

HBCU Projects

Dr. Kathryn Levasseur (Biology)

Title: Conservation genetics of marine turtles

Description:

Marine turtles have complex and extensive oceanic life cycles that hinder research efforts. Questions remain regarding migratory behavior, mating behavior, age at maturity, and the male component of the breeding population. Genetic tools can be used to target these questions and inform conservation strategies. One project we will be working on this summer will assess the breeding sex ratio of a hawksbill turtle breeding population in the Eastern Caribbean using genetic paternal reconstructions. A second project would examine natal homing precision and age at maturity in hawksbill turtles by combining genetic relatedness data with long-term nesting data. These projects will involve review of primary literature, molecular labwork training, data analysis, and a final report or poster presentation summarizing results.

Time frame:

8-10 weeks within May 22 - July 28

Dr. Scott Villa (Biology)

Title: The influence of pheromone production and reception in monarch butterfly mate choice

Description:

Monarch butterflies are an iconic species known for their transcontinental migration to Mexico. Their long-distance flying ability has allowed them to colonize a variety of different habitats. Turns out that monarchs from different areas eat and develop on different types of plants and as a result have developed tissues that “smell” differently. This variation in smell may form the basis for how monarchs choose mates, where females accept males that smell similar to themselves. This project will focus on three main questions: 1) do different populations of monarchs have detectable differences in their smell, and 2) do monarchs assortatively mate based on this difference, and 3) do they use their antennae as a way to determine monarch smell? You will be part of a fun, integrative team that learns how to raise and mate monarch butterflies to conduct manipulation experiments with lab-reared butterflies. This project will not only address a longstanding question in the evolution of species formation but will help understand how arguably the most widely known butterfly species makes mating decisions.

Time frame:

Approx 8 weeks from 06/25-08/18. There is some wiggle room for start and stop dates.

Dr. Lauren Stutts (Public Health and Psychology)

Title: Body Image Influences in Women

Description:

Students in my lab have conducted studies examining different factors that influence women’s body image such as exposure to fitness inspiration on Instagram, exposure to different body types in the media, and the impact of self-compassion. This DRI fellow would choose a research question of focus in this area.

Time frame:

Monday, May 22 – Friday, July 28 (10 weeks) or Monday, May 29 – Friday, July 21 (8 weeks)—I’m open to either schedule

Dr. LeeAnna Chapman (Biology)

Title: Microplastic contamination in freshwater and marine ecosystems

Description:

This scholar will work closely with two Davidson students who are examining the presence of microplastics along the Catawba River Basin. Microplastics, or pieces of synthetic plastic smaller than 5.0 mm in diameter, are present in many waterways and the impact that they have on the environment and human health is not yet fully understood. In addition to examining the freshwater contaminants, this project will examine water samples collected along the coast in marsh and marine environments. The goal of the project is to determine if there are different concentrations of microplastics in freshwater or saltwater ecosystems. We will sample surface waters then analyze utilizing procedures outlined by the National Oceanic and Atmospheric Administration including microscopic analysis.

Title frame:

Approx. May 22 - July 21 (there is some flexibility in these dates though).

Dr. Hammurabi Mendes (Computer Science)

Title: Instrumenting high-performance Data Structures

Description:

The best algorithms for high performance computing systems are those designed with considerations such as data layout, compiler optimizations, cache performance, etc. Learn about this with us! At Davidson College, we have a group devoted to implement highly efficient algorithms for multiprocessors, and part of that design process is obtaining performance information and analyzing it. We cordially invite you to participate in our group and learn about all those topics! The only prerequisite are Data Structures and knowing how to program in Java. We would be very excited to engage with our peer community in research. Please apply and come to work with us!

Time Frame:

8 weeks period either in

May 29 – Aug 4 (with a break/remote time during July 3-13)

June 5 – Aug 11 (with a break/remote time during July 3-13)

Dr. Raghu Ramanujan and Dr. Michelle Kuchera (Computer Science and Physics)

Project title: Physics Extraction using Deep Learning Techniques in the Active-Target Time Projection Chamber

Description:

The Active-Target Time Projection Chamber (AT-TPC) is a gas-filled detector housed at the Facility for Rare Isotope Beams (FRIB) in Michigan that is used to study the structure of atomic nuclei. Typical experiments at the AT-TPC produce terabytes of data and machine learning techniques play a key role in the analysis of this data. In this project, the scholar will work with students and faculty at Davidson College, as well as physicists at FRIB, to determine physics quantities of interest (like the momentum of a particle), given a point cloud representation of a reaction. *No prior experience with nuclear physics or machine learning is expected.*

Time Frame:

May 30--Aug. 4 (end date is flexible)

Dr. Owen Mundy (Digital Studies)

Title: Web Design & Development Book Evaluation

Description:

This DRI opportunity is for a student who wishes to learn foundational web design and development skills and develop independent web-based creative works using those skills by evaluating an in-process textbook. Critical Web Design (forthcoming, MIT Press) teaches readers to conceptualize, design, and program responsive websites as both an applied and creative practice. Readers will develop and use technical skills in interface design, usability, accessibility, and coding in HTML/CSS and Javascript, as well as design practices including design thinking, speculative design, and critical design for imagining and producing online works that address issues relevant to design and technology in society.

A detail-oriented student researcher will:

- Test content, exercises, tutorials, and prompts through a close reading of the material.
- Create idea-driven works which balance the technical and humanities-based components of the book.
- Learn to design and create diagrams, screen grabs, and code samples to illustrate and explain the concepts in the book.
- Use eye tracking software to create, conduct, and compile findings from a usability test, especially heatmaps showing the use of eye tracking software. The student will also recreate a specific heat map image showing the importance of focal points, leading lines, and human gaze within design layouts.

Time Frame:

May 15-July 21 (I am flexible on this, but 8 or 10 weeks, at the same time as my other DRI)