**CALL FOR APPLICATIONS**

**Luther and Alice Hamlett Undergraduate Research Support**

**in the Academy of Integrated Science**

Thanks to a generous gift from Luther and Alice Hamlett, the Academy of Integrated Science can provide support for the research activities of majors in **Computational Modeling and Data Analytics**, **Nanomedicine**, **Nanoscience** and **Systems Biology**. Students in these majors planning to do undergraduate research with faculty from Virginia Tech can apply for up to $2,000 in research support. This support can cover expenses for lab consumables or wages paid to the student.

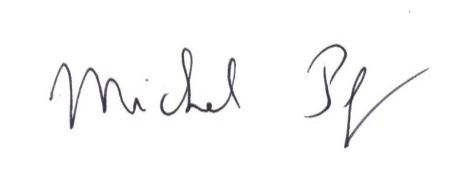
Students interested in this opportunity can apply for research support in Summer, Fall, and Spring. The deadlines are **April 15** for Summer research, August 1 for research during the Fall semester and December 15 for research during the Spring semester. It is possible for a student to get more than one scholarship in a given year.

The submitted application package must contain:

1. A completed Application Form signed by both the student and faculty member.
2. A short (less than one page) description of the research project. If the research project will be taken for credit, the Undergraduate Research / Independent Study form through your primary major’s college needs to be completed. If your primary major is CMDA, NANO, NMED, or SYSB, you would need to complete the form found on the [College of Science Student Forms Webpage.](https://www.science.vt.edu/resources/forms.html)

The application package should be sent electronically to Amanda Shepheard, Academy of Integrated Science (MC 0563), Hahn Hall South Suite 2108, 800 West Campus Drive, Blacksburg, VA 24061, email: [amandabs@vt.edu](mailto:amandabs@vt.edu), phone: 540-231-3647.

With best regards,



Michel Pleimling

Director, Academy of Integrated Science in the College of Science

**Application for**

**Luther and Alice Hamlett Undergraduate Research Support**

**in the Academy of Integrated Science**

**Student Information:**

Name: Jacob Wynne

Current Primary Major: Biological Sciences

Secondary Major (if applicable): Systems Biology

VT Email address: jacobwynne@vt.edu

Title of Project: Coupling a global climate scenario, general circulation models and lake models to partition uncertainty in the projected thermal budget of a northern oligotrophic lake

Student Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Faculty Member Information:**

Name: Cayelan Carey

Department / College: Biological Sciences

VT Email address: cayelan@vt.edu

Statement on how the scholarship funds will be used to support the student’s research: The funds would be split between a new stream discharge sensor needed to improve lake model calibration and open access page charges during publication.

Faculty Member Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Please add a short (less than one page) description of the research project. This description should also briefly discuss how the OVPRI Covid-19 guidance** [**https://www.research.vt.edu/covid-19-updates-impacts.html**](https://www.research.vt.edu/covid-19-updates-impacts.html) **will be implemented for this project.**

**Coupling a global climate scenario, general circulation models, and lake models to partition uncertainty in the projected thermal budget of a northern oligotrophic lake**

Due to human activities, freshwater ecosystems around the globe are increasingly changing. Clear water, or oligotrophic, lakes provide critical ecosystem services such as drinking water yet are experiencing relatively abrupt and severe water quality problems attributed to climate change and land development. Because of this, new tools to predict future water quality are vital to improving the management of oligotrophic lakes and combat water quality degradation. In this project, the focus of my research will be Lake Sunapee, an oligotrophic lake in New Hampshire and important drinking water source. Lake Sunapee is an exemplary case study for understanding how currently high-water quality lakes are being rapidly degraded due to human activities.

In order to better understand the impacts associated with the future climate change scenario representative concentration pathway (RCP 8.5), four general circulation models (GCM) will be used to model lake temperature with the five lake models within LakeEnsemblR (LER). Using a 30+ year historical dataset from Lake Sunapee, parameters will be calibrated, and baselines will be created for each GCM. GCM climate data will then be forced through the calibrated LER and the anomalies between GCMs will be compared using 30-year intervals up to 2099. Metrics of interest from this LER output will include thermocline depth, length of stratification, thermocline strength, and ice coverage. An array of compiled outputs including parameter distributions, water column output, and anomaly values will subsequently be used to partition uncertainty across the climate models, parameters, lake models, total forecast and climate scenario.

This project will be multifaceted in its outcomes: first, the outputs of the LakeEnsemblR models will give insight into the future of Lake Sunapee given certain climate conditions. This will provide desired insights to managers and homeowners residing at Lake Sunapee, who are greatly interested in mitigating the impacts of climate change on their lake in order to maintain its community-wide and personal values. Second, this project will lead to novel insights revolving around the modelling itself. Because all models have inherent uncertainty, whether that be revolving around future temperature projections, global circulation methods, or water column properties, it is important for researchers to understand how much uncertainty is present and where that model uncertainty is coming from (e.g., model parameters, driver data). Because this project contains multiple models for both climate projections and lake water quality response, the ability to compare an ensemble of predictions is possible and extremely useful. These insights will be relevant to researchers and modelers carrying out similar climate change impact studies in order to mitigate future negative impacts on lake water quality.

Funds from the Luther and Alice Hamlett Research Award would be extremely useful in both the research and communication aspects of the project. The funds would be split between a new pressure transducer sensor to more accurately model and calibrate the water budget of Lake Sunapee and open access page charges during publication to enable its broad dissemination.

The OVPRI Covid-19 guidance will be adhered to during this project, as all data is collected via remote sensor networks and no in-lab research will be required.