Beloit College Student Research Symposium, April 20, 2023

Moore Lounge, Pearsons Hall

12:05-1:00 Streams Student Forum
Streams are groups of 3-4 courses that explore specific topics and can be combined to create self-designed majors. Come eat pizza and learn about this new curricular idea. We are seeking student input!

Richardson Auditorium, Morse-Ingersoll Hall		
Moderator: Joe Bookman, Media Studies		
9:40	Joe Bookman	Opening remarks
9:45-10:10	Voleak Phan	A Reinterpretation of Cambodian Literature: Tum Teav, Chbab Srey, and Pkar Srorpon
10:10-10:35	Isabella Verdi	Clever Girl: An Ecofeminist Analysis of *Jurassic Park*
Moderator: Shawn Gillen, English		
10:45	Shawn Gillen	Opening remarks
10:50-11:15	Emma Zimmerman	From Walden Pond to Northern Wisconsin: The Necessity of Solitude
11:15-11:40	Sarah (Sawyer) Foley	Transcendentalism and the Cult of True Womanhood Unveiled
11:40-12:05	Eve Henley-Rayve	The Beauty of Death: Emotional Necrophilia in 19th Century Gothic Horror
Moderator: Pablo Toral, Political Science		
1:00	Pablo Toral	Opening remarks
1:05-1:30	Jada Daniel	Moses and the Black Post-Racial Political Promised Land: The Role of Obama in an Anti-Black America
1:30-1:55	Antariksh Sharma	The Dilemma of Integration: Multiculturalism and Assimilation as Trade-offs in Immigration Policy
1:55-2:20	Rafaella Pavarini de Souza	A First Step into the Field of International Relations: *Latin American News Digest* Internship
3:00-3:25	Daniela Padilla	How is Political Theory Relevant in Helping Us Navigate Contemporary U.S. Politics?
3:25-3:50	Edward Verzosa	Does Negative Campaigning Drive Polarization?

Room 150, Sanger Science Center		
Moderator: Ron Watson, Political Science		
9:15	Ron Watson	Opening remarks
9:20-9:45	Maddison Moser	Experiences While Serving Underserved Communities with HealthNet of Rock County: The Path of My Passion for Medical Care and Health
9:45-10:10	Daniel Mrzena	*Next Steps* Towards the Good Society: Transitional Housing and Self-Sufficiency in Rock County
10:10-10:35	Jada Daniel	The Impact of Career Channels on Domestic Minority Students
Moderator: Gana Ndiaye, Anthropology		
10:45	Gana Ndiaye	Opening remarks
10:50-11:15	Jared Saathoff	Making a Home: Mexican Americans in Sterling and Rock Falls, Illinois
11:15-11:40	Syd Clark	Increasing Casual Connections on Sidewalks: Micqanaqa'n as Case Study
11:40-12:05	Mason Hoffman	Creating a Rural Pipeline: Outcomes of a Rural-Track Medical Education Program
Moderator: Suzanne Cox, Psychology		
1:00	Suzanne Cox	Opening remarks
1:05-1:30	Lilian Lopez	Music Matching Mood: Music Helps Mental Health during the Pandemic
1:30-1:55	Moon West	The Impact of Disability Status on a Social Justice Mindset
1:55-2:20	Dakota Thompson	Perceptions and Utilization of Mental Health Services by Beloit College Students
Moderator: Brian Morello, CELEB		
2:30	Brian Morello	Opening remarks
2:35-3:00	Abhey Singh Guram	Entrepreneurial Learning: Cooking Your Way through College
3:00-3:25	Eric Seo, Sydney Felhofer, Joshua Laue, Aleksander Mytko	Make 48: Lessons Learned From 48 Hours of Innovation
3:25-3:50	Nico Doret, Eric Schilling, Rafaella Pavarini de Souza	MakerLab: Exploring Beloit College's Makerspace

Room 249, Sanger Science Center		
Moderator: Taylor Arhar, Chemistry		
9:15	Taylor Arhar	Opening remarks
9:20-9:45	Tyler Hoover	Attempting To Isolate Antibiotic Compounds From Soil Bacteria
9:45-10:10	Rose Loos-Austin	Expression of the *E. coli* Chaperone Protein CbpA
10:10-10:35	Cyrus Habas	Pannexin 1 channel silencing by DHHC protein acyltransferase
Moderator: Rachel Bergstrom, Biology		
10:45	Rachel Bergstrom	Opening remarks
10:50-11:15	Animesh Adhikary	Diet selection and overlap between four diurnal lemurs species in Analamazaotra Reserve, Eastern Madagascar
11:15-11:40	Dakota Thompson	Single Nucleotide Polymorphisms in Relation to Sex
11:40-12:05	Mikaila Davis, Emmalynn May	Beloit College Urban Forest Plan
Moderator: James Rougvie, Geology		
1:00	James Rougvie	Opening remarks
1:05-1:30	Emmalynn May	Predator Prey Relationships in the Beloit College La Brea Tar Pits Collection
1:30-1:55	Sam Hall	Electron Backscatter Diffraction Evidence of Interface-Coupled Dissolution-Precipitation in K Feldspars
1:55-2:20	Ryan Deany	The impact of long-term manure application on potentially mineralizable nitrogen in North Carolina soils
Moderator: Eyad Haj Said, Mathematics and Computer Science		
2:30	Eyad Haj Said	Opening remarks
2:35-3:00	Keeler Tardiff	Coefficients of Static and Kinetic Friction in Rotational Mechanics.
3:00-3:25	Mohammad Tanzil Idrisi	Enhancing Brain Tumor Segmentation with Modified 3D U-Net Model
3:25-3:50	Lifeng Wang	A Machine Learning Study of Climate Change in North America

Room 349, Sanger Science Center		
Moderator: Mehmet Dik, Mathematics and Computer Science		
9:15	Mehmet Dik	Opening remarks
9:20-9:45	Sadeen Alsabbagh	Navigation Tool Using Prolog: Theory
9:45-10:10	Abhishek Shekhar	Navigation Tool Using Prolog: Applications
10:10-10:35	Iftesham Rahman Sami	Fundamentals of Human Computer Interaction
Moderator: Katherine Harris, Mathematics and Computer Science		
10:45	Katherine Harris	Opening remarks
10:50-11:15	Hoang Pham	Applying PID Control to Assist People in Rehabilitation
11:15-11:40	Mohammad Tanzil Idrisi	Improved Medical Image Segmentation with Pooling Convolutional Capsule Network for Small Datasets
11:40-12:05	Nicolò Petroccione	Latin Squares, Cyclic Groups and Quiltdokus
Moderator: Ben Stucky, Mathematics and Computer Science		
1:00	Ben Stucky	Opening remarks
1:05-1:30	My (Miley) Le	Adaptive E-Learning System and Its Effect on the Performance of Chinese K–12 Students
1:30-1:55	River Pham	The Art of Data Analysis and Interpretation within a College Context
1:55-2:20	Hasti Hairy	Limited Representation in Clinical Research: An Empirical and Ethical Evaluation

Room 402, Sanger Science Center		
Moderator: Toby Altman, English		
1:00	Toby Altman	Opening remarks
1:05-1:30	Marcus Studinski	Ben Jonson and the Epictetian Debt: Philosophical Influences and their Modern Implications
1:30-1:55	Fiona Hughes	Variations of Misogyny in William Shakespeare's *The Tempest* and Aimé Césaire's *A Tempest*
1:55-2:20	Qiongyi Feng	Female Friendship as Supportive or Destructive Power: A Comparative Study between Leo Tolstoy and Kate Chopin
Moderator: Francesca Abbate, Critical Identity Studies		
2:30	Francesca Abbate	Opening remarks
2:35-3:00	Jaida Wesley	The Path of a Restless Mind
3:00-3:50	Harriet Estelle Rose	Geography of the Page: The Linguistically Innovative Poetry of Lorine Niedecker and Anthony Barnett (Reading and Workshop)

Abstracts

Sponsor: Joseph Derosier
Alida Hasiniaina (SIT)

Room 249, Sanger Science Center, 10:50-11:15

Animesh Adhikary '23

Pune, India

Major: Biology
Minors: Anthropology; French

Diet selection and overlap between four diurnal lemurs species in Analamazaotra Reserve, Eastern Madagascar

Studying primate diets is fundamental to understanding their behavior and ecology. Lemurs in Madagascar face dietary competition with sympatric species that share their habitat. This research focuses on diet selection and comparisons between 4 diurnal lemur species (*Indri indri, Propithecus diadema, Hapalemur griseus, Eulemur fulvus*) in the Analamazaotra Reserve in Eastern Madagascar, between November and December 2022. Each day, one single lemur group was followed and their diets were identified. Dietary overlaps were calculated for each species. *I. indri* had the smallest dietary range and shared 50% of its dietary items with *E. fulvus* and *P. diadema*. *E. fulvus* and *P. diadema* had approximately equal amounts of overlapping diets. *I. indri* and *H. griseus* were found to have no shared diets between them. *P. diadema* was found to have a significantly different diversity of plants consumed daily compared to *I. indri* (p=0.004, Df=17) and *H. griseus* (p=0.002, Df=17). The other species did not show significant differences amongst each other. Dietary data on lemurs can be used to develop conservation strategies for endangered and critically endangered species.

Sponsor: Mehmet Dik

Room 349, Sanger Science Center, 9:20-9:45

Sadeen Alsabbagh '24

Amman, Jordan

Major: Computer Science, Data Science

Navigation Tool Using Prolog: Theory

Our project focuses on developing a program that utilizes Prolog, a logic programming language, to provide navigational assistance by determining the user's current location. Prolog is a unique programming language that enables the representation of knowledge and reasoning based on rules and facts. We will explore various aspects of Prolog programming such as mapping, location alignment, and solving navigation problems using facts and rules, leveraging the benefits of a logic programming language. Additionally, we will discuss data types and objects within Prolog to ensure a comprehensive understanding of its functionality. Prolog has the potential to solve complex problems that require logical reasoning and advanced decision-making. Ultimately, this project has the potential to benefit a wide range of users by providing them with a navigational tool that employs the latest advancements in programming language integration and logic programming.

Sponsor: Pablo Toral

Room 150, Sanger Science Center, 11:15-11:40

Syd Clark '23

Ventura, California

Majors: Environmental Justice & Citizenship; International Relations
Minor: Critical Identity Studies

Increasing Casual Connections on Sidewalks: Micqanaqa'n as Case Study

This paper conducts a theoretical exercise to prepare possible interventions that could encourage casual encounters between organisms on sidewalks. By examining the role sidewalks play in illustrating the character of a city, we can evaluate the power they hold to spark equitable change and build community. Sidewalks offer a glimpse into a city's methods for acknowledging its legacies of colonialism, managing the effects of trauma and care for vulnerable populations, and framing mobility.

A block in the ancestral territory of the Coastal Chumash known as Micqanaqa'n (also labeled the Mission Historic District in Ventura, CA) is used as a case study. Possible interventions are determined by incorporating evidence from the author's own upbringing, field notes, interviews, and research on historic and contemporary Chumash values.

The lack of engagement with the Mission Historic District from local actors and tourists reflects the way Ventura regards its own history, vulnerable populations, and pedestrians. Interventions utilizing insurgent and tactical urbanism guided by Chumash values have the potential to disrupt the narrative of degradation and danger that the block has carried for decades. These interventions could draw various organisms to the block, increase attendance at the museums which contain historical information about Chumash life, and could create spaces where contemporary Chumash individuals are centered.

While this theoretical exercise investigates a problem within urban planning, it is important to note that infrastructural changes are done collaboratively with multiple actors. This paper was written by one person for the purpose of the author to examine their own path dependency and limitations in generating a proposal for community stakeholders. Clark is a settler/scholar and the interventions proposed in this paper are guided by Indigenous voices available through research which does not replace speaking with and listening to the Chumash community in person.

Sponsor: Emily Sager

Room 150, Sanger Science Center, 10:10-10:35

Jada Daniel '23

Chicago, Illinois

Majors: Political Science; Sociology; Critical Identity Studies

The Impact of Career Channels on Domestic Minority Students

In this research project, we assess the impacts of Career Channels on the class of 2025 with a particular focus on domestic minority student groups. We anticipate that Career Channels will positively impact students' outcomes, especially within domestic minority student demographic groups, because it exposes students to career exploration and experiential learning early in their education. We posit that the awareness and understanding of Integrated Learning Outcomes, utilization of Career Channels, and the employment of ILOs in class or on campus are predictors of students' participation in high-impact practices in the near future. Our overarching question is: What effect does Career Channels have on student retention and students' participation in high impact practices/out-of-classroom experiences such as job shadowing, internships, research, campus employment, study abroad, and volunteering, particularly within the domestic minority student demographic groups? Since the Class of 2025 is the second student cohort that will fully experience the Career Channels program, this project will build our capacity for outcomes assessment into the program's foundation as it relates to the retention and engagement in high-impact practices of domestic minority students.

Sponsor: Rongal Watson

Richardson Auditorium, Morse-Ingersoll Hall, 1:05-1:30

Jada Daniel '23

Chicago, Illinois

Majors: Political Science; Sociology; Critical Identity Studies

Moses and the Black Post-Racial Political Promised Land: The Role of Obama in an Anti-Black America

“I’m not the president of Black America. I’m the president of the United States of America…” (Obama, 2012) Sounds of exhales and cries of “We shall overcome” echoed throughout Black America as the first Black American was elected to the highest office in the United States of America. Barack Hussein Obama became a pillar of hope and a symbol of progress. A prophet of a post-racial milieu, he was believed to lead Black Americans into a political promise land. Instead, the Black community became socio-politically hypervisible more than they ever have as the pervasiveness of anti-Black racism continued to be entrenched in American political institutions and public sentiments. Existing scholarship finds that the election of Black politicians such as Barack Obama galvanized support and significant Black political engagement. Using theories of Linked Fate, Post-Racialism, Great Replacement, and Anti-Black Affect, I hypothesize that the nomination and election of Barack Obama activated racial animus towards the Black community by White constituents, which catalyzed a surge in single-bias, anti-Black hate crimes.

To understand whether the election of Barack Obama activated or mitigated anti-Black racial animus, I will conduct an in-depth quantitative analysis of the American National Election Studies’ thermometer rating surveys as well as the Federal Bureau of Investigation’s hate crime data from the Bush administration to the Trump administration, while evaluating the Obama administration in particular. I anticipate empirical evidence will demonstrate a significant uptake in anti-Black hate crimes over time as thermometer survey attitudes against Black Americans intensify and Barack Obama is elected to office.

This project will provide foundations for scholarship on political behavior in bi-racial presidential elections and Barack Obama’s role in an anti-Black America.

Sponsor: Yaffa Grossman

Room 249, Sanger Science Center, 11:40-12:05

Mikaila Davis '23

Gig Harbor, Washington

Majors: Environmental Geology; Biology

Emmalynn May '23

Frederick, Maryland

Majors: Geology; Environment Biology
Minor: Studio art

Beloit College Urban Forest Plan

The Beloit College Urban Forest consists of a wide variety of trees of different species, ages, and condition. Prior to this project, the last formal documentation of the trees found on Beloit College campus was completed in the late 1990s. However, no care plan was created and the state of many trees on campus remains unclear. Over the last three semesters the trees on campus were surveyed and compiled into a map created by Mikaila Davis and a Tree Policy Plan created by Emmalynn May. This map and policy will serve as guides to the Beloit College campus, facilities, and grounds departments.

Sponsor: James Rougvie

Room 249, Sanger Science Center, 1:55-2:20

Ryan Deany '23

Mackinaw, Illinois

Major: Environmental Geology

The impact of long-term manure application on potentially mineralizable nitrogen in North Carolina soils

Over application of nitrogen fertilizer can lead to leaching and eutrophication in runoff waters, which can result in negative human health and environmental impacts. Manure, as a sustainable source of nitrogen fertilizer, is readily available in North Carolina due to large numbers of swine, dairy, and poultry farms. The goal of this study was to determine if growers can reduce inorganic nitrogen applied to fields with a history of manure application and to determine if potentially mineralizable nitrogen could be an indicator of

nitrogen needs in manured soils of North Carolina. The research analyzed the amount of potentially mineralizable nitrogen in soils collected from fields across North Carolina with long manure application histories (minimum of 5 years). The research was conducted as an incubation study extracting inorganic nitrogen from soil at various dates over the 28 day incubation period to determine rates of change. Samples were analyzed using a Lachat flow injected colorimeter for concentrations of ammonium and nitrate. The rate of nitrogen mineralization increases rapidly over the first week of incubation. The final 3 weeks show a more gradual increase in nitrogen mineralization. The nitrogen mineralized over the course of 28 days is enough nitrogen to supply at least 60% of the economically optimal nitrogen available for crop uptake. Additionally, no statistical difference appeared between manure types used for fertilization.

Sponsor: Brian Morello

Room 150, Sanger Science Center, 3:25-3:50

Nico Doret '24

Illinois

Major: Media Studies
Minor: Spanish Language and Culture

Eric Schilling '23

Petaluma, California

Major: Physics
Minor: Environmental Studies

Rafaella Pavarini de Souza '25

São Paulo, Brazil

Majors: International Relations; Quantitative Economics

MakerLab: Exploring Beloit College's Makerspace

MakerLab is a student organization that empowers students to share skills and explore interests by providing tools and expertise. Our Supervisors maintain a safe learning environment and encourage curiosity, creativity, and collaboration across the Beloit College campus.

During this Symposium presentation, the President, Lab Manager, and Treasurer will present on the responsibilities, challenges, and benefits of maintaining Beloit College's makerspace. This discussion will emphasize MakerLab's goal of networking with, and improving accessibility for, the college's students, clubs, and organizations. MakerLab will utilize this session to collect feedback and ideas from the audience with regards to daily operations, events, and more.

Sponsor: Donna Oliver

Room 402, Sanger Science Center, 1:55-2:20

Qiongyi Feng '23

Chongqing, China

Major: Literary Studies
Minor: Philosophy

Female Friendship as Supportive or Destructive Power: A Comparative Study between Leo Tolstoy and Kate Chopin

While critics have often examined the dynamics of heterosexual liaisons in their approaches to literary works that portray women's adultery, little has been said about the depiction of same-sex bonds or interactions and how they can affect a woman's consciousness of and reflection upon herself in a transgressive erotic relationship. In this presentation, I make a comparison between Leo Tolstoy's *Anna Karenina* and Kate Chopin's *The Awakening*, focusing on the concept of women's friendship and connection. I will delve into how these two works are similar in embedding the female consciousness of the need for social conformity in women's interactions with each other. At the same time, I will explore how Chopin's attempts to depict same-sex affinity and spiritual mentorship are different from Tolstoy's. I will

also emphasize that despite Chopin's effort in diversifying the bonds between women, like Tolstoy, she ultimately fails to prove the power of female friendship as supportive to individuals faced with the loss of self in the misogynistic society they must live in.

Sponsor: Shawn Gillen

Richardson Auditorium, Morse-Ingersoll Hall, 11:15-11:40

Sarah (Sawyer) Foley '24

Loveland, Colorado

Majors: Literary studies; Biology

Transcendentalism and the Cult of True Womanhood Unveiled

Nathaniel Hawthorne (1804-1864), famed American author, was influenced by both Transcendentalism and the Cult of True Womanhood. Transcendentalism involved living a more idealistic, simple, and non-materialistic life in nature, the closest one could be to the divine. Some Transcendentalists and artists moved into intentional communities, which were created so that people could pursue a simple life and work on their own projects without the burden of societal expectations. The Cult of True Womanhood introduced the idea that women were morally superior to men. A True Woman was defined by purity, submissiveness, and domesticity unlike men who were dominant, public figures.

The influence of these ideas on Hawthorne's writing is nowhere more apparent than in his third novel, *The Blithedale Romance* (1852). The novel tells the story of several individuals attempting to live in an intentional community called Blithedale together and how the complex relationships between the characters prevents them from succeeding. It is ambivalent whether Hawthorne supported the Transcendentalist movement or not, but he did have some Transcendentalist peers, such as famous essayists Henry David Thoreau and Ralph Waldo Emerson.

The story is told from the perspective of Miles Coverdale, a bachelor who is moving to Blithedale in an attempt to escape his typically mundane life. The other major characters include Hollingsworth, who has a secret agenda, Priscilla, who seems innocent but has a secret past, and Zenobia, the beautiful but outspoken activist. Priscilla is the epitome of a True Woman, always submitting to Hollingsworth; while Zenobia is her opposite. It is unclear whether Hawthorne supported the Cult of True Womanhood because neither Priscilla or Zenobia necessarily had happy endings. Hawthorne was also associated with Margaret Fuller, a writer and activist who pushed against the ideas of the Cult of True Womanhood.

Sponsor: Brian Morello

Room 150, Sanger Science Center, 2:35-3:00

Abhey Singh Guram '24

Patiala, India

Majors: Quantitative Economics; International Relations
Minor: Environmental Science

Entrepreneurial Learning: Cooking Your Way through College

The entrepreneurial spirit is a valuable asset in today's job market. This presentation delves into the concept of "learning by doing" through a student-led business venture, The Himalayan Kitchen. The focus of this kitchen is to sell South Asian cuisine while providing students with a unique opportunity to learn valuable skills in customer relations, project management, marketing, inventory accounting, and entrepreneurship.

This presentation will explore skills that are to be gained through the creation and management of a small business which is essential in the development of an entrepreneur. The Himalayan Kitchen provides a platform for students to put into practice what they learn in their various courses throughout college. This experience highlights the importance of a liberal arts education, emphasizing critical thinking, creativity, and practical application of knowledge in the real world. Through this project, students are converted into "experiential entrepreneurs."

Sponsor: Taylor Arhar
Erik Henze and Toshi Kawate (Cornell University)

Room 249, Sanger Science Center, 10:10-10:35

Cyrus Habas '23

Hulmeville, Pennsylvania

Majors: Biochemistry; Philosophy
Minor: Political Science

Pannexin 1 channel silencing by DHHC protein acyltransferase

Pannexin 1 (Panx1) is an ATP release channel that has important roles in inflammation, cellular migration, pain, and epilepsy. While posttranslational modifications (PTMs) of Panx1 have emerged as an important step in the channel's activation mechanism, the underlying mechanisms are poorly understood. We recently discovered using mass spectrometry and western blot that palmitoylation occurs at cysteines C40 and C347 through DHHC7, a member of the major class of acyltransferase enzymes known as the DHHCs. Evaluation of Panx1 point mutants C40S and C347S, which prevent depalmitoylation, indicates that palmitoylation acts to close the channel. We therefore hypothesize that DHHC7 can act on Panx1 to silence the channel through palmitoylation at cysteines C40 and C347. To test this hypothesis we co-expressed DHHC with Panx1 to determine if the channel is silenced as assessed by a cell-based optical readout of channel activity. We also tested the ability of DHHC to silence voltage-activated Panx1 currents using whole-cell voltage clamp. We found a DHHC7-dependent suppression of Panx1 activity in both experiments. These results suggest that DHHC palmitoylation is a novel pathway by which Panx1 activation is modulated.

Sponsor: Matthew Tedesco

Room 349, Sanger Science Center, 1:55-2:20

Hasti Hairy '24

San Jose, California
Brussels, Belgium

Major: Physics

Limited Representation in Clinical Research: An Empirical and Ethical Evaluation

My research paper explores the ethics of limited representation in clinical research. To do this I first describe what clinical research entails and what the current empirical data says about representation in clinical research. Then, I analyze the empirical data from an ethical perspective, specifically from consequentialist and non-consequentialist perspectives. Based on my analysis I argue that limited representation in clinical research is a serious moral problem from both the consequentialist and non-consequentialist moral frameworks. In this presentation I will share a concise version of my findings and argument.

Sponsor: James Rougvie

Room 249, Sanger Science Center, 1:30-1:55

Sam Hall '23

Eagle River, Alaska

Majors: Geology; Political Science
Minor: Physics

Electron Backscatter Diffraction Evidence of Interface-Coupled Dissolution-Precipitation in K Feldspars

Interface-coupled dissolution-precipitation (ICDP) is a model for mineral replacement that involves precipitation along a fluid interface. In the conventional two-step model, a parent mineral dissolves entirely before a replacement precipitates. However, during ICDP dissolution and precipitation occur simultaneously. ICDP is a mechanism for mineral replacement during metasomatism, the process by

which rocks and minerals are altered via interaction with a reactive fluid. ICDP is a potentially widespread process for mineral replacement throughout the Earth's crust. As such, identifying ICDP has broad geologic implications, particularly for understanding patterns of crustal deformation.

This project examined the reaction mechanisms that took place during low-T K-metasomatism of ash-flow tuffs found in Creede, Colorado. An initial review of these samples showed they contain feldspar crystals that display a variety of distinct zoning patterns, suggesting the occurrence of ICDP. Some of the zoning patterns show fluctuation between original and replacement minerals. Others show variation in the cathodoluminescence (CL) color of replacement material that suggests changes in the composition of the metasomatizing fluid.

To further characterize mineral replacement in the Creede samples, this study compared images made using two techniques. Electron backscatter diffraction (EBSD) was performed via scanning electron microscopy at Northwestern University. The resulting data were compared with existing CL images at Beloit College. This provided a detailed view of crystallographic orientations, porosity, and elemental composition.

The evidence gathered suggests that patchy and concentric zoning patters are the result of ICDP in the Creede samples. It also demonstrates that other methods of feldspar replacement, including overgrowths, were locally important. This research provides an example of an environment in which ICDP can occur, and how it can be identified.

Sponsors: Shawn Gillen and Joseph Derosier

Richardson Auditorium, Morse-Ingersoll Hall, 11:40-12:05

Eve Henley-Rayve '23

Los Angeles, California

Majors: Creative Writing; Literary Analysis
Minor: Journalism

The Beauty of Death: Emotional Necrophilia in 19th Century Gothic Horror

"The death of a beautiful woman," Edgar Allen Poe wrote, "is, unquestionably, the most poetical topic in the world." Nineteenth-century literature took this sentiment to a extreme degree, using poetry and prose to engage in emotional necrophilia and speculative hauntings with an overwhelming intensity. Although the bodies are not always explicitly female, some of the most influential writers of the period share a particular reverence for "beautiful" corpses. Drawing upon examples from the works of Edgar Allen Poe, Charles Baudelaire, and Émelie Zola's novel *Thérèse Raquin*, this paper explores the gothic obsession with death, and specifies where these writers were finding beauty in such a decidedly grim topic. The illicit death poems of Charles Baudelaire's *Flowers of Evil* show a more direct necrophilic tendency than the lamenting woes of Poe's memorial-esque poems *Annabel Lee* and *Lenore*, but demonstrate a similar obsessive emotional investment in bodily decay. Prose pieces like *The Black Cat* and *Thérèse Raquin* deal with the direct psychological impacts of murdering a spouse, and demonstrate the reverse side of this obsession: fascination and delusion arising from a place of hatred, rather than blinding infatuation. An examination of death's decidedly unique place in these texts helps to reveal death's importance in the annals of nineteenth-century literature.

Sponsor: Charles Westerberg

Room 150, Sanger Science Center, 11:40-12:05

Mason Hoffman '23

Deforest, Wisconsin

Majors: Biochemistry; Sociology

Creating a Rural Pipeline: Outcomes of a Rural-Track Medical Education Program

Rural-track medical education programs have successfully placed a majority of their graduates into rural areas for decades. They have proven to be a far more efficient way to meet rural needs than unfocused expansion of medical class sizes. However, they have been unable to increase the percentage of their graduates in rural practice much above 50%, and the rural physician shortage has not improved for decades. This paper discusses the effects of socioeconomic status, rural origin, prestige, debt, and exposure on the outcomes of rural-track programs. This paper adds to the understanding of current rural-track outcomes by analyzing data on the Rural Medical Education Program at the University of Illinois College of Medicine-Rockford. Recommendations are made for avenues for future research into how debt, socioeconomic status, prestige, and exposure affect outcomes of the RMED program and similar rural-track programs.

Sponsor: Kristin Labby

Room 249, Sanger Science Center, 9:20-9:45

Tyler Hoover '23

Racine, Wisconsin

Major: Biochemistry
Minor: Health & Society

Attempting To Isolate Antibiotic Compounds From Soil Bacteria

This talk will describe my research work in collaboration with the Tiny Earth Network. Bacterial samples were extracted from soil samples taken around Beloit. The bacterial samples were then tested against lab-safe relatives of pathogenic bacterial species to determine if the soil bacteria demonstrated antibiotic properties. Bacteria that showed antibiotic promise were grown large scale and chemical extraction was used to separate the small molecule natural products made by this isolate. The extract will be further examined by TLC, bioautography, and shared with the Tiny Earth Chemistry Hub for further analysis.

Sponsor: Toby Altman

Room 402, Sanger Science Center, 1:30-1:55

Fiona Hughes '26

Kimberly, Wisconsin

Major: undeclared

Variations of Misogyny in William Shakespeare's *The Tempest* and Aimé Césaire's *A Tempest*

Aimé Césaire reworks the original plot of William Shakespeare's *The Tempest* to form a critique of colonialism. However, despite radical changes to the story, Césaire continues the misogynistic storylines, even knowingly using it to support his own message. My research examines how misogyny affects the women in the story and how both authors' varying views on race and colonialism affect those storylines. This research focuses primarily on Sycorax, due to her unique role as a Black woman, and the differing impact that her absence has on the texts. In addition, I look into how both Shakespeare and Césaire approach the relationship of white women and Black men, including the complications of the rape accusation against Caliban. Overall, this presentation is about how both versions of the same story reduce women to narrative tools and silence what could have been vital voices.

Sponsor: Mehmet Dik

Room 349, Sanger Science Center, 11:15-11:40

Mohammad Tanzil Idrisi '26

Siddharthnagar, UP, India

Majors: Computer Science; Mathematics

Improved Medical Image Segmentation with Pooling Convolutional Capsule Network for Small Datasets

Medical Image Segmentation is one of the standard starting points for predicting any disease and preparing for higher procedures in the medical field. Before, we used CNN for the classification of CT Scans and MRI, which required extensive data augmentation and a large dataset to identify detailed spatial relations between image instances. Therefore, Capsule Networks have shown potential in various medical image segmentation tasks due to their ability to learn better representations by replacing pooling layers with dynamic routing and convolutional stride. This paper proposes a modified architecture of the capsule network, called the Pooling Convolutional Capsule Network, which utilizes new routing techniques to improve competition between lower and higher-level capsules. This architecture incorporates ResNet as a CNN backbone, capsule-based saliency segmentation, accurate feature extraction using pre-trained VGG-16, and an improvised Whale Optimization Algorithm to increase efficiency. By doubling the types of capsule instances in COVID-19 image segmentation, the proposed method offers an efficient solution for the classification of small datasets, such as lung cancer's histologic image classification, and other biomedical and normal classifications. Capsule Networks hold promise for the efficient classification of small datasets, and this proposed method can be extended to other medical image segmentation tasks.

Sponsor: Mehmet Dik

Room 249, Sanger Science Center, 3:00-3:25

Mohammad Tanzil Idrisi '26

Siddharthnagar, UP, India

Majors: Computer Science; Mathematics

Enhancing Brain Tumor Segmentation with Modified 3D U-Net Model

Brain tumor segmentation is a crucial task in biomedical imaging and diagnostic radiology, as it assists doctors and radiologists in accurately detecting and delineating the tumor sub-type. Manual segmentation is time-consuming, rigorous, and prone to errors, and therefore, there is a need for automated segmentation methods. The U-Net model is a fully convolutional network designed for biomedical image analysis that has shown promising results in brain tumor segmentation. However, downsampling at the last encoder layer leads to a loss of spatial information and degrades model performance. To overcome this limitation, in this paper we propose a modified last encoder layer with a residual unit and a custom-tailored dice loss function. Our 3D U-Net model achieves precise segmentation and overcomes the constraint on input image size, making it suitable for the analysis of brain tumors with a small number of training images. The proposed method has the potential to improve the accuracy of brain tumor segmentation and assist doctors in monitoring the progression of the tumor and planning for treatment.

Sponsor: Ben Stucky

Room 349, Sanger Science Center, 1:05-1:30

My (Miley) Le '25

Dong Nai, Vietnam

Major: Quantitative Economics

Adaptive E-Learning System and Its Effect on the Performance of Chinese K–12 Students

The world has witnessed a substantial increase in both supply and demand for the educational technology products market, especially after the outbreak of COVID-19. Many new technologies have been found, developed, and applied to the variations of e-learning products.

Recently, AI adaptive e-learning products that include advanced technology and specific pedagogy techniques have been introduced and released throughout many countries in Asia, especially China. This research will investigate the promising impact of AI adaptive e-learning platforms – SquirrelAI – on Chinese K–12 students. There are many factors contributing to the successful implementation of this online platform including the high expectations for Gaokao (the college-entrance exam), the urgency of having equal educational resources distribution in a large country, and intensified market competition.

Sponsor: Taylor Arhar

Room 249, Sanger Science Center, 9:45-10:10

Rose Loos-Austin '23

Madison, Wisconsin

Major: Biochemistry

Expression of the *E. coli* Chaperone Protein CbpA

Over this semester I have worked with Professor Taylor Arhar to troubleshoot the expression of the *E. coli* chaperone protein CbpA.

I will explore the purpose of the protein CbpA in *E. coli* and the original research goal and then explore my part of the puzzle and how I have contributed to the furthering of this research.

The protein was not growing in concentrations high enough to complete research effectively, so this semester I have worked to go through the entire procedure, changing variables to see if it would increase expression. In this presentation I will go through the various variables I changed and how those variables affected the overall expression of the protein. I tested changing the concentration of the IPTG, which induces the expression of the CbpA protein, and I also changed the optical density at which expression is induced.

Sponsor: Suzanne Cox

Room 150, Sanger Science Center, 1:05-1:30

Lilian Lopez '23

Los Angeles, California

Major: Psychology
Minors: Music; Dance

Music Matching Mood: Music Helps Mental Health during the Pandemic

Rates of mental health challenges such as depression and anxiety among adolescents and emerging adults have increased during the COVID-19 pandemic, especially for adolescents of color. The need for physical distancing resulted in social isolation and stress for many. The current research focuses on how current and previously enrolled college students used music as a self-soothing tool to regulate stress related to the COVID-19 pandemic. Questions central to this research are: a) how do college students symbolically identify with artists during the pandemic, and b) what is the relationship between music and mood for college students? The initial predictions were that students would interact with music receptively, identify with artists, and listen based on their priorities and moods. Individual interviews centered on interviewees' listening habits and ways they interacted with music. The data were analyzed by categorizing participants' music preferences and their moods. Based on the data collected, participants primarily interacted with music by listening, and listening to music had a positive impact on the participants. Additionally, both participants' mood and their priorities for how to address the pandemic influenced their listening habits. The research findings are limited due to the small number of research participants, but the research experience has helped me understand the foundation of the role of receptive music therapy in fostering well-being in young adults.

Sponsor: James Rougvie

Room 249, Sanger Science Center, 1:05-1:30

Emmalynn May '23

Frederick, Maryland

Majors: Geology; Environmental Biology
Minor: Studio Art

Predator Prey Relationships in the Beloit College La Brea Tar Pits Collection

Beloit College boasts a collection of fossils from the La Brea Tar Pits in Los Angeles, CA. The tar pits created a death trap for some of the animals that wandered into them. Any animal that died in the pit

would have been an easy target for predators and scavengers who would have also run the risk of getting caught in the pits. These fossils contain a plethora of knowledge that gives insight to the Pleistocene Epoch when these animals lived. Some of the fossils display predation marks including gnaw marks, tooth holes, chipping, and breakage. A data set was created describing the total fossil count along with an examination of the predation marks found on some fossils. These predation marks were scrutinized through the use of microscopic evidence and data from other studies. The predation rates in the Beloit College collection are consistent with studies of other collections. Predator-prey ratios typically display much higher rates of prey than predators, both in modern and geologic settings. The tar pit ratios have a much higher number of predators than would be seen in the true ecologic setting due to the ease of predation that can occur in the pits. Predation rates give insight and proof as to why the number of predators found in the pits far outnumbers that of prey. Both the life history and curatorial history of these specimens give important geologic context for both Beloit College and the greater paleontological community.

Sponsor: Rongal Watson

Room 150, Sanger Science Center, 9:20-9:45

Maddison Moser '23

Anchorage, Alaska

Majors: Biology; Health & Society

Experiences While Serving Underserved Communities with HealthNet of Rock County: The Path of My Passion for Medical Care and Health

In the summer following my Junior year, I had the wonderful opportunity to be an intern/volunteer with HealthNet of Rock County. HealthNet is a medical organization that provides care to those who do not have health insurance for free or for a very small charge. Following graduation, I will be volunteering with HealthNet of Rock County again, but this time for a longer term. Prior to this year, I volunteered and shadowed at HealthNet for about 5 months. Luckily, I had a wonderful experience and am happy to be rejoining them for about a year and a half post graduation. In my time at HealthNet last summer I learned so much about care given to those who are underrepresented in healthcare. To continue broadening my knowledge, I have offered my time as their new volunteer lab phlebotomist. Following graduation, I will be running HealthNet's entire lab department, taking and testing samples from patients, and communicating results to doctors and nurses. Taking on this position (given that I will be working for free) was a difficult decision for me since I will be freshly graduated and nowhere near financially stable. Although difficult, this decision makes me feel even more passionate about my future career in the medical field. Medical care should be available to everyone and HealthNet makes that possible. Continuing to be part of HealthNet's team will not only be a major stepping stone in broadening my patient interactions but will also allow me to understand cultures, lifestyles, and communities that I may not have experienced throughout my life thus far.

Sponsor: Carol Wickersham

Room 150, Sanger Science Center, 9:45-10:10

Daniel Mrzena '23

Chicago, Illinois

Major: Sociology
Minor: Law and Justice

Next Steps Towards the Good Society: Transitional Housing and Self-Sufficiency in Rock County

Actively in development, *Next Steps* is a transitional living project designed to support young children and their caregivers currently experiencing homelessness transition towards stable housing and self-sufficiency by providing 18 apartments, a 79 unit childcare center and individualized case managed social support services. As a Duffy scholar working with *Family Services of Southern Wisconsin and Northern Illinois*, I've had the unique opportunity to work with the project from concept to near ground breaking. In this session, I invite you to join me as we: develop a diverse coalition; advocate for $6 million dollars of

public and private funding before the County Board, the City Council and individuals; address *Not In My Backyard* concerns; purchase the old Royce Elementary School, join Beloit College students and the community to clean the property; develop the program and budget; review architectural plans and more. The goals of *Next Steps* are to work with families and the broader community to reduce generational poverty, childhood trauma, and homelessness. Using sociological concepts, I will reflect on the goals and process landing us in the present.

Sponsor: Gregory Koutnik

Richardson Auditorium, Morse-Ingersoll Hall, 3:00-3:25

Daniela Padilla '25

Chicago, Illinois

Major: Political Science

How is Political Theory Relevant in Helping Us Navigate Contemporary U.S. Politics?

How can political theory help us navigate contemporary U.S. politics? What can we learn from political theories that can help us become more engaged in the democratic process?

Political theory is the process of examining politics through a philosophical lens. One of the questions that people may have after seeing this definition is “why are philosophy and politics important?”

When people hear the word “politics,” they may associate unpleasant experiences with it. In our current society, people frequently do not want to educate themselves about our form of government and believe that the government is corrupt and that it has failed its citizens. While it is important to identify the flaws in our government, we must also identify where they come from.

Although many believe that we can dismiss politics and go on with our daily lives, that is not the case, because politics surrounds us and is not something that should be thought of as irrelevant. Some people also think of philosophy as irrelevant, but that is a misconception, because it helps us reason and communicate better with others.

To demonstrate the importance of being an engaged, active and reflective democratic citizen, I am studying a range of texts in political theory, from the Socratic dialogues to modern scholars like Diana Mutz, Helene Landemore, and Jurgen Habermas. Their theories highlight the importance of ways in which philosophy can be used to further understand politics and how this can improve our understanding of our system of government and beyond.

Sponsor: Pablo Toral

Richardson Auditorium, Morse-Ingersoll Hall, 1:55-2:20

Rafaella Pavarini de Souza '25

São Paulo, Brazil

Majors: International Relations; Quantitative Economics

A First Step into the Field of International Relations: *Latin American News Digest* Internship

This presentation is based on my experience as an intern with *The Latin American News Digest* during the spring semester of 2023. The Digest is committed to spreading awareness in the US of journalism produced in Latin America by Latin Americans. The Digest picks one student from different institutions every semester to be part of their team and contribute by aggregating and writing condensed versions of news articles found in Latin American news sources, which are written in Spanish or Portuguese. Thus, the interns are also expected to use their translation skills since the Digest is targeted at English speakers. The opportunity of interning with the Digest has expanded my perspectives on Latin American issues in the most varied fields of interest, such as politics, Inter-American relations, society, economy,

and much more.

As a Brazilian student pursuing an International Relations and Economics double major, this experience has given me precious knowledge about Latin America and its dynamics. Besides, my general writing and Spanish skills have greatly improved, as well as my ability to stay tuned with current information and rapid changes in different world scenarios, a basic skill for every global citizen nowadays. In my presentation, I will give more details on how I got involved with this opportunity, what are my responsibilities, and challenges and what are some of the next steps I am getting ready for. Students interested in Latin American issues, looking for an opportunity to improve multiple skills, and wishing to take their first step into the International Relations field, will find my experience helpful.

Sponsor: Katherine Harris

Room 349, Sanger Science Center, 11:40-12:05

Nicolò Petroccione

Santa Maria Dell'Arzilla, Italy

Majors: Mathematics; Quantitative Economics
Minor: French

Latin Squares, Cyclic Groups and Quiltdokus

If we wanted to investigate the outcomes of a round robin exchange for a group of *n* people, an existing model is a *Latin square* of size *n*. This mathematical tool, which is similar to a Sudoku puzzle, can be very useful and fun to explore. Malmskog and Haymaker in their 2019 MAA Mathematics Magazine article discuss *row complete Latin squares*, which satisfy conditions equivalent to modeling a round robin sport tournament in which two teams never face each other twice. Their vast literature review in this article shows different methods to create these row complete Latin squares, drawing concepts from combinatorics, graph theory and group theory. In our work we exploit symmetries and other techniques from graph theory to understand underlying patterns of these mathematical tools. The results of this have been two-fold: creating new methods to construct these row complete Latin squares and attempting to turn this into a Sudoku-like puzzle.

Sponsor: Jessica Fox-Wilson

Room 349, Sanger Science Center, 1:30-1:55

River Pham '23

Danang, Vietnam

Major: Quantitative Economics

The Art of Data Analysis and Interpretation within a College Context

Data is an invaluable resource to identify challenges and inform strategic planning. Colleges are finding more ways to capture their performances and outcomes, from administrative data offering information about students, to research data on their respective behaviors in many aspects, to smaller survey setups that are conducted every day on campus. But being rich in data is not equal to the ability to capture and utilize their true value. Many departments still use descriptive summaries that lack clarification on how to interpret them correctly with respect to data limitations and ethical concerns. Plain statistics can be more than helpful, however, if we do not communicate well where the data comes from and how to properly translate them into knowledge, we may end up with non-optimal solutions or even misleading conclusions.

This presentation is an attempt to understand data and its nature. We will take a deeper dive into how student data can be used in a college context by looking at how Beloit College student engagement with Career Works may correlate with their placement fresh out of college. From this, we hope to devise strategic plans to further encourage student interaction with the office and support them better in career preparation.

Sponsor: Mehmet Dik

Room 349, Sanger Science Center, 10:50-11:15

Hoang Pham '26

Ho Chi Minh city, Viet Nam

Major: Computer Science

Applying PID Control to Assist People in Rehabilitation

The use of the PID controller (Proportional–Integral–Derivative controller) in rehabilitation has gained significant attention in recent years due to its potential to enhance the effectiveness and efficiency of rehabilitation processes. PID control is a feedback control mechanism that has been widely used in engineering to regulate systems by adjusting their inputs based on the difference between the desired output and the actual output. The application of PID control in rehabilitation aims to assist individuals in performing exercises accurately and efficiently by providing real-time feedback on their movements. This research paper explores the potential benefits of applying PID control to assist people in rehabilitation. The paper begins by providing an overview of the PID control mechanism and its application in rehabilitation. It then presents a review of relevant studies that have investigated the use of PID control in rehabilitation. The paper also highlights the potential advantages and challenges of applying PID control in rehabilitation, including its potential to enhance the accuracy and efficiency of exercises and its dependence on accurate sensors and feedback systems. Finally, the paper concludes with a discussion of future research directions in this field and the potential impact of PID control on the field of rehabilitation.

Sponsor: Shawn Gillen

Richardson Auditorium, Morse-Ingersoll Hall, 9:45-10:10

Voleak Phan '23

Siem Reap, Cambodia

Majors: Sociology; Creative Writing

A Reinterpretation of Cambodian Literature: Tum Teav, Chbab Srey, and Pkar Srorpon

In middle school, I read canonical Cambodian Literature, such as *Tum Teav* (1915) by Pikou Soam, *Pkar Sropon* (1948) by Nou Hach, and *Chbab Srey* (1947) by Moeurn Mai. Although these texts were written in the 1900s, many of the traditions and norms are still prevalently practiced in Cambodian society. After the Khmer Rouge regime (1975-1979) that destroyed most of our literature, Cambodian literary works are not widely studied or translated in French or English. Drawing upon my education in Cambodia and my studies in literature and literary theory at Beloit College, I will delve deeper into why *Tum Teav* and *Pkar Srorpon* are not just about romance and much more about restrictive cultural norms for women and parental pressure, and how *Chab Srey*, translated to *The Code of Conduct for Women*, plays a role in societal and familial pressure on Cambodian women.

Sponsor: Francesca Abbate

Room 402, Sanger Science Center, 3:00-3:50

Harriet Estelle Rose '24

Brighton, United Kingdom

Major: English Literature

Geography of the Page: The Linguistically Innovative Poetry of Lorine Niedecker and Anthony Barnett (Reading and Workshop)

In this talk I will introduce two Late Modernist poets, Lorine Niedecker (1903-1970), and Anthony Barnett (1941-present), giving a brief overview of their work and situating them within a broader literary and political context.

Lorine Niedecker (who studied for a brief time at Beloit College) wrote mainly in the surrealist and objectivist traditions, with a significant folk influence. Her poetry is centrally concerned with gender, class,

Capitalism, and land ethic. The influence of her contemporaries on British Poetry Revival has been well documented, but a full investigation of Niedecker's transatlantic reach has yet to be conducted.

Anthony Barnett is a poet, musician and publisher, living and working in Britain. His role as the editor and publisher of Avant Garde poets is significant - publishing early "collected works" of contemporaries whose work was sometimes too "difficult" for mainstream press. Barnett's work is innovative too; short, fragmented, de-narrativised, making frequent use of citation and literary allusion. His work addresses both place and displacement, and the limits of language.

Through both poets we will think about the "geography" of the page, word play/polysemy, and poetic "deconstruction" in writing anti-capitalist, and anti-authoritarian lyric. I will give a short reading from my paper to introduce the work of both poets, and to make a brief case for "difficult" poetry. For the second half of the session we will write poetry together, using a series of prompts and exercises to explore ideas and techniques central to both poets.

Sponsor: Gana Ndiaye

Room 150, Sanger Science Center, 10:50-11:15

Jared Saathoff '24

Sterling, Illinois

Major: Anthropology

Making a Home: Mexican Americans in Sterling and Rock Falls, Illinois

This presentation examines the process of immigration and the belonging of Mexican immigrants and their descendants in the twin towns of Sterling and Rock Falls, Illinois. America in the 20th century saw a large influx of Mexican immigrants, especially in the Midwest, where many cities were experiencing a boom in manufacturing and industry. These immigrants brought significant changes to the communities they moved into, economically, culturally, and demographically. These individuals faced challenges fitting into their new homes, including pressure to assimilate into American culture and avoiding ostracization and mistreatment.

Taking into consideration data from personal interviews and publications on the subject, this presentation shows that first-generation immigrants arriving in the Midwest in the 20th century made substantial efforts to assimilate into American society, which resulted in their descendants being increasingly "Americanized" and less likely to speak Spanish and identify themselves as being connected to their Mexican heritage, while newer immigrants arriving in the 21st century are more likely to speak Spanish and feel connected to their Mexican heritage. Factors as to why this is the case include economic status, family status, public opinion on immigrants, and opportunities to express and celebrate culture.

Sponsor: Mehmet Dik

Room 349, Sanger Science Center, 10:10-10:35

Iftesham Rahman Sami '25

Dhaka, Bangladesh

Majors: Computer Science; Business Economics
Minor: Mathematics

Fundamentals of Human Computer Interaction

The human-computer interaction (HCI) is concerned with the development, assessment, and use of interactive computing systems for human use. By taking into account their needs, capabilities, and preferences, it strives to produce useful, efficient, and rewarding experiences for users interacting with digital technology. The field of HCI is interdisciplinary and includes psychology, computer science, design, engineering, and other related subjects. The ultimate goal of HCI is to enhance the usability, accessibility, and user-friendliness of computer-based systems and applications. Interface design, user experience,

usability testing, human factors, cognitive psychology, and interaction design are important areas of HCI research. As technology becomes increasingly common in our daily lives, and with a growing demand for more intuitive interfaces, HCI has become even more crucial.

Sponsor: Brian Morello

Room 150, Sanger Science Center, 3:00-3:25

Eric Seo '25

Woodridge, Illinois

Major: Mathematics
Minor: Physics

Sydney Felhofer '24

Door County, Wisconsin

Majors: Political Science; Anthropology

Joshua Laue '25

St. Louis, Missouri

Major: Physics

Aleksander Mytko '25

El Segundo, California

Major: Physics Engineering

Make 48: Lessons Learned From 48 Hours of Innovation

Our group of Beloit College students competed in Make 48, a televised engineering / innovation competition, both regionally and nationally. In both competitions, we were tasked with creating a working prototype of a novel product in only 48 hours. Over the two days, we learn an incredible amount every time. From physical skills like video editing and construction to intangibles like trust and friendship, one learns so much from Make 48. In this way, we hope to highlight some of the lessons we learned from 48 hours of innovation, despite sleep loss and internal frustrations.

Sponsor: Beth Dougherty

Richardson Auditorium, Morse-Ingersoll Hall, 1:30-1:55

Antariksh Sharma '23

Mumbai, India

Major: Computer Science
Minor: Political Science

The Dilemma of Integration: Multiculturalism and Assimilation as Trade-offs in Immigration Policy

This symposium presentation will showcase the results of research exploring different models of immigrant integration conducted during an exchange semester at the University of Sussex. The Swedish model of multiculturalism emphasizes the preservation of cultural diversity, while the German model of assimilation emphasizes the adoption of the host culture. The presentation will highlight the significance of understanding the various approaches to immigrant integration and their implications for immigrant communities and society at large. It will also provide insights into the challenges and prospects associated with the implementation of different integration models, and suggest potential solutions to improve integration outcomes for immigrants in both countries.

Sponsor: Mehmet Dik

Room 349, Sanger Science Center, 9:45-10:10

Abhishek Shekhar '23

Kathmandu, Nepal

Major: Computer Science
Minor: Mathematics

Navigation Tool Using Prolog: Applications

Our project aims to create a navigation tool using Prolog, integrated with mapping technology and Python via PySwip. We will leverage Prolog libraries such as Prolog-RDF, SWI-Prolog, and Graphviz to manipulate and query RDF data, handle data types, and create visual maps of graphs and networks. Our fully functional program will enable users to determine their location and receive directions to a desired destination, utilizing algorithm to find the best route. Our project showcases the capabilities of Prolog as a logic programming language, and demonstrates its integration with other languages such as Python, providing value to those interested in these areas.

Sponsor: Toby Altman

Room 402, Sanger Science Center, 1:05-1:30

Marcus Studinski '26

Stevens Point, Wisconsin

Major: undeclared

Ben Jonson and the Epictetian Debt: Philosophical Influences and their Modern Implications

This presentation outlines Ben Jonson, his debt to Stoic philosophy and Epictetus specifically beyond the frequently identified Seneca. Over the course of research, this came across in multiple poems, such as *An Elegy on the Lady Jane Pawlet, Marchioness of Winton*. Little existing research has identified Ben Jonson's connection to Epictetus, despite parallels that are difficult to ignore. This presentation works to remedy the problem and to provide needed scholarship for an underappreciated Shakespearean poet and a Stoic philosopher. The debt is especially noticeable in the wake of ongoing social issues. These may mandate a new outlook on life drawn from those who faced similar adversity in their times with solutions not often considered.

Sponsor: Britt Scharringhausen

Room 249, Sanger Science Center, 2:35-3:00

Keeler Tardiff '23

Indianapolis, Indiana

Major: Physics
Minor: Mathematics

Coefficients of Static and Kinetic Friction in Rotational Mechanics.

Based on past research with Emeritus Prof. Polley, we designed two labs to help deepen the understanding of rotational mechanics for introductory students, in high school and college. Rotational mechanics has statistically tested lower on the AP physics test compared to other subjects. Within our two labs, equations were derived from Newton's laws of forces in kinetic and rotational motion. We were able to predict the values of the number of completed rotations, linear acceleration, and the coefficients of static/kinetic friction. As well, we could predict the critical angle, at which a ball will begin to roll with slipping. In the first experiment, we were able to calculate the coefficient of static friction and predict the coefficient of kinetic friction. In the second experiment, linear acceleration, completed rotations and coefficient of kinetic friction was determined, respectively, through a motion detector, slow motion videography, and through derivation of equations. By crosschecking our theoretical predictions and experimental values we were able to determine the lab to be very effective, with an average percent error across the board at about 4%.

Sponsor: Gregory Buchanan

Room 150, Sanger Science Center, 1:55-2:20

Dakota Thompson '23

Island Lake, Illinois

Majors: Biology; Psychology

Perceptions and Utilization of Mental Health Services by Beloit College Students

Mental health services are offered at most if not all institutions of higher learning. Beloit College offers free mental health services to all students through the Health and Wellness Center. Despite the services being provided free of charge, some students may fail to take advantage of them. In the Spring of 2023 students at the college were asked to participate in a survey about mental health services. Participants answered demographic questions about race, ethnicity, and grade level as well as college specific demographics such as participation in sports and Greek life. The next section included a widely used and accepted brief depression and anxiety screening based on Beck's inventories. The final section focused on experiences with counseling, perceptions of mental illness, and knowledge of the services provided by Beloit College. It was hypothesized that those who scored higher on Beck's scale would be more inclined to seek out help with their mental health and to utilize it for longer periods. Participants who hold negative views of mental health services were hypothesized to make less use of mental health services compared to those who hold more positive views despite similar scores on Beck's inventories. Finally, it was hypothesized that the predicted relationship between students with greater need being more likely to utilize the services would be mediated by their overall perception of the services. That is, services are most likely to be utilized only by those with both a greater need and a positive attitude.

Sponsor: Rachel Bergstrom
Dr. Turk Rhen (University of North Dakota)

Room 249, Sanger Science Center, 11:15-11:40

Dakota Thompson '23

Island Lake, Illinois

Majors: Biology; Psychology

Single Nucleotide Polymorphisms in Relation to Sex

The common snapping turtle (*Chelydra serpentina*) exhibits temperature-dependent sex determination. While temperature has a major effect on sex determination, genetic factors also influence the sensitivity of developing embryos to different temperatures. For instance, snapping turtle populations at different latitudes have distinct responses to temperature during gonad development. Population differences in TSD pattern imply genetic differentiation. Controlled breeding studies demonstrate significant heritability for sex determination in thermal regimes that produced mixed sex ratios. Data from a prior genome-wide association study revealed highly significant associations between sex determination and loci on several chromosomes, including chromosome 1. DNA was extracted from hatchlings that had been briefly exposed to a female producing temperature for 3, 4, 5, or 6 days but otherwise incubated at a male producing temperature. High resolution melt temperature analysis was used to genotype these hatchlings for a SNP on chromosome 1 (locus 20148572) that was associated with sex in the prior GWAS study. Our results also indicate a significant association between this SNP and sex determination. This SNP is likely to be in linkage disequilibrium with a variant that influences embryo sensitivity to a feminizing temperature at stage 17 of embryonic development. Future experiments should test other loci to more precisely map the sex determining gene in this region on chromosome 1.

Sponsor: Joe Bookman

Richardson Auditorium, Morse-Ingersoll Hall, 10:10-10:35

Isabella Verdi '23

Highland, California

Majors: Creative Writing; Environmental Communication and Arts

Clever Girl: An Ecofeminist Analysis of *Jurassic Park*

Ecofeminism is a theoretical framework that examines the connections between the oppression of women and the exploitation of the natural world. Through an analysis of *Jurassic Park's* narrative and female characters in particular, this presentation will explore how different types of femininity and nature are represented and created, mis/construed, and un/controlled. The research highlighted parallels between the ways that women and nature are treated as objects that only exist to make a profit for and reinforce the power of those who control them. By analyzing *Jurassic Park* through an ecofeminist lens, this presentation contributes to a broader conversation about the relationship between gender, nature, and power.

Sponsor: Diep Phan
Phil Chen (University of Denver)

Richardson Auditorium, Morse-Ingersoll Hall, 3:25-3:50

Edward Verzosa '23

San Jose, California

Majors: Economics; Political Science

Does Negative Campaigning Drive Polarization?

In recent decades, the United States has witnessed a rise of political polarization. It has also seen an increased use of negative campaigning and attack advertisements. The rise of negative campaigning, therefore, correlates to a more politically hostile and polarized electorate. Previous research mainly focuses on how negative campaigning affects voter behavior, such as candidate favorability. Researchers, then, acknowledge that their findings may have an association with political polarization. Hence, research focusing on the causal relationship between negative campaigning and polarization is limited. We use survey data taken from a representative sample collected by Lucid to assess how negative campaigning affects polarization. We find that negative campaigning does not significantly increase polarization, but rather may create a "backlash" effect against the sponsor. A concluding discussion considers the implications these findings have on the American electorate, as well as how this paper can add to the literature to encourage progress towards easing political polarization.

Sponsor: Eyad Said

Room 249, Sanger Science Center, 3:25-3:50

Lifeng Wang '23

Qingdao, Shandong, China

Majors: Computer Sciences; Mathematics

A Machine Learning Study of Climate Change in North America

Climate change is promoting more extreme weather and affecting atmospheric circulation patterns, but in uncertain ways. One circulation pattern often associated with extreme rainfall is a "cut-off low" (COL), a low-pressure unit that is cut off or removed from the prevailing jet stream winds and thus relatively stagnant. The research project will focus on applying Convolutional Neural Network (CNN) and image processing algorithms to develop an automatic detection of important patterns such as COL, Cutoff Low (COH) and Close Low (CL). The data used in the project consist of multiple realizations of existing climate model output of circulation patterns for simulated past (colder) climatic conditions covering multiple decades of the 19th century compared with projected future (warmer) climatic conditions covering multiple decades of the late 21st century. In this project, we are using the data in years 2000 and 2001. The final model accuracy was as high as 88%.

Sponsor: Ariana Vaeth

Room 402, Sanger Science Center, 2:35-3:00

Jaida Wesley '24

Fort Worth, Texas

Major: Studio Art

The Path of a Restless Mind

This year, I have been in the development of my fourth comic, *The Devil's Symphony*, a fictional action thriller about the lives of those involved in organized crime. Following the narrative of *J*, a syndicate leader with a moral code, readers are introduced to the life of crime and corruption within a bustling metropolis. My goal for this comic is to gain more experience as a webcomic artist and storyteller.

My studio practice involves an interest in storytelling that revolves around life experiences and how they mold our moral compass. There are explorations of empathy and notions of justice. Through sequential art, my audience experiences the action, trauma, and charm that build dynamic people. In this program, we will walk through the process of creating comics.

Sponsor: Suzanne Cox

Room 150, Sanger Science Center, 1:30-1:55

Moon West '23

Nashville, Tennessee

Majors: Psychology; Education & Youth Studies
Minor: English

The Impact of Disability Status on a Social Justice Mindset

The aim of this study is to determine whether there is an association in adults among disability status, self-esteem, self-efficacy, and a social justice mindset. Additionally, this study investigates whether there is a relationship between college education and inclination towards a social justice mindset.

Data collection is currently in progress. Using the online service Prolific Academic, individuals living in the United States ages 18-30, disabled and non-disabled, with and without a college degree, are being surveyed. The measures used in this study are the Personal Disability Identity Measurement: Self-Worth and Personal Meaning, the General Self-Efficacy Scale, the Rosenberg Self-Esteem Scale, and the Social Justice Scale (SJS).

Once data are collected, associations among the variables will be analyzed. Predicted results for this study are that individuals with a personal disability identity and a social justice mindset will have higher self-esteem and self-efficacy compared to those without a social justice mindset. The presentation will explore implications for a diverse community and next steps for future research.

Sponsor: Shawn Gillen

Richardson Auditorium, Morse-Ingersoll Hall, 10:50-11:15

Emma Zimmerman '23

Poplar Grove, Illinois

Major: Environmental Biology

From Walden Pond to Northern Wisconsin: The Necessity of Solitude

Solitude is a concept that has been explored in various forms, from literature to music, and has always been associated with the innate human need for introspection and self-discovery. Solitude in wilderness became popular with the Transcendentalists because they believed that nature was a source of spiritual renewal and enlightenment. They believed that in nature, one could escape the distractions and superficialities of society and connect with a higher power. One of the most prominent figures associated with this concept is Henry David Thoreau. Thoreau's famous work, *Walden* (1854), chronicles his two-year experiment living in a cabin in the woods where he immersed himself in nature and practiced self-reliance.

Thoreau believed that solitude was essential for the cultivation of personal growth and reflection and viewed it as a means of attaining greater clarity and insight into one's own existence.

Although Thoreau's time in solitude at Walden Pond took place nearly 200 years ago, the necessity of solitude is just as essential today. Contemporary artists, such as Bon Iver and Adrianne Lenker, have explored the need for solitude as a creative tool in the creation of music, with Bon Iver's album *For Emma, Forever Ago* and Adrianne Lenker's album *Songs and Instrumentals* being notable examples. After times of personal turmoil, both albums were recorded entirely in isolation in the woods. Both Bon Iver and Adrianne Lenker credit their growth and change in perspective following these times to their time spent in solitude. For both, solitude was a fundamental element in creating an album that was intimate, raw, and emotionally charged. Today, these albums are a testament to the power of solitude, and the necessity of periods of solitude in order to grow and renew oneself.

OUR SINCERE THANKS

Thank you to all those who advanced the work of our students through their time and educational expertise, and by funding through a variety of opportunities designated for research support.

Link to the online program