Madeline Dabney

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EDUCATION

The University of Texas at Austin Austin, TX
B.S. Neuroscience, *Concentration in Theoretical and Computational Neuroscience* Expected May 2024
Certificate in Elements of Computing

EXPERIENCE

Undergraduate Research Assistant and Peer Mentor Austin, TX
Freshman Research Initiative (FRI)
The University of Texas at Austin, Department of Integrative Biology January 2021 – Present

- Led team research projects and produced publishable outcomes.
- Learned scientific writing and presentation of data
- Mentored new lab students, taught lab procedures as well as experimental procedures.
- Analyzed and visualized experimental data using R statistical programming and Ethovision software.
- Conducted live fish behavioral trials and analyzed animal behaviors.
- Presented research outcomes at two undergraduate research forums in 2022 and 2023.

RESEARCH PROJECTS

Aversive Route Learning and its Effect on Anxiety/Boldness in *G.affinis* Fish Austin, TX
Undergraduate Research Assistant and Peer Mentor
Advisor: Dr. Mary Ramsey
FRI, The University of Texas at Austin, Department of Integrative Biology June 2022 – Present

- Developed research design and lead the project.
- Tested *Gambusia affinis* fish in the Barnes Maze aversive learning paradigm.
- Assessed spatial learning abilities through the use of aversive learning.
- Examined the effects of aversive learning and spatial learning capabilities on anxiety through the scototaxis anxiety/boldness assay.
- Generated publishable data showing effects of aversive stimuli and Barnes Maze solving capabilities on boldness levels.
- Presently undergoing further data analysis.

Heterospecific and Conspecific Mate Choice in *G.affinis* Females Austin, TX
Undergraduate Research Assistant and Peer Mentor
Advisor: Dr. Mary Ramsey
FRI, The University of Texas at Austin, Department of Integrative Biology March 2023 – Present

- Tested *Gambusia affinis* females on preference of heterospecific and conspecific males through a sociability assay.
- Assessed these preferences based on exposure to heterospecific and conspecific males in long-term living conditions.
- Mentored new lab students and instructed them on experimental protocols.
- Analyzed data in the sociability assay.

Aversive Route Learning in *G.affinis* Fish Austin, TX
Undergraduate Research Assistant
Advisor: Dr. Mary Ramsey
FRI, The University of Texas at Austin, Department of Integrative Biology August 2021 – May 2022

- Tested Gambusia affinis fish in the Barnes Maze aversive learning paradigm.
- Assessed spatial learning abilities through the use of aversive learning.
- Generated sex differences in solving ability in an aversive learning paradigm and showed spatial learning through reversal learning as well as problem solving abilities.

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RELEVANT NEUROSCIENCE COURSEWORK

Neural Computation Austin, TX

The University of Texas at Austin, Dr. Xue-Xin Wei

Course Description: This course is meant to give students a strong intuition and appreciation for why quantitative methods are so important in neuroscience and explore common analytic techniques and learn how to interpret results from neural data and modeling. This course teaches how to apply basic concepts in calculus, probability theory, linear algebra, and statistics to neuroscience examples.

Course Topics: Core mathematical concepts, signal processing and filtering in the brain, stochastic neural encoding and decoding models, neural networks

Programming and Data Analysis in Modern Neuroscience Austin, TX

The University of Texas at Austin, Dr. Marcel Goldschen

Course Description: This course is meant to teach students translate problems into code applying modern approaches for data analysis, statistical inference and modeling to various levels of neural systems and their component behavior. This is done through the use of Python as a coding environment. Although geared for neuroscience, the approaches covered in this course are highly salient for a wide array of applications.

Course Topics: Representation of mathematical concepts, neural networks, machine learning

Neurobiology Laboratory Austin, TX

The University of Texas at Austin, Dr. Nace Golding

Course Description: This course is meant to teach students the essential skills of modern electrophysiology to understand key concepts in cellular neuroscience. The focus is on intracellular recording via patch clamp techniques to understand concepts including resting potentials and action potentials, ion channels and receptors, as well as synaptic integration.

Course Topics: Passive Membrane Properties, action potentials and voltage-gated ion channels, synaptic transmission and plasticity

Neural Systems III: Quantitative Tools in Neuroscience Austin, TX

The University of Texas at Austin, Dr. Román Corfas and Dr. Mike Mauk

Course Description: This course is meant to teach students some of the most important skills in neuroscience. How to design neuroscience experiments, analyze neurobiological data, use computational tools and programming to help us analyze these data, look at other people's work, and determine if it is credible, and communicate our ideas and discoveries.

Course Topics: Data analysis, scientific communication, analyzing neurobiological data, science in practice

Neural Systems II Austin, TX

The University of Texas at Austin, Dr. Román Corfas

Course Description: This course is meant to teach students to consider how nervous systems are broadly organized, how they can change over time, how they can produce complex behaviors, and how we can study these systems. In particular, this course examines neuroanatomy, neural development, and neural mechanisms of memory, emotions, and other higher cognitive functions.

Course Topics: Neuroanatomy, developmental neuroscience, learning and memory, the brain and behavior,

Neural Systems I Austin, TX

The University of Texas at Austin, Dr. George Pollak

Course Description: This course is meant to teach students to consider how individual nerve cells, or neurons, generate their electrical signals, how those signals are transmitted along their processes, or axons, how one nerve cell communicates with other neurons or muscle cells by way synaptic transmission, how millions of nerves in a system are organized and how they work as a "nervous system".

Course Topics: Electrical signaling in neurons, molecular biology of ion channels, synaptic transmission, neurotransmitters, synaptic plasticity, functions of cerebral cortex, visual neuroscience,

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RELEVANT COMPUTER SCIENCE COURSEWORK

Elements of Software Engineering I Austin, TX

The University of Texas at Austin, Dr. Fares Frajj

Course Description: This is a course on software engineering using Python. It is strongly focused on using tools to improve the quality of software development.

Course Topics: automated builds with make, source control with git and GitLab, unit testing with unittest, code coverage with coverage, continuous integration with GitLab CI, automated documentation with pydoc, Docker

Elements of Software Design Austin, TX

The University of Texas at Austin, Dr. Carol Ramsey

Course Description: The course focuses on software development using object-oriented methodology. This course includes how to design software, create reusable software components, and compose programs from already available components. Also, students learn about basic data structures and algorithms, and how to match the data structures and algorithms to problems.

Course Topics: Object oriented programming, data structures, data analysis, graph topography

Elements of Computers and Programming Austin, TX

The University of Texas at Austin, Prof. MJ Johns

Course Description: This course is an introduction to computers, computer science, and programming.

Course Topics: Elements of python programming, object oriented programming, algorithms

PRESENTATIONS

Madeline Dabney, Madison Montoya, Julian Padilla, Cassandra Rocha. Aversive Route Learning and its Effect on Anxiety/Boldness in *G.affinis* Fish**.** Poster presentation delivered at the University of Texas at Austin Undergraduate Research Forum, Austin, TX, April, 2023.

Mowna Ravipati, Nhu Nguyen, **Madeline Dabney**. Aversive Route Learning in *G. affinis* fish. Poster presentation delivered at the University of Texas at Austin Undergraduate Research Forum, Austin, TX, April, 2022.

SKILLS

Laboratory skills

- Data analysis using R programming
- Patch clamping neurons
- Performing and analyzing live fish experiments in the following assays: Scototaxis, Barnes Maze, Sociability, Mirror Aggression, Detour

Programming Languages

- R
- Python
- Swift

Languages

- Spanish with advanced proficiency
- Korean with limited proficiency
- Russian with limited proficiency