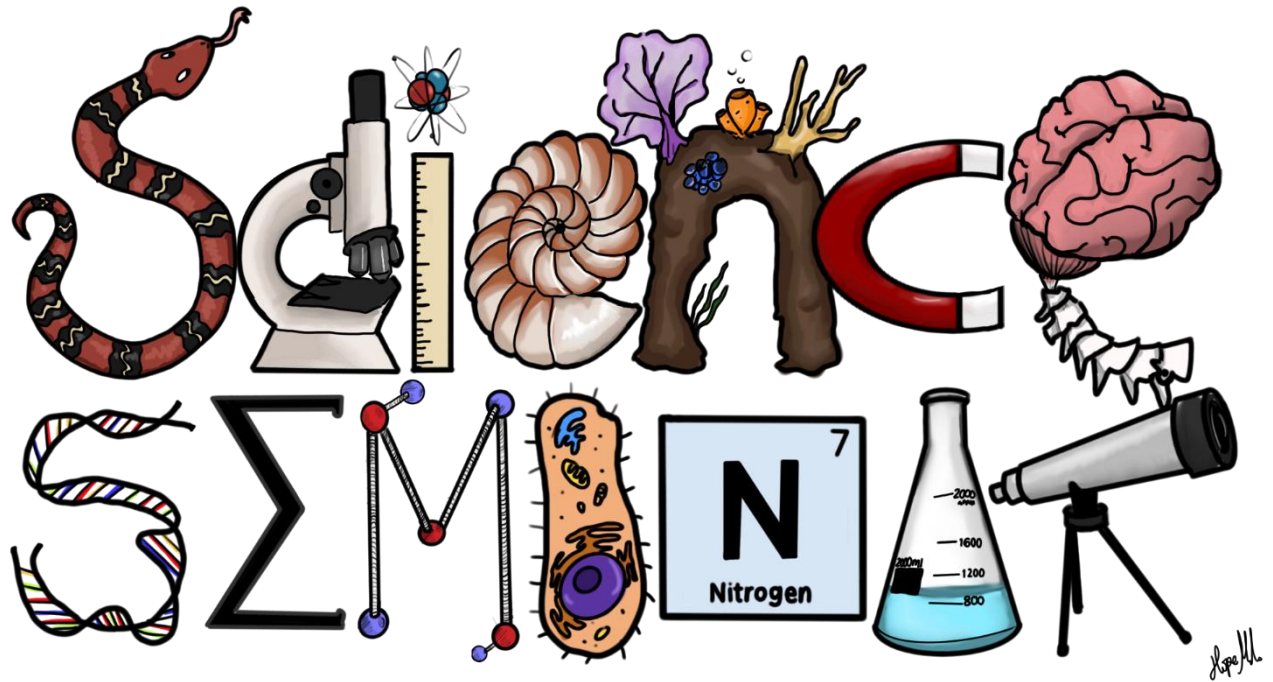


65th Annual

Hollins



April 5th & 14th
2023

“The important thing is not to stop questioning. Curiosity has its own reason for existence. One cannot help but be in awe when he contemplates the mysteries of eternity, of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of this mystery each day.”

– Albert Einstein

We are delighted to invite you to join us for the 65th Annual Hollins Science Seminar. Our celebration of the dynamic research that has been conducted by Hollins University mathematics, science, and psychology students during the 2022-2023 academic year will occur over the course of two days.

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In the afternoon on April 5th, we will have several students give oral presentations on their research. These presentations will be followed in the evening by a Keynote Address by Dr. Michael Olson, a social psychologist from the University of Tennessee.

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On the afternoon of April 14th, we will have a research poster session. Here the 44 students conducting research in Biology, Environmental Studies and Science, Chemistry, Mathematics/Statistics/Data Science, and Psychology will share their work.

WEDNESDAY, April 5th

4:30-5:30 p.m.

Senior Research Presentations

VAC Auditorium

Please join us as we hear from three seniors who are exploring research projects in psychology, chemistry, and mathematics/statistics.

See detailed abstracts of their work in the Abstract section

4:30-4:45 - *"Investigation of the impact of Latine ethnicity on substance use self-stigma."*
Yareli Sosa Antunez, Department of Psychology. (Under the direction of Dr. Caroline E. Mann)

4:45-5:00 - *"The Study of Chemical Compounds in the Mainstream Smoke of Herbal Cigarettes."* **Uyen Thanh Nguyen**, Department of Chemistry (Under the direction of Dr. Son Hong Nguyen)

5:00-5:15 - *"Identification of patients with stable coronary artery disease who benefit from ACE inhibitors using Cox mixture model for heterogeneous treatment effects."* **Van Le**, Department of Mathematics/Statistics (Under the direction of Chirag Nagpal (Ph.D. candidate) and Artur Dubrawski (Ph.D. and faculty), Auton Lab, School of Computer Science, Carnegie Mellon University)

5:15 – 5:30 p.m.

Induction of Students to Sigma Xi

Rowan Abshire Sims (Biology)

Yareli Antunez (Psychology)

Saro Naomi Gakusi (Environmental Studies)

Van Le (Mathematics)

Soha Munir (Psychology)

Alea Rodriguez (Biology)

Sigma Xi, the Scientific Research Honor Society, was founded in 1886 to "honor excellence in scientific research and encourage a sense of companionship and cooperation among researchers in all fields of science and engineering." Membership in Sigma Xi is "by invitation, and is not limited by the possession of any specific degree." Candidates for Associate Membership must have "conducted independent investigation and written a report concerning their research...in a field of pure or applied science." Members of the Hollins Chapter of Sigma Xi have all conducted an independent research project in a setting that is outside of a course-embedded experience and were nominated for membership by a faculty member in Biology, Chemistry, Environmental Science or Studies, Mathematics, Physics, or Psychology

KEYNOTE ADDRESS

The Science of Bias: Implicit Attitude Formation, Change, & Impact

Dr. Michael Olson

University of Tennessee

7:30 – 8:45 p.m.

SCIENCE SEMINAR KEYNOTE

Dr. Michael Olson



THE SCIENCE OF BIAS: IMPLICIT ATTITUDE FORMATION, CHANGE, & IMPACT

Michael Olson's research at the University of Tennessee centers on implicit bias, measures of implicit cognition, prejudice reduction, and intergroup relations. More broadly, he applies a dual-process approach to a variety of domains, including prejudice correction, close relationships, sexual aggression, and, most recently, suicide. He has served as associate editor of Personality and Social Psychology Bulletin and The Journal of Experimental Social Psychology. He is currently completing a textbook on the Psychology of Prejudice.



Research Poster
Session
FRIDAY April 14th
1:30-3:00

Dana Science
Building, 2nd floor

Biology

Foraging patterns of juvenile and sub-adult green turtles (*Chelonia mydas*) in sea grass meadows dominated by an invasive seagrass

Ellie Song¹, Zoë Jordan¹, Kaylin Wallen¹, and Caleb Amstutz

¹ Hollins University

Under the direction of Dr. Renee Godard

The introduction of *Halophila stipulacea*, an invasive sea grass species, has impacted grass bed composition in the Caribbean, reducing the presence of the native turtle grass, *Thalassia testudinum*. These changes in grass bed composition could have impacts on grazers such as *Chelonia mydas*, green turtles, who in turn could modulate grass bed structure through their foraging behavior. In June 2022, we sampled the composition of grass beds and foraging sites of green turtles in five bays (Francis, Maho, Salt Pond, Great Lameshur and Waterlemon) located on St. John (U.S. V.I.). Photo transects taken across each grass bed were compared to the exact foraging locations of all juvenile and sub-adult *Chelonia mydas*. While grassbed transects were dominated by *Halophila*, foraging transects had significantly higher abundance of the three native sea grass species. When foraging transects of juvenile turtles were compared to those of the sub-adults, we found that juvenile foraging transects had significantly less turtle grass and significantly more manatee grass than did the sub-adults. In addition, *Halophila* was more common in juvenile turtle transects, though this difference was not significant. Our results are similar to those found in other regions of the Caribbean and could indicate that turtles may act as an agent to increase the abundance of the invasive grass (enemy release hypothesis). However, the differences in foraging choices made by juvenile and sub-adult turtles is intriguing and may indicate the potential for juvenile turtles to acquire a taste for the non-native invader.

Two years in the life of an invader:

Halophila stipulacea Increases in Abundance only in Grassbeds Transects

Kaylin Wallen¹, Zoë Jordan¹, Ellie Song¹, and Caleb Amstutz

¹ Hollins University

Under the direction of Dr. Renee Godard

An invasive sea grass species, *Halophila stipulacea*, was introduced to the Caribbean in 2002 and first appeared in St John (STJ), USVI in 2010. To understand the invasion dynamics of this species, five bays in STJ were sampled with 25 cm² photo transects across each bay (grassbed transects) in January 2020 and again in June 2022. In addition, photo transects were taken at the exact foraging locations of green turtles *Chelonia mydas* in both years. Individual grass blades were identified and counted in each of the photo transects separately by 3 individuals and an average abundance of each species was calculated per transect over both years. *Halophila stipulacea* showed a significant increase in grassbed transects between 2020 and 2022. While an increase in *H. stipulacea* was noted in foraging transects, this increase was not significant. However, there was an increase noted in the abundance of turtle grass (*Thalassia testudinum*) in turtle foraging transect sites between the two years. *H. stipulacea* increased in abundance in grassbed transects in all 5 bays sampled but only increased in foraging transects in one bay. It appears that *H. stipulacea* has been increasing in abundance in St. John and that the foraging preferences of turtles may act as an agent for the increase in the non-native species.

Biology

Changes in the American Toad Microbiome During Development

Olivia K. Sacci

HU-SURF Research Internship

Under the direction of Drs. Korin R. Jones & Lisa K. Belden

Virginia Tech Department of Biological Sciences

The microbiome (the collection of microbes and their genes that reside in or on hosts) can have both positive and negative impacts on overall host health. For instance, in amphibians, the skin bacterial community can reduce pathogen infection. Adding beneficial bacteria to these bacterial communities could protect amphibians from potentially lethal infections, but knowing when to apply beneficial bacteria during development to achieve positive health outcomes remains unknown. The first step is to understand normal changes in the microbiome that occur over the typical complex life cycle of amphibians: embryos, tadpoles, juveniles, adults. In this study, we surveyed the whole-body microbiome of American toads (*Anaxyrus americanus*) during embryo, tadpole, and juvenile (recently metamorphosed) stages. For ten samples at each stage, whole-body bacterial communities were investigated using 16S rRNA gene amplicon sequencing. Understanding these developmental changes can have important practical implications for amphibian conservation. The findings suggest that the presence and absence of bacteria species and their relative abundances shift over development. Species richness was found to be higher in tadpoles than eggs or metamorphs while no significant difference was found between metamorphs and eggs. Significant differences in phylogenetic diversity and effective number of species were found across all stages.

People's Knowledge and Perceptions of Wild Horses and Their Management

A. Jasmin Lopez Bautista, Mallory E. Francis, Gabriella G. Goshtigian, Katharine M. Kleinberg, Karina J. Moreno

Under the direction of Drs. Elizabeth R. Gleim & Meg du Bray (University of Northern Colorado, Greeley)

Wild horses are frequently viewed as icons of the American West and their management is frequently steeped in controversy. However, managers face incredible challenges as they are charged to manage 62,398 wild horses in "off-range," government-managed corrals and pastures and an additional 82,384 free-roaming wild horses in the U.S. on lands that aren't meant to support more than 27,000 wild horses. The purpose of this research was to assess people's knowledge and perceptions of wild horses and wild horse management. A survey was developed and distributed to students, faculty, and staff at Hollins University. Ultimately, 124 people took the survey, of which 61.3% were students and 38.7% were faculty or staff. Eighty-two percent of respondents felt that wild horses should be managed and 17.6% felt that they should not be managed. Fertility control and humane euthanization of sick and dying horses were viewed as the most effective and most supported management methods. When asked where they get most of their information on wild horses, 21.2% of respondents said social media and only 7.1% and 6.2% got the majority of their information from government websites and peer-reviewed literature, respectively. Collectively, this data could be used to help managers better understand people's knowledge and perceptions of wild horses and their management and develop data-based strategies to enhance understanding and support of effective wild horse management strategies.

Biology

Inside and Out:

Analyzing the Effects of the East Harbour Lobster and Conch Reserve (TCI) on Population Metrics of the Queen Conch (*Aliger gigas*)

Hope Milo¹, Maxwell Lutz², Syed Sharique Ahmed³, Bryn Copenhaver⁴

¹ Hollins University, milohm@hollins.edu; ² Clark University, mlutz@clarku.edu; ³ Ohio Wesleyan University, ssahmed@owu.edu; ⁴ University of North Carolina at Chapel Hill, bryncope@email.unc.edu

Under the direction of Dr. Kassie Dudek, School for Field Studies, Turks and Caicos

Anthropogenic disturbances of marine systems are varied and ubiquitous, eliciting in extreme cases acute and rapid declines of certain marine species. To slow the degradation of these marine habitats and species, Marine Protected Areas (MPAs) were conceived of and established across the globe with the intent to lessen the impact of these anthropogenic disturbances. However, management and enforcement of MPAs can be lacking, which may result in MPAs not functioning as well as intended. The MPA featured in this study is the East Harbor Lobster and Conch Reserve (EHLCR) in South Caicos, TCI, which was established in 1993 to stymie the rapid population decline of the economically important species Caribbean Spiny Lobsters (*Panulirus argus*) and Queen Conch (*Aliger gigas*), due to overfishing. In this oral presentation, the effects – or lack thereof - of the East Harbor Lobster and Conch Reserve on Queen Conch populations in South Caicos will be discussed, with the hope of bringing more awareness to the flaws of modern marine conservation strategies.

Revealing Subclinical Sodium Channelopathies in an *In Vivo* Mouse Model Using Osmotic Manipulation

Rowan Abshire Sims^{1,2}, Chandra Bain², Dr. Steven Poelzing²

¹, Hollins University, Roanoke, VA; ², Fralin Biomedical Research Institute at VTC, Roanoke, VA

Brugada Syndrome is a rare cardiac disease that leads to an increased risk of sudden cardiac death due to arrhythmias as a result of reduced sodium current due to mutations in genes such as SCN1B. Contemporary mouse models are criticized for their inability to produce an *in vivo* ECG phenotype consistent with human clinical presentation. Importantly, the same *ex vivo* mouse models can produce the human phenocopy when isolated edema is induced in hearts with the clinically relevant blood volume expander mannitol. Therefore, the purpose of this study is to test the hypothesis that sodium channel loss of function can be unmasked *in vivo* by the infusion of hyperosmotic solutions in mouse. Mice of both sexes heterozygous null for SCN1B (n=11, 20-30 weeks old) were retro-orbitally injected with 0.9% NaCl solution or 26.1 mg/mL mannitol dissolved in 0.9% NaCl solution. The ECG was measured in awake and ambulatory animals with the non-invasive ECGenie. The QRS duration, a measure of ventricular conduction, was significantly prolonged by 14.2% in heterozygous SCN1B mice after treatment with the osmotic agent mannitol compared to a non-significant 2.3% in the QRS duration of wild-type littermates. QTc significantly increased by 12.6% in the heterozygous SCN1B mice compared to a non-significant 2.3% increase in the QTc interval of the wild-type littermates. The change in QTc was not significantly different from the change in QRS duration in the SCN1B heterozygous mice, suggesting that the QTc prolongation was a result of slowed ventricular conduction manifest as a prolonged QRS duration. Importantly, the clinically relevant osmotic agent mannitol can be used in mice *in vivo* to unmask a human phenocopy of sodium channel loss of function, and mannitol challenge may be a novel clinical challenge to unmask the Brugada Syndrome early in disease progression when some patients lack a diagnostic ECG. The corollary conclusion is that preventing cardiac edema could be a novel therapeutic strategy to reduce arrhythmias in patients with sodium channel loss of function.

Chemistry

Synthesis and Characterization of Fullerene-Functionalized Metal Chalcogenide Nanosheets

Malaika Amin

Under the direction of Dr. Brian J. Reeves

Bulk heterojunction solar cells composed of fullerene electron acceptors and polymer electron donors are the current leaders in the area of flexible and transparent solar cells. The solubility of these components enables low-cost production of thin, transparent films but render low efficiency. Metal chalcogenide nanosheets, such as CdS, CdSe, and ZnS, represent potential solutions to the problem. Although these materials are difficult to process because of their low solubility, it is hypothesized that chemically bonding fullerenes to CdX (X= S, Se, or Te) nanosheets will improve nanosheet stability and solubility while maintaining flexibility and transparency, allowing them to be used as a new electron transport material to make efficient, flexible, and transparent solar cells. The synthesis and preliminary characterization of N-boc protected nanosheets as precursors to fullerene-functionalized nanosheets is presented here.

The Study of Chemical Compounds in the Mainstream Smoke of Herbal Cigarettes

Uyen Thanh Nguyen

Under the direction of Dr. Son Hong Nguyen

Herbal cigarettes are nicotine-free and made from a blend of several herbs rather than tobacco. Due to its nature, herbal cigarettes can be sold legally to smokers of any age and gaining popularity as a non-smoking aid. However, research on herbal cigarettes is limited and leads to a vast majority of people still believing that herbal cigarettes are less harmful than regular cigarettes. This study could broaden the knowledge about herbal cigarettes and its side effects compared to regular cigarettes by analyzing compounds of both cigarettes before and after combustion in the mainstream smoke using IR and Mass Spectrometry. The result of the study will better inform the choices of cigarette consumers, especially the youth, on their action and its effects on their lives.

Stereoselective Glycosylation *via* Dynamic Kinetic Resolution

Tram Nguyen, Ashree Bhatta, Cristina Pokhrel, and Aqsa Fazal

Under the direction of Dr. Son Hong Nguyen

Abstract: One of the most significant challenges in the construction of carbohydrate libraries is controlling the stereoselectivity of newly formed glycosidic linkage. Although a number of impressive advances in this field have been made over the last few decades, some methods achieve high stereoselectivity but very modern yield and vice versa. The central theme of this work is to develop a new method to achieve highly stereoselective glycosylation products starting from a mixture of two enantiomers via dynamic kinetic resolution. We aim to apply our method for the construction of libraries of stereo-defined glycoconjugates. Moreover, mechanistic studies of our method will provide valuable insights into the factors which determine stereocontrol in glycosylation reactions.

Chemistry

Synthesis and evaluation of rhodamine- and biotin- probes for detection of cysteine-containing proteins

Nupur Sehgal*, Megan K. Brown*,

Under the direction of Dr. Son Hong Nguyen

* These two authors contribute equally to the work.

Abstract: With cysteine-containing proteins playing an important role in most biological processes, the detection and imaging of Cysteine proteins have been of great interest. Here, we present the synthesis and evaluation of two maleimide probes, Rhodamine and Biotin, designed for the detection of Cys-rich proteins. In this design, we postulate that maleimide protein's alkene substituent would react with the thiol group of the Cysteine to form a covalent bond at a certain pH in the presence of a reducing agent. From this bond, we propose that we would be able to detect Cys-rich proteins and qualitatively and quantitatively analyze the Cysteine concentrations. This methodology provides a way to identify the specific Cys-rich proteins to further explore their roles and activities in related diseases.

On Efforts to Prepare *cis*-Re₂(O₂CCH₃)₂X₂(dppmR)₂ (R = CN or CH₃) Talibah R. Beckwith, Madison E. McIntosh, Elizabeth M. Olech

Under the direction of Dr. Daniel R. Derringer

Dirhenium(II) complexes that contain two bridging Ph₂PCH₂PPh₂ (dppm) ligands are known to adopt one of three possible configurations. Characterization of these complexes by H-1 NMR spectroscopy has revealed that the chemical shifts of certain hydrogen atom are configuration dependent. To our knowledge, no one has explained this dependence. Here we summarize our efforts to put an explanation within our reach. To get to this point, a complex of the type *cis*-Re₂(O₂CCH₃)₂X₂(dppmR)₂ (where X is Cl or Br and R is CN or CH₃), must be synthesized, we believe. This report details our accomplishments this year. It includes a summary of the reactions that were carried out and the characterizations (by cyclic voltammetry and IR and NMR spectroscopy) that were done.

Environmental Studies/Science

Feeders and Flowers: A comparison of hummingbird activity at artificial feeders and flowers in Ecuador

Sammy Stuhlmiller, Zoey Abram, Breanne Sharp, Kylie Lakin

Under the direction of Dr. Renee Godard

Many tropical plant species depend on hummingbirds as their primary pollinator, and it is thought that competition for this flower nectar has been a driver for hummingbird speciation. The development of ecotourism in many tropical countries has led to increased use of artificial feeders which may alter the feeding rates and thus pollination opportunities for flowering tropical plants. To better understand this, we compared hummingbird activity at artificial feeders and paired flowering plants as well as at more isolated flowering plants in Ecuador. Paired feeder/flower observations were carried out at one ecolodge near Quito (Zaysant Lodge), while isolated flowers were observed in several forested locations. A total of 40 20-minute surveys were collected across a two-week timeframe. We found no significant difference in the number of visits hummingbirds made to paired flowers and feeders. However, hummingbirds were much more likely to visit flowers in areas supplemented with feeders than they were to visit flowering plants in more isolated forested locations. Our results indicate that the presence of artificial feeders does not hinder the ability of flowers to attract hummingbirds but rather may facilitate higher visitation rates than flowers isolated in the wild. In addition, our findings highlight the pollination challenges that flowering plants in forested tropical environments face.

Two Hemispheres, Four Countries: A Global Snapshot on Environment Perspectives

Naomi Gakusi and Jacquelynn Abe

Under the direction of Drs. Renee Godard and Kaila Thorn

A global understanding of people's attitudes and perspectives on environmental issues is of critical importance if we are going to even begin to address some of the world's most pressing environmental problems that have global. To address this, we interviewed adults in Ecuador (N=46), France (N=33), Rwanda (N=20), and United States (N=86) during December 2022 and January 2023 using a survey that asked individuals to identify their top five environmental concerns and to rate the impacts they perceived these issues could have on different constituencies (e.g. their health, their future, future generations, wildlife). Of the 24 environmental issues identified in the survey, several were of concern across all four countries, with over 50% of individuals surveyed in each country selecting the extinction crisis as a top concern. Other top concerns were global warming (particularly in France & US), deforestation (Ecuador, Rwanda), trash (particularly Ecuador), and ocean pollution (not Rwanda). Generally, people perceived that these environmental concerns would have a more significant impact on people in the world and future generations than on themselves or their community. In addition, the youngest cohort (18-24 yo) perceived that environmental issues would have a more significant impact on themselves, future generations, and the natural world than did individuals in the older cohorts (25+).

Environmental Studies/Science

Mammalian Biodiversity in Primary and Secondary Tropical Forests

Jessica Willebeek-LeMair, Abigail Bishop, Selena Wolfe

Under the direction of Dr. Renee Godard

Mammalian diversity and distribution in biologically diverse regions, such as the Ecuadorian Amazon, are important in relation to conservational efforts of the habitat and its inhabitants. To identify the possible importance of Amazonian Rainforest conservation to the survival of certain species of mammals, we investigated whether there was a relationship between mammal species abundance and habitat type (primary and secondary forest). We hypothesized that more felid species would be found in the primary forests and that there would be higher concentrations of smaller mammals belonging to the order Rodentia in the secondary forests. Trail cameras captured images of mammals at three different sites (Sumak, Waska, and Cuchilla) over the course of three months. Our results indicated that maintaining primary forests is crucial in the conservation of several endangered felid species, and conservation of secondary forests is important for maintaining rodent populations.

Characteristics of Understory Vegetation in a Primary and Secondary Tropical Rainforest in Ecuador

Blair Turner

with field assistance from Talibah Beckwith, Megan Pickell, and Chloe Riederich

Under the direction of Dr. Renee Godard

Tropical rainforests are some of the most biodiverse ecosystems in the world and currently face high rates of deforestation. More than 50% of Ecuador is forested with primary (undisturbed by humans), secondary (recovering from human disturbance), and tree plantations. In our study, we sampled understory plants along seven transects in a primary and seven transects in a secondary forest. For 10 plants on each transect, we noted the presence or absence of plant characteristics associated with: 1.) high moisture environments (drip tips, waxy cuticles), 2.) low light conditions (leaf area, leaf fenestration), and 3.) predator reduction (hairy stems, thorns, red/purple undersides, leaf variegation). The prevalence of assessed characteristics did not differ between understory plants in the primary and secondary forests, except that understory plants in the secondary forests were more likely to possess leaves with red/purple pigmentation in the undersurface of their leaves. Common understory plant adaptations were drip tips and waxy cuticles (adaptations to high moisture environments), while adaptations to reduce predation and those to low light conditions were much less common. Our overall goal was to see if understory characteristics changed with a changing forest environment that has more or less of the optimal resources for growth. The data we found from our study leads us to insight on the typical understory plant characteristics in primary and secondary tropical rainforest in Ecuador.

Mathematics/Statistics/Data Science

Predicting the Loan Default using Logistic Regression Model

Sujata Bhandari

Under the direction of Dr. Giancarlo Schrementi

Predicting loan default is an important problem for managing risk at banks. Banks began to emerge as key players in the lending market since industrial revolution and they would use the collateral to minimize their risk. Loan default is an important issue for banks because it can lead to bank's insolvency and can have broader impact on economy. Hence, it is important to manage the risk of loan defaults to promote financial stability and economic growth. Previous studies have been done in this field to predict the probability of loan default using logistic regression, machine learning models and python programming models. This study examines using a logistic regression model in predicting the probability of loan default of customers. A logistic regression is a statistical analysis method to predict a binary outcome, such as yes or no, based on prior observations of a data set. Thus, a logistic regression model is used here because loan default is a binary prediction problem i.e. (a loan is defaulted or not) and logistic regression is commonly used in binary prediction. The dataset is taken from the Kaggle dataset repository, an open dataset platform, and contains a wide assortment of features, half of them being categorical and half being quantitative. The data has highly unbalanced class proportions, as most customers do not default. The methods include exploratory data analysis, data wrangling and cleansing, feature selection, and evaluating the resulting model.

Statistics and Machine Learning: Regression and Forecasting

Anna Doan

Under the direction of Dr. Julie Clark

Statistics and machine learning are two methods for analyzing and modeling data. A dependent variable's relationship to one or more independent variables is described through regression. The forecasting technique is used for predicting future results based on historical data. This study compares two approaches—regression and forecasting—along with statistics and machine learning. Regression and forecasting methods have been explored in numerous studies, but the results vary depending on the problem, the data, and the technology, so it is important to continue investigating regression and forecasting algorithms. We study the statistical model of ordinary least squares (OLS) and the machine learning model of gradient boosting regression (GBR) for the linear regression technique. For forecasting utilizing the Markov chain, we investigate the statistical model of the Autoregressive Integrated Moving Average (ARIMA) and the machine learning model of the Hidden Markov Model (HMM). Although regression and forecasting are applications of both machine learning and statistical models, there are some distinctions in their algorithms and data approaches. The choice between statistics and machine learning will depend on the specific problem, data, and available resources.

Mathematics/Statistics/Data Science

Detecting Small Multi-Set Differences Efficiently for Data Privacy

Anna Doan

Under the direction of Weiqi Chu, University of California, Los Angeles (UCLA)

Advertisers in internet advertising access data about their ad campaigns across devices through secure, privacy-centric environments. To further improve the security protections for these environments, constraints against SQL queries involving multiple sets, or multi-sets, are in place. The purpose of this project is to develop efficient strategies and data structures to better detect multi-set overlaps and differences in order to better protect user privacy when evaluating multi-set queries. In this session, we will show our investigation into algorithms for detecting 3+ set differences. We developed two algorithms: the maximum-ID method and the reduced row echelon form (RREF) linear algebra-based method. The maximum-ID method uses element frequencies, or the number of times an element appears in a set, as a means to detect multi-set differences. The RREF method formulates queries and sets operations as vectors and matrices and converts the detection into a problem of matrix operations. For each method, we put forth theoretical analyses demonstrating privacy violations always caught coupled with experimental results highlighting additional potential use cases.

Social Factors Contributing to Academic Success: A Statistical Analysis

Marella Fernandez

Under the direction of Dr. Giancarlo Schrementi

School dropout and academic failure in higher education has an adverse effect on students and their families, higher education institutions, and society at large. The data collected by higher education institutions on their students provides opportunities to investigate factors that might impact student success. The dataset investigated in this work consists of demographic, socioeconomic, macroeconomic, and academic data on enrollment and academic achievement of students at the conclusion of the first and second semesters. The data is analyzed to determine whether social factors impact their academic success by employing the Chi-Squared Test of Independence. This test determines whether variables are related to each other or independent and assesses if results in data are unexpected or expected. This is accomplished by comparing observed values to theoretically expected values. Educational researchers who wish to compare student academic achievement may benefit from this research. This research can further be applied through various intersectional lenses to determine the magnification/minimization of these factors contributing to the academic success of marginalized communities such as international students.

Mathematics/Statistics/Data Science

The Mathematics behind Quantum Entanglement

Kiran Gautam

Under the direction of Dr. Molly Lynch

The 2022 Nobel Prize in Physics was awarded to three physicists Alain Aspect, John Clauser and Anton Zeilinger for experiments in quantum mechanics that involved the study of a phenomenon known as quantum entanglement. When Albert Einstein found out quantum information had seemingly traveled faster than the speed of light, he believed that the basic foundational principle on which quantum mechanics stood must be flawed and incomplete and he named the phenomena “Spooky action at a distance.” However, the three 2022 Nobel Prize in Physics recipients' combined experiments demonstrated that entanglement, a strange quantum phenomenon in which two widely separated particles appear to share information while having no logical methods of communication, is more than just spooky activity at a distance. Quantum entanglement is a phenomenon where two or more quantum systems become correlated in such a way that the state of each system cannot be described independently of the others, even when they are physically separated by a large distance. This means that if you measure the state of one system, it immediately affects the state of the other, regardless of the distance between them. In this project “The mathematics behind quantum entanglement” we begin by understanding the basics of quantum mechanics and exploring the mathematics used in quantum mechanics. In doing so, we explain how complex numbers and linear algebra play a key role in the description of quantum mechanics. Following that we study the mathematics behind quantum entanglement, which involves something known as the tensor product. Mathematics and physics are highly correlated and intertwined fields, with each providing important insights and tools that help us understand the natural world. Physics relies heavily on mathematical modeling and analysis to formulate theories and laws that explain the behavior of the universe. The goal of this project is to understand quantum entanglement and the math behind it together to gain a deeper understanding of both subjects and how they relate to each other.

Identification of patients with stable coronary artery disease who benefit from ACE inhibitors using Cox mixture model for heterogeneous treatment effects

Van Le

Under the direction of Chirag Nagpal (Ph.D. candidate) and Artur Dubrawski (Ph.D. and faculty),
Auton Lab, School of Computer Science, Carnegie Mellon University

The presence of heterogeneity in response to treatment effect is often excluded in the evaluation process of Randomized Clinical Trials. In this talk, we utilize the existing Deep Cox Mixtures with Heterogeneous Effects (CMHE) model to study the heterogeneous treatment effects in The Prevention of Events with Angiotensin Converting Enzyme Inhibition (PEACE) study. The PEACE primary publication found no benefit of using ACE-Inhibitors in patients with stable coronary disease and reduced left-ventricular function. With the CMHE to subgroup the PEACE trial population based on response to ACE-inhibitors, we identified a patient subgroup whose outcomes could improve with treatment, even though population level on-average analysis shows no desirable effects.

Mathematics/Statistics/Data Science

Game Theory in FIFA World Cup 2014-2022

Van Le

Under the direction of Dr. Molly Lynch

This study focuses on the concepts of mixed strategies in game theory within the football game setting using penalty kicks as the focal point. A penalty kick involves one kicker and one goalkeeper. The kicker must choose which direction (right, left, center) to shoot in order to score a goal, and the goalkeeper must choose which direction to dive (right, left, center) in order to catch the ball. Each makes a choice simultaneously without being aware of the other's decision. Thus, there is a unique mixed-strategy equilibrium with a well-defined strategy system. A goal is scored by the kicker or not (zero-sum structure¹) because the goalkeeper makes a save or the kicker shoots high or wide. Given the availability of historical data, both the kickers and goalkeepers know about the past behaviors or preferred feet of their opponents, respectively. A number of studies have assessed the empirical validity of Nash equilibrium² for the two-person zero-sum game in both experimental and natural settings. This project re-examines one model developed by Chiappori, Levitt, and Groseclose in 2002 which specified a general game in which each player can choose one out of three possible strategies (right, left, center), and then evaluates their proposed assumptions via the payoff matrix (scoring probabilities) using data from recent penalty shootouts in the World Cup games of 2014, 2018, and 2022. We gathered the data by collecting information from live commentators on players' strategies and outcomes. With this data, we tested a new model which specifies a general game in which each player can choose one out of two possible strategies (upper or lower) and then evaluated our proposed assumptions using the payoff matrix. We found that scoring is more likely when kickers successfully place the ball in the upper corner of the net, a tactic that is also known as the "Olympic goal"³. Our data also supports both the assumptions made by Chiappori, Levitt, and Groseclose 2002 and our new model. We conclude that the empirical results of our model could better inform kickers to be more effective especially in the World Cup, the most popular football competition in the world, where the pressure is insurmountable.

Stock Market Regime Detection

Sneha Malakar

Under the direction of Dr. Giancarlo Schrementi

The stock market frequently undergoes behavior modification due to a variety of factors such as changes in economic conditions, monetary policy, government policy, and investor sentiment. Such behavior modifications can be categorized by time periods called market regimes. It is important to detect regime changes to optimize quantitative trading and investment strategies. This research paper uses a Hidden Markov Model (HMM) to identify three main market regimes: bull, bear, and neutral, for the S&P 500 Index. The model infers the underlying regime state based on the visible asset returns data. Using the fact that companies in the index are categorized by the Global Industry Classification Standard (GICS), this paper compares the performance of the information technology and energy sectors in the varying regimes.

Mathematics/Statistics/Data Science

Winner, winner, chicken dinner! Gambling in an ARPG

Fee Myrick

Under the direction of Dr. Emelie Curl

In the video game industry, a recent trend has arisen where, instead of a single upfront cost for a game, games are “free-to-play,” with the company earning money through in-game “microtransactions.” A popular form of these microtransactions is the loot box/gacha systems, where a player purchases lottery trials rather than directly buying a desired item(s). Many articles, such as Mark D. Griffiths “IS THE BUYING OF LOOT BOXES IN VIDEO GAMES A FORM OF GAMBLING OR GAMING?” have compared this to gambling, particularly gambling games traditionally found in casinos, and criticize the lack of regulation on this multibillion-dollar industry. Here we look more in-depth at the statistics of the popular gacha game Genshin Impact while comparing it to two similar forms of traditional gambling: roulette and slot machines. MiHoYo (the company that publishes Genshin Impact) has not been completely explicit when divulging the exact probabilities of success, though they provide some basic numbers and overall probabilities. However, fans within internet subcommunities have found data that differs from what MiHoYo provides. Using a compilation of their own in-game trials, internet communities have found the existence of a hidden system that influences the probabilities of success in Genshin Impact. To test this, we used software such as Maple and Microsoft Excel to create simulations of trials within roulette, slot machines, and Genshin Impact, using probabilities from the publisher as well as user-generated data. We also put a concrete monetary value on successes within the gacha system of Genshin Impact in order to more accurately compare to traditional gambling. After reviewing and displaying this data, if viewed as a form of gambling, the gacha system of Genshin Impact would be one of the few forms of gambling that appear to favor the player rather than “the house.” Despite allowing for “free play” alongside microtransactions, Genshin Impact’s “player-friendly” method successfully subverts the archetypical “predatory casino” while remaining profitable. Thus, publishers have managed to circumvent the traditionally negative casino-player relationship of “the house always wins” while still collecting billions of dollars from players.

Stock Market Prediction Model

Esha Shrestha

Under the direction of Dr. Julie Clark

Stock Market can be a challenging space for those wanting to invest their savings and gain some profit. Hence, it would be helpful if there was any way for the investors to predict the market accurately. Although this would sound next to impossible a few years ago, with today’s technology including artificial intelligence and machine learning, investigating this possibility is worth exploring. We explore the use of machine learning models for US stock market prediction using the S&P 500 Index. Two models Both linear regression and the decision tree models are used to forecast the next day’s closing value of the S&P 500 companies from data from 2010 – 2021. Results from the linear regression and decision tree models are compared against each other and against the 2022 data.

Mathematics/Statistics/Data Science

Implementation of Binomial and Black-Scholes Option Pricing Models in Python to Predict Amazon European Option Premiums

Linh Pham

Under the direction of Dr. Emelie Curl

The Black-Scholes and Binomial option pricing models are two of the most well-known and widely used methods for valuing options in the financial world. There has been previous work to compare these notable valuation methods all of which highlight that one model is not more accurate and even more so that the valuations which these methods produce converge. We aim to confirm these facts for specific and potentially highly profitable contracts. Amazon is one of the world's most valuable and semi-ubiquitous brands. The right to buy and sell stock in Amazon are therefore desirable options. This project focuses on those options and uses the relationship between the Binomial and Black-Scholes Option Pricing models as a conduit to predict these prized derivatives. In this research project, we will apply the Black-Scholes and Binomial option pricing patterns within the Python programming language to price the Amazon European Call/Put options using data provided by Yahoo Finance. We will verify that the generated option prices of both models satisfy the Put-Call Parity Equation, confirm that no arbitrage opportunities exist, and option premiums calculated by the Binomial model approach those of the Black-Scholes model. We further explore the relationship between the two models by comparing their respective option premiums as well as discussing the advantages and disadvantages of either model. Finally, we conclude that because both models in this research project use the same simple formula to calculate the stock's volatility, a future research project would be to further increase both models' accuracy by changing how we model volatility and therefore improve the precision of this prominent financial theory.

Predicting the Stock Prices using ARIMA Model

Abhigya Tamang

Under the direction of Dr. Giancarlo Schrementi

The stock market, a volatile marketplace, has its stock prices determined by the ever-changing demand and supply of stocks. The Efficient Market Hypothesis (EMH) postulates that the prevailing prices of securities are adequately priced and encompass all accessible information in the market, resulting in difficulty to generate returns even with technical and fundamental analyses. However, some investors claim that they can surpass the market in the short run through forecasting methods, such as the Autoregressive Integrated Moving Average (ARIMA) model, which uses historical data to predict future trends based on the assumption that future trends will imitate prior trends. The model has been extensively utilized in predicting demand, particularly in forecasting future demand in the food manufacturing industry, as it provides managers with trustworthy guidance for making supply chain-related decisions. This research intends to employ the ARIMA model to scrutinize and forecast the stock prices of Apple and GameStop, particularly concentrating on discerning the comparative effectiveness of the model for the two companies. Apple's history of stable stock prices may render it a more suitable candidate for the ARIMA model than GameStop. This study has the potential to provide valuable insights for investors seeking to invest in Apple or GameStop.

Psychology

Time is Money: Using Delay Discounting and Reflection to Improve Decision Making in the Iowa Gambling Task

Soha Munir

Under the direction of Dr. Alex Wooten

With gambling behaviors on the rise, it is crucial to understand what makes one individual more likely than another to develop a gambling disorder. Impaired decision-making has been associated with problematic gambling behaviors, and delay discounting has been related to multiple behaviors such as alcohol use, drug use, and gambling. This study investigates the relationship between delay discounting and performance on the Iowa Gambling Task (IGT), a commonly used decision-making task in the field of psychology. Delay discounting refers to the tendency to devalue rewards as the delay in receiving them increases. The hypothesis is that individuals who exhibit high levels of delay discounting may be more likely to perform poorly on the IGT, which requires participants to make decisions based on long-term outcomes rather than immediate rewards. However, studies have observed reflective feedback can improve decision-making. The participants were assessed for delay discounting using a standard questionnaire and then performed the IGT with or without reflective feedback. The results of the study will be presented to see if those with higher levels of delay discounting will exhibit poorer performance on the IGT. This study highlights the importance of cognitive operations and feedback during complex tasks such as the IGT.

Investigation of the impact of Latine ethnicity on substance use self-stigma

Yareli Sosa Antunez, Emma Davis, Olivia Hawkins

Under the direction of Dr. Caroline E. Mann

Self-stigma is a form of internal stigmatization, which can deter people with mental illness from seeking treatment. While previous research explored levels of self-stigma among individuals with substance use issues, few studies have examined the impact of ethnicity on self-stigma. More research is needed on self-stigma in Latines who use substances in order to understand stigma's interaction with socio-cultural and individual factors. For the present study, the Simple Screening Instrument for Substance Abuse and the SASSS (Luoma et al., 2012), SSMIS-SF (Corrigan et al., 2012), and Internalized Stigma Scale (Link et al., 2015) were translated into Spanish and administered to 22 participants at an outpatient substance abuse facility. Results will compare participants' levels of self-stigma with scores from previous research. We will also examine relationships between substance use symptoms and components of stigma (i.e. shame, avoidance).

Psychology

Effects of Microaggressions and Self-efficacy on Academic Motivation of Ethnic Minorities


Isadora Farias Lopes de Queiroz

Under the direction of Dr. Alex Wooten

The purpose of this study was to better understand the effects of microaggressions on the self-efficacy of ethnic minority students and how that impacts their motivation. This can help researchers identify ways in which states and counties can work to enhance motivation in underrepresented ethnic individuals from any educational level through interventions that work with aiding self-efficacy beliefs or target micro-aggressions and its impacts. This study surveyed a sample of varying backgrounds to assess the correlation between amount of microaggressions experienced, self-efficacy beliefs, and academic motivation.

“What I love about science is that as you learn, you don’t really get answers. You just get better questions.”

– John Green

The background of the entire page is a photograph of a sunset. The sun is a bright, glowing orb positioned just above the horizon line, which is obscured by the silhouette of a wooden pier. The sky transitions from a deep orange near the horizon to a pale, hazy blue at the top. The water in the foreground is dark and still, reflecting the colors of the sky. The pier's railing, composed of vertical wooden posts, runs across the lower third of the image. In the distance, a few small, dark silhouettes of birds or structures are visible against the bright sky.

Student Biographies 2023

listed by subject area

Biology



Rowan Abshire Sims, class of 2023, is a Biology (B.S.) major with a minor in Public Health. She transferred to Hollins University after graduating from Virginia Western Community College with an Associates Degree in Health Science. While at Hollins, she became a part-time research associate at the Fralin Biomedical Research Institute Center for Vascular and Heart Research under Dr. Steven Poelzing. She is a member of the Alpha Lambda Delta honors society and will soon be the primary author of a scientific manuscript using her research. After graduating from Hollins, she plans to pursue a PhD and a career in biomedical research, specializing in cardiovascular health or infectious diseases.

Mallory Francis, class of 2024, is majoring in Biology (B.S.) with plans to attend veterinary school. During her time at Hollins, she has been a part of the Riding Council, on the Hollins Activity Board formals committee, and a member of SAAC. Since her freshmen year, she has been on the Hollins equestrian team and was named an all-conference ODAC scholar for the 2021-2022 school year. Following graduation, Mallory plans to pursue a Doctor of Veterinary Medicine (DVM) to practice large animal sports medicine.



Gabriella Goshtigian, class of 2026, was raised in sunny Southern California. She is majoring in Psychology. Gabriella was given riding lessons and that was the beginning of a long career in horses. She has competed at some of the most prestigious horse shows including Pennsylvania National Horse Show and Kentucky National Horse Show. Last year she qualified for the Ariat National Adult Medal Final and the Taylor Harris Adult National Medal Final. Here at Hollins she is on the Varsity IHSA Equestrian A team. Gabriella is excited to continue her studies and love for the sport here at Hollins.

Biology



Katharine "Katie" Kleinberg, class of 2025, is a current sophomore studio art and business double major at Hollins University. She is on the equestrian team and works on much of the photography for team social media pages. Katie began riding horses in middle school and has enjoyed taking the biology of the horse class to further her equine knowledge. Katie is a Hollins creative talent scholarship recipient and has been on the dean's list twice during her time at Hollins. She spends her free time taking photos with one of her many film cameras as well as riding horses.

Jasmin Lopez, class of 2026, is a freshman at Hollins University with an intended double major in Business, with a concentration in finance, and Film Production. While growing up in Nelson County, Virginia, a rural area, she has had a variety of experiences with different farm animals has grown to love them all. Here at Hollins, Jasmin is part of the Women's soccer team, HSTA, and has participated in theater productions. After graduation, she plans to either go to graduate school for accounting or open a business in Film Production.



Hope Milo, class of 2023, is a Biology (B.S.) major, whose immense fascination with the natural world began at an early age. They are an avid lover of all animals, though they direct most of that love towards invertebrates, which they find to be underappreciated. During their time at Hollins, they have done research in the Caribbean alongside Drs. Morgan Wilson and Renee Godard and have studied abroad in Turks and Caicos with the School for Field Studies program. Additionally, in sophomore year they composed a review paper on the enigmatic process of gastropod torsion. Post-graduation, they plan on attending graduate school for either Invertebrate Zoology or Marine Biology, and eventually doing research on invertebrate cognition and behavior.

Biology



Karina Moreno, class of 2025, is a creative writing major with a minor in film. Karina serves as senator for UEL club and is one of Gravel's editors. Karina loves to experiment with TV shows and branch out to different genres when it comes to writing, and has directed three short films. In her free time, Karina enjoys walking her dog.

Olivia Sacci, class of 2024, is a Biology (B.S.) major with a Chemistry minor. Since her freshman year, she has served on the Hollins Activity Board, currently holding the position of Performance Arts Chair; she has also had roles on campus such as a Quantitative Reasoning Tutor and the Physics Department work-study. Furthermore, she has pursued various projects pertaining to microbiology at both Hollins University and Virginia Tech. Following graduation, Olivia plans to pursue a Doctor of Veterinary Medicine, specializing in zoological medicine.



Ellie Song, class of 2024, is an English major from Los Angeles, California. She has served as SGA social media coordinator and a member of HAB during her time at Hollins. She relishes bread, cheese, and fruit by the beach and is currently studying abroad in London having a marvelous time.

Kaylin L. Wallen, class of 2025, is a double major Biology (B.A.) and Public Health (B.A.). She grew up in the U.S. Virgin Islands where she fell in love with the ocean and eventually her love for science. She is an ETP Peer Mentor for HU Connect and the President of Carvin Global Specialty House. Additionally, she recently spent her short term in Tours, France to learn French for the first time. After graduation she hopes to continue her education going to a graduate PhD program.



Chemistry



Malaika Amin, class of 2025, is a biology major, on pre-med track. On campus she enjoys working with Hollins Activity Board as a member to plan and organize events that cater to the community. As secretary for the Pre-med/vet society, Malaika enjoys engaging with and coordinating events for fellows who share interest in medicine. Past January term, she worked with the Virginia Family Medicine as an Intern where she gained hands on experience by shadowing, scribing, and providing medical assistance. Malaika is also an active advocate for women's rights, health, and social justice. She spoke at the 2022 Girls Lead Act briefing event for the rights of adolescent women and at Leading EDJ conference 2023 on stressors and mental health challenges faced by BIPOC and international students. She will be serving Hollins community in the coming school year as President class of 2025.

Talibah Beckwith, class of 2023, is majoring in Chemistry (B.S) on the pre-pharmacy track. During her time at Hollins, she has held positions such as the President of the Pre-Medical Society and the Vice President of Carvin International Housing. She was also an active member in clubs such as the chemistry journaling club, anime club, ACCENT, and SEA. Additionally, she spent a short term in Ecuador studying abroad. After graduation, she hopes to use her gap years to gain more experience and to explore further interests in environmental sciences, pharmacology, dermatology, and toxicology.



Ashree Bhatta, class of 2024, is on the three-year track majoring in Chemistry with a minor in Data Science. Along with her academic pursuits, she is actively serving as a Quantitative Reasoning Tutor, and has held positions in the Honor Court, SGA Senate and various clubs around the campus. Last summer, she participated in the Summer Undergraduate Research Program where she gained valuable research experience. This summer, Ashree is preparing to embark on a new opportunity as an intern at Novartis Institutes for Biomedical Research in the Separations Department, where she will work with supercritical liquid chromatography. With her passion for drug discovery and development, Ashree plans to attend graduate school and ultimately pursue a research career in the pharmaceutical industry.

Chemistry

Megan Brown, class of 2023, is a Chemistry major with a minor in Physics and Mathematics. She grew up in Nassau, Bahamas and always had a love for chemistry. During her time at Hollins, she has previously been a part of the Class of 2023 cabinet and is currently an Admissions Ambassador. Additionally, for the past two years she has been the treasurer of Pre-Medical Science Club, the Co-Director of Chemistry Journal Club, and involved in research under the direction of Dr. Nguyen. Following graduation, Megan plans to get a job then attend graduate school in Fall 2024.



Aqsa Fazal, class of 2023, majoring in Chemistry (B.S.) with Biochemistry Concentration and pursuing the Batten Leadership Institute Leadership Certificate. She is the chair of ACCENT (Association of Countries, Cultures, Events, and National Traditions) and Chemistry Department tutor. Aqsa has conducted research in a Biochemistry Lab at VA Tech on determining if the Culex Tertian mosquito species is a vector for ranaviruses, which impacts amphibian populations. She has also done research in the Organic Chemistry Research Lab at Hollins University. After Hollins, Aqsa hopes to pursue a career in healthcare and go to graduate school.

Madison McIntosh, class of 2023, was inspired by her high school AP Biology teacher to pursue her love of the sciences in college. While at Hollins she has served on the Hollins Activity Board in the Novelty Committee and has been a part of the Chemistry Journal Club since her sophomore year. The Chemistry (B.S.) with a concentration in Biochemistry major plans to pursue a Ph.D. in Biochemistry and become a researcher at the National Institutes of Health after departing from Hollins.



Chemistry



Tram Nguyen, class of 2024, is majoring in Chemistry (B.S) with a concentration in Biochemistry concentration. Since her sophomore year, Tram has worked as student researcher in Dr. Nguyen's lab. She also spent last summer as a Summer Undergraduate Research Fellow at Hollins working on developing a new effective methodology to synthesis sugar molecules. After graduation, she plans to attend graduate school for chemistry.

Uyen Thanh Nguyen, class of 2023, is Chemistry (B.S.) major. She is passionate about solving sustainable development problems and her five-year goal is to create a sustainable filter to desalinate seawater and transparent solar panels for green house. At Hollins, she is working on analyzing chemical compounds in the mainstream smoke of herbal cigarettes. After graduation, she plans on attending graduate school at the University of Minnesota for chemical engineering in environmental sustainability.



Elizabeth Olech, Class of 2025, is a Chemistry (B.S.) major. In high school, she was inspired by her AP chemistry teacher to pursue her love of science. During her time at Hollins, she has served as the Mae Jemison President as well as joined the Chemistry Journal Club. Elizabeth plans to minor in Physics and hopes to attend graduate school after graduation.

Chemistry

Cristina Pokhrel, class of 2023 is Chemistry major with Biochemistry concentration (B.S.) and a minor in Data Science. She is from Kathmandu, Nepal. At Hollins, she was a TA for Chemistry 101/102 during her junior year and is currently serving as a Quantitative Reasoning tutor for over a year now. She is also one of the active coordinators of the Chemistry Journal Club and a board member of the Hollins Honor Court. She is very passionate about research and development and wants to build a career in drug development. After graduation, she will be pursuing a PhD in Translational Medicine from Virginia Tech University.



Nupur Sehgal, class of 2023, is majoring in Chemistry (B.S.) with a concentration in Biochemistry and minors in Physics and Psychology. During her time at Hollins, she has participated in research related to biological and analytical chemistry. She carried out her research as a Summer Undergraduate Research Fellow at Hollins University and attended several local and national conferences to present her work. Additionally, she has worked as a Resident Assistant, volunteered as an ISOP mentor, and assisted summer residential science students as a Hollins Summer Community Assistant. Following graduation, Nupur plans to pursue a Doctoral degree (PhD) in Chemistry at the University of Florida.

Environmental Studies/Science



Jacquelyne Abe, class of 2024, is majoring in Public health and Environmental studies. She is currently the president of Colleges for CEDAW, senator of public health club and a Subject Area Tutor in French. Jacquelyne is also a Track and Cross Country team member at Hollins. Additionally, she spent a short term studying with Hollins Abroad in France for a research project. After graduation, Jacquelyne plans to pursue a Master of Science.

Zoey Abram, class of 2026, is an undeclared major. Even at a young age, she has always found joy in being in nature. Rather than going to parks, she would insist on walks on the local nature trails, spending many hours admiring the wildlife. Zoey entered Hollins University in 2022 with the intentions of furthering her education within the STEM field, but still makes time to take in the beauty that nature has to offer. As a first year starting on the biology track, she is making her transition over to the data science major. Unsure exactly of her plans after Hollins, she hopes to continue her education in data science by getting her master's degree.



Abigail Bishop, class of 2025, is majoring in Biology (B.S.) on the pre-veterinary track and plans to minor in chemistry and psychology. She is the Vice President of the Mae Jemison specialty house and the senator for the pre-medical/veterinary society. After Hollins Abigail plans to pursue a doctorate degree in veterinary medicine and dedicate her time to animal rescue and wildlife conservation.

Environmental Studies/Science

Naomi Gakusi, class of 2024, is double majoring in Environmental Studies (B.A.) and Public Health (B.A.). At Hollins, she has served various positions as a Student Success Leader, Vice President for the Public Health Outreach Club, Community Outreach Chair for the Black Student Union, Kingdom Come Community Associate Team Leader, and Student Chaplain. She experienced a J-term in Ecuador, in 2023, conducting research and journeying through the rich culture and biology of the equator. She is passionate about issues interrelated with the natural environment and humans and plans to attend graduate school to pursue a degree in One Health.



Breanne Sharp, class of 2024, is majoring in Biology (B.S.) with a minor in Environmental Studies. During her time at Hollins, Breanne has completed various research. This includes Green Turtle foraging patterns on invasive seagrass, anthropogenic noise impacts on plants and pollinators, and now patterns of hummingbirds in Ecuador. She is a recipient of the Erica Feiste Student Research Award, has served on the Honor Court, and is a member of the Virginia Native Plant Society. During short term of 2023, she went abroad with Hollins to Ecuador. In her free time, she enjoys hiking and fawning over her dog.

Samantha “Sammy” Stuhlmiller, class of 2025, is majoring in Environmental Science (B.S.) and International Studies (B.A.). During her time at Hollins, she has been a member of the cross-country/track team, the Students for Environmental Action Club, and Model United Nations/Model Arab League. She has spent a short term abroad in Ecuador and will continue her studies abroad with the School for Field Studies Chile program in the spring. Sammy intends to pursue further education in climate sciences and geosciences, with the intent of attending graduate school after graduation.



Environmental Studies/Science



Blair Turner, class of 2025, is an Environmental Science (B.S.) major and Economics minor. They have a fascination with plant research and participated in research on the J-Term 2023 Ecuador trip. They plan on furthering their plant studies with an internship at Cornell University summer of 2023. Coinciding to plant research, they are an active member in the Hollins community. Blair participates in the clubs Black Student Union and Students for Environmental Action. In addition, they are an ETP (early transition program) mentor for HU Connect which caters to mentoring first-year BIPOC and low-income communities at Hollins University. Blair plans to go to graduate school for conservation science and work for environmental conservation and justice.

Jessica Willebeek-LeMair, class of 2023, is an Environmental Science student at Hollins University. During her time at Hollins, she has served as a Global Ambassador for the study abroad program and a Senator for Near East Fine Arts. Jessica spent a semester abroad in Tanzania through the School for Field Studies program where she learned wildlife management techniques and designed and conducted an independent research project. She also traveled with a group of students to Ecuador this past January where they conducted research in the Amazon Rainforest. After Jessica graduates later this fall, she plans to use her knowledge and experience to work in environmental education.



Selena Wolfe, Class of 2025, is a Biology (B.S.) and Environmental Science (B.S.) double major. She is a member of the volleyball and basketball teams here at Hollins and she also is the treasurer of the Hollins Repertory Dance Club. Over this past J-term she took a two-week biocultural adventure through varies parts of Ecuador to widen her experience in field work. Following graduation, she wants to continue to get her doctoral degree in Veterinary Medicine to pursue her passion and love for animals and medicine.

Mathematics/Statistics/Data Science



Sujata Bhandari, class of 2023, is a double major in Economics and Mathematics (B.S.) with double concentrations in Data Science and Applied Economics. She is an international student from Nepal and has a keen interest in the field of data analytics. During her time at Hollins University, she consistently earned recognition on the Dean's list, was a member of the Omicron Delta Kappa Honor Society, a Quantitative Reasoning tutor, and honed her skills in data analysis, statistical modeling, and data visualization through various coveted data science internships and personal projects. After graduation she plans to embark on a career as an Analyst.

Anh "Anna" Doan, class of 2023, is a Mathematics major (B.S.) with a concentration in Data Science. She is an international student from Vietnam who aspires to be a data. During her time at Hollins University, she received numerous accolades including being honored with the Claudia W. Belk International Scholar Award and making the Dean's List a number of times. She held various positions including being a Quantitative Reasoning tutor, a Global Ambassador, and a peer mentor for ISOP (International Student Orientation Program); she also participated in various internships including being a Google Data Science Research Intern at UCLA. After graduation, she plans to work as a data analyst for several years before going back to graduate school in order to obtain a doctoral degree focusing on Machine Learning and AI.



Marella Fernandez, class of 2023, is Mathematics major (B.S.) with a concentration in Data Science and a Social Justice Minor. She is an international student from India who aspires to use her mathematics and data analytics expertise to expose and find solutions to problems found within our modern society such as the racial and nationalistic inequity in education. While at Hollins University she volunteered as a Peer Mentor ISOP, served as a Resident Assistant, and an Academic Policy Board chair. She also participated in several fascinating independent studies such as one surrounding mathematics and social justice and internships including a data analyst internship at ProDeal Inc.

Mathematics/Statistics/Data Science



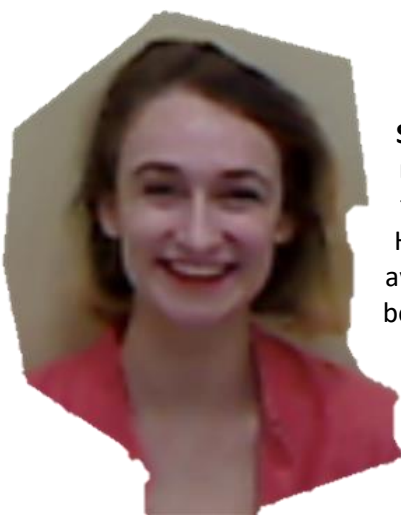
Kiran Gautam, class of 2023, is a double major in Mathematics and Economics (B.S.) with a double concentration in Data Science and Applied Economics. She is an international student from Nepal who is a self-described foodie and also a lover of man's best friend. During her time at Hollins University, she served as one of the CCE (Cultural & Community Engagement) leaders, was a tutor in the Quantitative Reasoning Center, and was able to participate in various internships and student research initiatives including presenting at the 11th Annual Summer Research Symposium at Virginia Tech, serving as a Web Developer for Multicultural College Magazine, being an Investment Management intern at Omega Wealth Management, and being a Data Analysis Intern at YoungInnovations Pvt Ltd. After graduation, she plans to attend the Master of Engineering (M.Eng.) in Computer Engineering with an emphasis in Machine Learning and applications program at Virginia Polytechnic Institute and State University (Virginia Tech).

Van Hai Le, Class of 2023, is a double major in Economics and Mathematics (B.S.) with a double concentration in Applied Economics and Data Science. She is an international student from Vietnam who is as promising a quantitative researcher as she is a friendly and phenomenal student. For the duration of her time at Hollins University, she was honored with numerous distinctions including the Elise Deyerle Lewis Award, the Claudia W. Belk International Scholar Award, and making the Dean's List at various points in time. She also became a member of several honor societies including Phi Beta Kappa, Sigma Xi, and Omicron Delta Kappa, and was able to participate in many internships, research ventures, and appointments at Hollins University including being a Research Scholar at Carnegie Mellon University, an Intern at Wingo NYC, and a Global Ambassador. After graduation, she plans to pursue a Doctor of Philosophy (Ph.D.) in Operations Research at NCSU (North Carolina State University).



Mathematics/Statistics/Data Science

Sneha Malakar, class of 2023, is Mathematics major (B.S.) with a concentration in Data Science. She is an international student from Nepal who strives to be a top Data Analyst at an esteemed corporation. During her time at Hollins University, she made the Dean's list various times, served as a tutor in the Quantitative Reasoning Center, and participated in many prized internships including being a Data Analyst Intern at Hitachi Energy, A Research/Data Management Intern at E2E, and a Data Analyst at Climate Central Inc. After graduation, she wants to work in the field of information technology as a data analyst. She is interested in expanding her horizon in this subject and diving more into machine learning in the near future.



Sophie "Fee" Joyner Myrick, class of 2023, is a Mathematics (B.A.) major. She grew up in South Carolina where she developed a fondness for mathematics and video games. During her time at Hollins University, she took many courses in mathematics, met other avid gamers, and conducted research on the probability and statistics behind gambling and a popular RPG called Genshin Impact.

Linh Thi Thuy Pham, class of 2023, is a Mathematics major (B.S.) with a concentration in Data Science. She is an international student from Vietnam who hopes to put her mathematics and data science prowess to use in the financial world. While at Hollins University, she was a tutor in the Writing Center, and participated in several internships and research programs including being a Large Group Pricing Actuarial Intern at Highmark Inc, a Research Intern at E2E, and conducted research as part of the Polymath Jr. Program. She is also the recipient of numerous awards including being inducted into the Phi Beta Kappa Society, making the Dean's list a number of semesters, and the Claudia W. Bell International Scholar Award. After graduating, she plans to pursue a career in the actuarial sciences and she'll start by studying to pass accreditation exams.



Mathematics/Statistics/Data Science

Esha Shrestha, class of 2023, is a double major in Economics and Mathematics (B.S.) with a double concentration in Applied Economics and Data Science. She is an international student from Nepal with a penchant for movies, hiking, and data analysis. While at Hollins University, she worked at the Quantitative Reasoning Center as a tutor and participated in several dynamic and rewarding internships including being an Asset Management Intern at Silvercrest Asset Management, a Junior Underwriting Intern at AmeriSave Mortgage Corporation, and a Finance Data and Research Analyst at Clean Energy Pipeline. After graduation, she plans to work in the finance industry for a few years before moving on to graduate school in order to obtain either a masters or a doctorate in Economics or Finance.



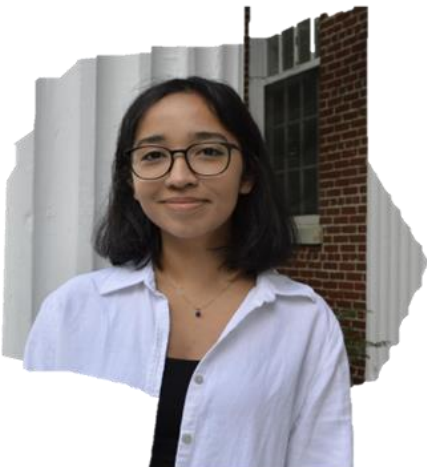
Abhigya Tamang, class of 2023, is a double major in Economics and Mathematics (B.S.) with a double concentration in Applied Economics and Data Science. She is an international student from Nepal who aspires to employ her web development and data analysis skills in the world of economics. While at Hollins University, she held several positions and internships including being a Quantitative Reasoning tutor, the Secretary/Web Developer for Gravel Magazine, an ISOP (International Student Orientation Program) Mentor, and a Research Analyst intern at The Economic Club of New York. She also received many honorable achievements including the Elizabeth Kennedy Chance Award, being recognized on the Dean's List during several semesters, and joining the Omicron Delta Kappa Honor Society. After graduating, she plans to work as an Analyst.

Psychology



Isadora Farias Lopes de Queiroz, class of 2023, is a Psychology (B.A.) major and Public Health minor. During her time at Hollins, she has served in many leadership positions, she was the president and founder of the Public Health Club and the vice-president of the Pre-Medical Society. She has also acted in the Honor Court and the Library Advisory Board. Isadora joined the Applied Memory and Cognition Lab as a research assistant during her junior year and has been a research assistant remotely at the Cognitive Agility and Learning Across the Lifespan Lab at the University of California, Riverside. After graduation, she will attend graduate school to pursue a PhD in Psychology.

Soha Munir, Class of 2023, is a Psychology (B.S) major and Biology minor. During her time at Hollins, she has been on the dean's list and tutored chemistry and research statistics. She has also been working under the guidance of Dr. Wooten since her sophomore year executing research projects studying eyewitness memory, cross-race effect, and decision-making. Soha is passionate about neuroscience and the workings of the brain. She has had research internships at Virginia Tech Carilion, Van Andel Institute in Michigan, and the University of Florida. Her hobbies include painting, hiking, and cooking. Soha will be pursuing a Ph.D. in neuroscience at Virginia Commonwealth University in Richmond post-graduation.



Yareli Sosa Antunez, class of 2023, is majoring in Spanish and Psychology (B.A.) with a concentration in clinical and counseling skills. During her time at Hollins, she has served as a Student Success Leader, FLI mentor, secretary of the Psi Chi honor society, and senator of la Union de estudiantes latines. She has completed multiple community internships. Additionally, she was part of the Hollins Summer undergraduate Research Fellowship 2022 cohort. Following graduation, Yareli plans to work as a research associate of a psychology lab before applying for graduate school.

A 65 Year Legacy Science Seminar Speakers (1957-2023)

1957-58	Dr. Michael Scriven, Swarthmore College
1958-59	Dr. Michael Scriven
1959-60	Dr. Kirtley Mather, Professor Emeritus of Geology, Harvard University
1960-61	Dr. Kirtley Mather
1961-62	No information available
1962-63	Dr. Milton D. Soffer, Professor of Chemistry, Smith College
1963-64	Dr. Henry Margenau, Physics, Yale University
1964-65	Dr. Ernst Nagel, Philosophy of Science, Columbia University
1965-66	Dr. Neil Miller, Psychology, Yale University
1966-67	No science seminar
1967-68	Dr. Andrew de Rocco, Theoretical Physics, University of Maryland
1968-69	Dr. I. J. Goode, Statistics, VPI & SU
1969-70	Dr. Peter Trower, Physics, VPI & SU
1970-71	Dr. John Cairns, Biology, VPI & SU
1971-72	Dr. Henry W. Morgan, Physics, Oak Ridge National Laboratory
1972-73	Dr. James Dumont, Biology, Oak Ridge National Laboratory
1973-74	Dr. Robert E. Lyle, Chemistry, UNH (Visiting Prof. at UVA)
1974-75	Dr. Robert Giles, Wildlife and Forestry Dept., VPI & SU
1975-76	Dr. Derek A. Davenport, Professor of Chemistry, Purdue University
1976-77	Anne Maher Matthews, Hollins '68, Division of Public Health, U. Mass.
1977-78	Dr. Henry W. Morgan, Sr. Chemist, Oak Ridge National Laboratory
1978-79	Drs. Beatrice T. and R. Allen Gardner, Professors of Physiology, U. of Nevada
1979-80	Dr. Mary Beth Hatten, Hollins '72, Asst. Professor of Pharmacology, NYU Medical Center
1980-81	Dr. Alan Goren, Chemistry, VPI & SU
1981-82	Dr. Bolling Farmer, Hollins '70, Sr. Software Engineer, E-System, Dallas, TX
1982-83	Dr. Thomas Williams, Ocean View Veterinary Hospital, Pacific Grove, CA
1983-84	David E. Gushee, Chief, Environmental and Natural Resources Policy Division Congressional Research Service and Senior Specialist in Environmental Policy
1985-86	Dr. Dana Vardeman, Lab Supervisor, Stehlin Foundation for Cancer Research, Dr. R. Lowell Wine, Professor Emeritus, Statistics, Hollins University
1986-87	Dr. Michael Gazzaniga, Dept. of Neurology, NY Hospital, Cornell Medical Center, Southwestern
1987-88	Dr. Philip Tucker, Dept. of Microbiology, University of Texas Medical School
1988-89	Dr. Peter Anthony Cawood, Memorial University of Newfoundland "Continental Drift and the Development of the Appalachian Mountains"
1989-90	Dr. Neil Campbell, Biology, University of California at Riverside "Science Education in the 1990's: An Optimistic Forecast"

1990-91	Dr. Doris Schattschneider, Professor of Mathematics, Moravian College, "Visions of Symmetry: Mathematics in the Art of M.C. Escher"
1991-92	Dr. Derek A. Davenport, Professor of Chemistry, Purdue University "Early Vindication of the Rights of Woman Chemists"
1992-93	Dr. Mary Kay Hemmenway, Dept. of Astronomy, University of Texas-Austin "Results from the Hubble Space Telescope"
1993-94	Dr. Kennan Marsh, Hollins '78, Abbott Labs, Illinois
1994-95	Dr. Elizabeth Brownlee Kolmstetter, Hollins'85, Industrial Psychologist, FBI
1995-96	Dr. Jerry Mohrig, Dept. of Chemistry, Carleton College "Learning and Teaching: What's the Place for Undergraduate Research"
1996-97	Brenda Wilson, Science Editor, National Public Radio
1997-98	Dr. Muriel Lederman, Associate Professor of Biology, Virginia Tech
1998-99	Dr. Jean Chin, MD, Hollins'72, New York, NY "Health Issues of Importance to Young Women (especially STDs)" "Childbirth After Age 35" and "Breast Cancer and Genes"
1999-00	Robert Hansen, Professor Emeritus, Computer Science, Hollins University
2000-01	Dr. Mary D. Ellison, Hollins '76, Dir. of Research, United Network for Organ Sharing
2001-02	Dr. Arlan Mantz, Oakes Ames Professor of Physics, Connecticut College, New London, CT
2002-03	Col. Frank Borman, USAF, Retired "The American Space Program"
2003-04	Dr. David Bressoud, DeWitt Wallace Professor of Mathematics, Macalester College "Proofs and Confirmations: The Story of the Alternating Sign Matrix Conjecture"
2004-05	Dr. Kevin Shinpaugh, Director, Research and Cluster Computing, Virginia Tech "System X: Virginia Tech's SuperComputer"
2005-06	Dr. Bonnie Bowers, Associate Professor of Psychology Dr. Randy Flory, Professor of Psychology, "The Relative Effectiveness of Dim Green Light and Bright White Light for Treating Seasonal Affective Disorder," Dr. Erika Latty, Assistant Professor of Biology, "Comparisons of the Biological Communities in Old-Growth and Previously Logged Forests"
2006-07	Dr. Thomas A. Jenssen, Associate Professor, Department of Biological Sciences, V. Tech "Infanticide in curly-tailed lizards: Selection to avoid eating your young"
2007-08	Dr. Arthur M. Greene, Associate Research Scientist at Columbia University's International Research Institute for Climate and Society, Columbia University "Applied Climate Research at the IRI: Intersection of Climate and Society"
2008-09	Dr. David Mullins, Assistant Professor of Microbiology, Surgery and Human Immune Therapy, University of Virginia "Immune Therapy in the Treatment of Metastatic Melanoma"
2009-10	Dr. Larry Riddle, Professor of Mathematics, Agnes Scott College "Pioneering Women in Mathematics"
2010-11	Dr. Greg Morrisett, Professor of Computer Science, Harvard University, "RoboBees"
2011-12	Dr. David Harrison, Virginia Tech Behavioral Neuroscience Laboratory, "Emotion, the Angry, Hostile and Violent-Prone, A Functional Neural Systems Approach"
2012-13	Dr. Sue A. Tolin, Professor Emerita Virginia Tech, "Viruses and Global Food Security"
2013-14	Dr. Kennan Marsh, Director of Experimental Sciences, AbbVie (Abbott Laboratories), "Neglected Tropical Disease Research: a new model for corporate citizenship"
2014-15	Dr. Per Carlson, Royal Institute of Technology, "Alfred Nobel and the Nobel Prizes"

2015-16	Dr. Linda Powers, Biomedical Engineering graduate faculty at the University of Arizona, "Sensors and Diagnostics for Microbial Health Hazards"
2016-17	Dr. Talitha Washington, tenured Associate Professor of Mathematics at Howard University "How Modeling Can Explain Our World"
2017-18	Dr. Michelle Ferebee, NASA Langley Research Center, "Women of NASA: Past, Present, and Future"
2018-19	Dr. Suzanne E. Dorsey, Assistant Secretary, Maryland Department of the Environment, "Touching Sea Turtles: Research collaboration and leadership in conservation"
2019-20	CANCELLED due to COVID-19.
2020-21	Dr. Susan Campbell, Assistant Professor of Animal and Poultry Sciences at Virginia Tech, "Mechanism of Seizure Development: Switching Roles and Gut Feelings"
2021-22	Dr. Holly Gaff, Professor of Biology at Old Dominion University, "Understanding ticks and tick-borne diseases through surveillance and modeling"
2022-23	Dr. Michael Olson, Professor of Social Psychology, University of Tennessee Knoxville "The Science of Bias: Implicit attitude change and impact."

"We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology."

– Carl Sagan

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