neural power spectra.

neurodsp: Neuro Digital Signal Processing ([Github](#) - [PYPI](#) - [Documentation](#))
Co-Developer - Python package for analyze neural electrophysiological recordings.

lisc: Literature Scanner ([Github](#) - [PYPI](#) - [Documentation](#))
Lead Developer - Python package for collecting and analyzing the scientific literature.

spiketools: Analysis of spiking data ([Github](#) - [PYPI](#) - [Documentation](#))
Lead Developer - Python package for analyzing single-unit neural data.

ByCycle: Cycle-by-cycle analysis of neural oscillations ([Github](#) - [PYPI](#) - [Documentation](#))
Maintainer - A package for analyzing cycle properties of neural oscillations.

Github Code & open-source contributions are available on my [Github profile](#) and indexed [here](#).
Example contributed projects: [bycycle](#), [spikeinterface](#), [pynwb](#), [nwbwidgets](#).

Resource Contributions

The following are open source / open access resources that I have created and made public.

SigViz: animated signal visualizers for exploring signal processing ([Github](#) - [Website](#))
This resources includes novel animations to explain signals and topics such as filtering.

OpenLists: open lists of open resources ([Github](#) - [Website](#))
This collection curates open resources, including open-access data & open-source tools.

StructuredScience: templates & resources for organizing scientific projects ([Github](#) - [Website](#))
This resource curates templates for creating organized and standardized project structures.

Science Outreach

2022 - **Mentoring: Student Mentor for High-School Summer Internship**
Mentor for the [Brainyac](#) program, offering intensive summer internships to young students.

2020 - **Mentoring: Project Guidance & Assistance with Grad School Applications**
Organizations include: [Cientifico Latino](#), [neuromatch](#)

2018 - **Public Workshops & Presentations**
10/2018: Data Wrangling & Web Scraping: 2 hr workshop with [SCALE-SD](#). *[Materials](#)* - *[Media](#)*

2013 - **Volunteer Tutoring & School Presenter**
Tutoring, presentations, science fair judging, and miscellaneous volunteering.
Organizations include: [Brain Awareness](#), [San Diego Science Fair](#), [San Diego Refugee Tutoring](#)

1/2014 - **Science Writer / Editor / Podcast Host, Useful Science Organization** ([usefulscience.org](#))
1/2017   Writing clear, concise and useful summaries of scientific research for a general audience.

Training in Teaching

Formal training in teaching and related topics.

2018   **Introduction to College Teaching**, Teaching & Learning Commons, UC San Diego
Semester long course on evidence-based teaching in university contexts.

2017   **Equity, Diversity, and Inclusion in Postsecondary Education**, UC San Diego Extension
Course on best practices for inclusive & equitable teaching in university contexts (10 hrs).

Teaching Experience

2018   **Instructor-of-Record**, Department of Cognitive Science, UC San Diego
COGS 18: Introduction to Python (30 hours lecture + coding labs; 200 undergrad students)
Developed & taught a course teaching introductory Python programming. Materials: LINK

2017 -   **Instructor (3X)**, Clubes de Ciencia Mexico
2020   Clubes de Ciencia is a non-profit organization promoting science education across Mexico.
1 week, hands-on research focused courses (25 hours of instruction; 12-18 students / year)
- CdeCMx Challenge: Soluciones cientificas a problemas emergentes (online, Aug. 2020)
- Inteligencia Biologica & Artificial: Amigos o Enemigos? (Ensenada, Mexico, Aug. 2019)
- Bots on the Brain: Cognitive Science & Bio-Inspired Robotics (Monterrey, Mexico, Aug. 2017)

2015 -   **Instructor (3X)**, Academic Connections, UC San Diego
2017   Academic Connections offers university-level courses to advanced high school students.
Co-developed & taught a course introducing cognitive science. Materials: LINK
Introduction to Cognitive Science (75 hours of instruction; 16-24 students / year)
Ratings: Course {4.71, 4.80, 4.59}/5; Instructor: {4.86, 4.92, 4.92}/5; Years: {2015, 2016, 2017}.

2015 -   **Teaching Assistant (7X),** Department of Cognitive Science, UC San Diego
2018   COGS 108: Data Science in Practice (Winter '18, Prof. Bradley Voytek, TA Evals: 4.31/5)
COGS 108: Data Science in Practice (Spring '17, Prof. Bradley Voytek, TA Evals: 4.32/5)
COGS 107B: Systems Neuroscience (Winter '17, Prof. Douglas Nitz, TA Evals: 4.60/5)
COGS 17: Neurobiology of Cognition (Winter '16, Dr. Christine Johnson, TA Evals: 4.58/5)
COGS 9: Introduction to Data Science (Fall '15, Prof. Bradley Voytek, TA Evals: 4.34/5)
COGS 3: Introduction to Computing (Spring '15, Prof. Bradley Voytek, TA Evals: 4.54/5)
    Awarded *Excellence in Teaching* Award from the UCSD Cognitive Science Dept.
COGS 107B: Systems Neuroscience (Winter '15: Prof. Douglas Nitz, TA Evals: 4.69/5)
    Awarded *Outstanding Teaching* Award from the UCSD Cognitive Science Dept.

Educational Materials

Openly available educational materials that I have created and/or contributed to.

Introductory Python, openly available online course
Materials for learning introductory programming in Python (Website - Source).

Data Science in Practice, openly available online course
Materials for learning introductory data science in Python (Website - Source).

Tutorials, openly available tutorial materials online course
    Python Boot Camp: Open materials for a graduate student bootcamp. LINK
    Electrophysiology Tutorials: Materials for getting started with M/EEG analyses. LINK