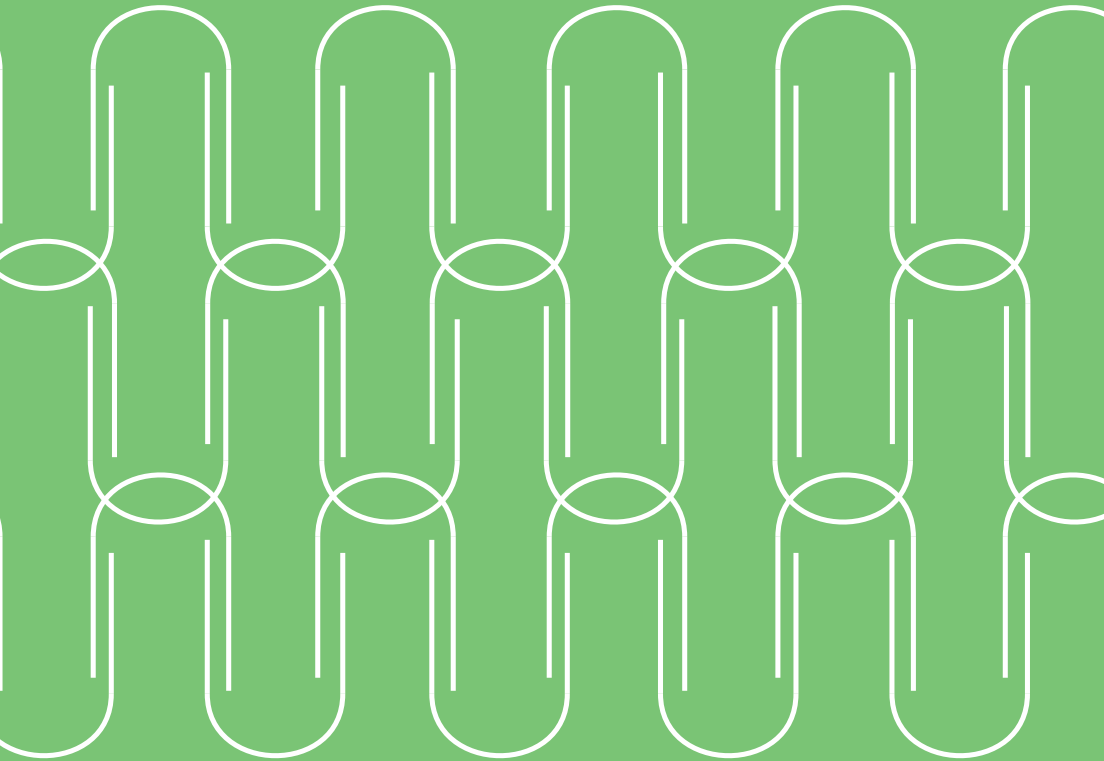
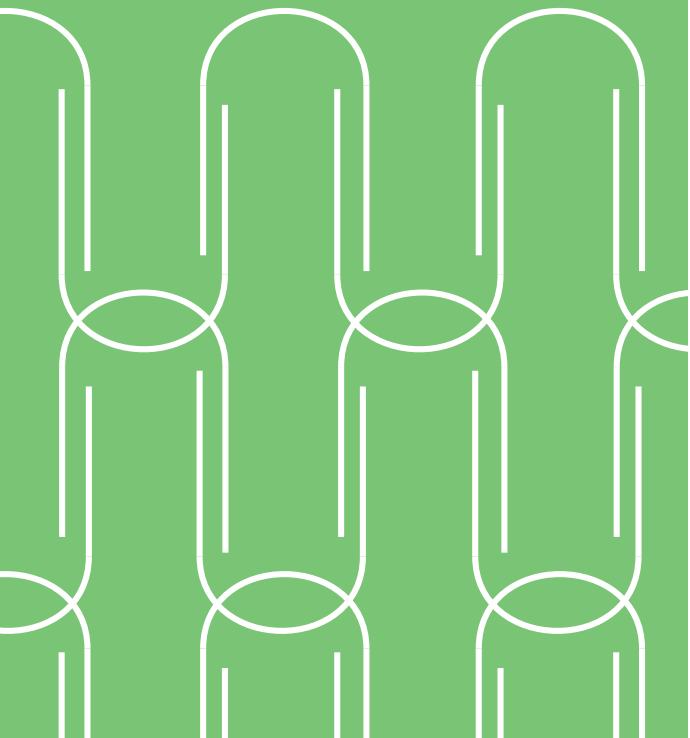




ST. THOMAS AQUINAS COLLEGE  
**8<sup>th</sup> ANNUAL ART, DESIGN &  
SCHOLARSHIP EXHIBITION**





## **Ignite your curiosity. Ignite your imagination.**

Welcome to Ignite, St. Thomas Aquinas College's Eighth Annual Art, Design, and Scholarship Exhibition. Ignite is a celebration of our undergraduate students, their research, and their creativity from multiple disciplines across campus. The scope of the presentations featured showcase the outstanding caliber of our undergraduate students at St. Thomas Aquinas College. We hope that this exhibition will ignite the passion for discovery and ingenuity in all of our students for years to come.

The projects on display also demonstrate the ongoing commitment of our faculty to supporting undergraduate research. As is true of the faculty advisors who support them, these students and their work hold the potential to contribute positively to the world. Each of these students has benefited from mentoring provided by exceptional faculty. We thank the faculty for their efforts on behalf of these students.

We encourage you to share in this showcase as you visit the poster presentations and portfolios, and read the collection of abstracts included in this program and at [stac.edu/ignite](http://stac.edu/ignite).

Organized and curated by

Members of the Ignite Committee:

Professor Nina Bellisio, Professor Kimberly Burns, Dr. Meghan DeWitt, Dr. Carolyn Fraker, Dr. Staci Shultz, Dr. Rossen Trendafilov, and Dr. Benjamin Wagner

Special thank you to Annie Lombardi and the Office of Campus Communications

# IGNITE: 8<sup>th</sup> ANNUAL ART, DESIGN & SCHOLARSHIP EXHIBITION

April 27, 2023

## College Fed Challenge 2022: Monetary Policy in a High Inflationary Environment

Presenters: Madison Brownell, Carmelo Bruzzesi, Ayesha Burnett, Juan Cedeno, Ryan Collins, Daniel Curran, James Davies, Vera Gak, Maximillian Heuter, Matthew Johansmeyer, Maximillian Kendler, Tricia Possell, Daniel Smith

Faculty Advisors: Dr. Meghan Mihal, Professor of Economics; Dr. Rossen Trendafilov, Associate Professor of Finance

In August 2022, STAC gathered a team of thirteen students to participate in the nationwide College Fed Challenge competition. Our team placed 18th out of 50 colleges in New York State. Throughout our experience we battled against time constraints and did late nights in order to get the best information possible. The team decided on recommending a 75 basis point hike towards a 3.75 to 4% target Fed Funds range in order to break the inflation cycle and decrease the mentioned overheating of the economy. Recommending extended tapering of the Federal Reserve's Balance Sheet as well as extending Section 14 of the Federal Reserve Act for Open Markets Operations. The team recommends the Federal Reserve to open more liquidation facilities to prepare for nationwide and global shocks. The team worked vigorously to get to the next round of the competition. We all became very well versed in the economic world and with the Bloomberg lab and software.

## Art Therapy- How Are You Feeling?

Presenter: Madison Mavrogiannis

Faculty Advisor: Carol Lagstein, Director of Art Therapy

For those who are unable to express themselves verbally, as well as those who are able to, painting feelings onto a canvas can be very beneficial. Paint is a rather fluid material which makes it a great tool for creating art that illustrates varying emotions like anxiety, joy, sadness, etc. (Malchidoi, 2007) Similarly to Freud's concept of free association, painting feelings can allow someone to express themselves and their thoughts in an abstract or

spontaneous way. Our thoughts usually do not erupt in an organized manner, so having the freedom to create an abstract depiction of those spontaneous thoughts can be rather therapeutic. (Rabeyron & Massicotte, 2020) Each color, shape, and brush stroke made on the canvas may represent different thoughts or emotions and the ways in which a person experiences them. The colors chosen by the artist can evoke different feelings and perspectives through the viewers. However, there are associations with certain colors that a majority of people usually experience, like red with anger, yellow with sunlight or warmth, purple with royalty, and so on (Malchidoi, 2007) As the viewer looks at these colors that depict certain moods or thoughts that the artist had, they may also experience those moods or thoughts in themselves. (Hussain, 2021) Because of that, it's easier for an art therapist to learn about their clients through the act of painting feelings abstractly and observing each color used. At my current internship site, I've tried this with some students in order to encourage them to express themselves, explore their feelings, and to engage in mindfulness as they paint. I've attached the results of my "feeling paintings" as well as those from some of the students at my internship site.

## **The Phillips and Beveridge Curves: A Greater Understanding of the Labor Market**

Presenters: Daniel Smith Jr, James Davies

Faculty Advisors: Dr. Meghan Mihal, Professor of Economics; Dr. Rossen Trendafilov, Associate Professor of Finance

The Phillips curve and the Beveridge curve are tools that economists use to examine changes in the labor market and to better understand the overall health of the economy. Over the last few decades, the Phillips curve has flattened, indicating that the unemployment rate is having a weaker inverse relationship with wage inflation. However, during and following the COVID-19 Pandemic, the Phillips curve relationship appears to have strengthened again. In addition, the Beveridge curve has also shifted upward noticeably over the same time frame as the strengthening of the Phillips curve relationship, indicating that the natural rate of unemployment has risen. We hypothesize that the COVID-19 Pandemic, and the policy decisions following it, were the main drivers behind the recent shifts in the Phillips and Beveridge curves, thus inferring that there is a relationship between the two curves. The hypothesized relationship is between the vacancy ratio and real wage growth. The previously mentioned comparison between the two variables has not been directly researched, indicating new information about the labor market can be inferred through our research. We test our hypotheses through regression analysis and find that current high inflation and the COVID-19 pandemic can identify the likelihood of a relationship between the Phillips and Beveridge curves.

# VOYAGER



*Spring 2022*

**VISUAL COMMUNICATIONS IN GRAPHIC DESIGN**  
**Minor in Forensic Psychology**

Deborah Vukaj

## **IBESCC Case Study Team: How Apple Can Revitalize Solar Panel Waste**

Presenters: Paolo Bruzzesi, James Davies, Juan Pablo Cedeno Varea, Vera Gak Anagrova  
Faculty Advisor: Christine Cahill, Esq., Professor of Business Administration

According to Apple's Environmental Progress Report, Apple's focus is to reduce their carbon footprint to zero by 2030. One way that Apple is moving toward their goal of a zero carbon footprint is by transitioning to 100% renewable energy for all their facilities and supply chain. In 2015, Apple began building a solar farm in California that came online in 2017. The question then becomes what to do with the solar panels that need to be replaced. In the United States, there are no federal regulations that mandate solar panel recycling. The US National Renewable Energy Laboratory states that "less than 10% of the country's decommissioned panels are recycled," which means most end up in landfills. Apple has no defined plan for end-of-life or damaged solar panels that need to be recycled.

We recommend that the board of Apple considers partnering with Cascade Eco Mineral, which is a solar panel recycling company that aims to protect the environment for future generations. The aforementioned recommended partnership will aid both companies in increasing their brand image and in the long run this will lead to sustainable eco-friendly business practices.

## **Can Therapeutic Recreation Activities Effect Stress And Mood?**

Presenters: Karen Mathew

Faculty Advisor: Dr. Linda Levine-Madri, Professor of Therapeutic Recreation

This was a two part research study conducted on the campus of St Thomas Aquinas College on October 11, 2022 and November 16, 2022. We looked at approximately 98 students self response reported on stress and mood. Findings indicated after a 20 minute therapeutic intervention there was a significant decreased in both variables, stress and mood in the 98 participants.

## **Self-Promotion Outside the Classroom: NIL vs. NCAA Regulations in Paying College Athletes**

Presenters: Hanna Jung, Jamal Barnes

Faculty Advisor: Dr. Deirdre-Noel Engels, Associate Professor Marketing

In the NCAA, the question of whether college athletes should be paid for their successes and efforts to balance academic and athletic life has increased over the years, and the answer is found in three letters: NIL- Name, Image, Likeness. NIL describes the term that College Athletes are eligible to receive financial compensation through third parties that use the student-athlete's name,

image and likeness to promote products or brands. This can take the form of autographs, product endorsements, or paid social media posts. Why do NCAA regulations still prohibit colleges and universities from paying athletes directly for their athletic achievements?

The average athletic scholarship is around \$18,000, leaving many college athletes on their own when it comes to room and board, textbooks, and living expenses. NIL can produce alternative streams of income to students, but as a new revenue vehicle, finding the right sponsor and establishing fees is still an uncharted road. In the research project we will look at the top 5 female and 5 top male athletes and compare their compensation and number of sponsorships. Who is more successful? Does gender matter, Does sport matter?

### **Engineering Biochemical Solutions for Protein Energy Undernutrition**

Presenters: Joseph Henion, Karolina Jaruseviciute, Paula Palero

Faculty Advisor: Dr. Stephanie Lauer, Assistant Professor of Biology

A global food crisis has led to acute food insecurity for a record 349 million people across 79 countries. Since the COVID-19 pandemic began, there has been a staggering increase in the number of people experiencing malnutrition, with 200 million more people affected compared to pre-pandemic levels. Protein, carbohydrates, and fat are essential components of a healthy diet, and without these important biological macromolecules, children are particularly at risk of stunted growth and wasting. Protein energy undernutrition (PEU) is a specific form of malnutrition characterized by deficient calorie and/or protein intake. Here, we focused on communities in south Asia, central Africa, and Madagascar where PEU has had a significant impact on children. For each region, we tested combinations of various protein sources with specific constraints including the following: availability of protein source, cost, transportation, packaging, storage, and protein and iron content. Each combination of protein sources was identified based on the region's culture, ecological diversity, and dietary requirements of the target demographic. After an initial round of protein content quantification using the Bradford assay, proposals were refined to accommodate additional constraints. We present our findings and recommendations below, with the hope that our ideas for solving PEU could be beneficial to these communities.





**VISUAL COMMUNICATIONS IN GRAPHIC DESIGN**  
**Minor in Computer Science**

Yan Zhang

## **STAC Justly Made- Independent Study of Fair Trade.**

Presenters: Vera Gak Anagrova, Alba Guijo Parra, and Joel Hofstetter

Faculty Advisors: Dr. Deirdre-Noel Engels, Associate Professor Marketing; Dr. Rossen Trendafilov, Associate Professor of Finance

St. Thomas Aquinas College is a Spes Nova Business Development University Partner. The professors Dr. Deidre Noel-Engels and Dr. Rossen Trendafilov organized STAC Justly Made, which sells fair-trade goods. This year we will sell handmade beanies that come from a group of women from Bolivia. Alba Guijo, Vera Gak, and Joel Hofstetter make up our team. STAC Justly Made envisions a better trading method that provides artisans from economically disadvantaged areas with access to global markets and issues STAC students with a collaborative academic experience by establishing a fair trade startup business.

The fair trade system is designed to empower marginalized producers by ensuring that they receive a fair price for their products, and that their working conditions are safe and dignified. Fair trade certification also promotes environmental sustainability by encouraging sustainable farming practices and reducing the use of harmful chemicals.

Fair Trade USA, North America's leading certifier of fair trade products, reports significant growth in its produce category. The Fair Trade system currently works with over 1.70 million farmers and workers. There are 1,707 Fair Trade producer organizations across 73 countries. Fair Trade sales reached over \$8.9 billion from 158 countries. Which is a positive sign that consumers and businesses are increasingly interested in purchasing products that are ethically and sustainably produced, as Fair trade is an important step towards a more just and sustainable global trade system.

## **The Potential of ChatGPT to Disrupt Culturally Responsive Literacy Instruction**

Presenter: Michael Malin

Faculty Advisor: Dr. Cassandra Lo, Assistant Professor of Education; Dr. Staci Shultz, Associate Professor of English; Brett Karopczyc, Professor of Practice, Computer Science

OpenAI's ChatGPT program not only provides students with a seemingly effective way of dishonestly completing assignments, it also has the potential to rob underrepresented groups of these same students from building literacy skills needed to analyze resources/research in a way that is responsive to their own cultures.

Perhaps the most relevant literacy skills needed in today's world are in the domain of information-gathering practices. However, the recent rollout of OpenAI's ChatGPT may serve as a hurdle in ensuring that students develop this literacy. After all, information literacy is seemingly unimportant when students have OpenAI aggregating information for them. If students consistently use ChatGPT to write their assignments, they are losing a valuable literacy necessary for modern life: critically navigating sources of information. Part of the literacy of researching is being able to distinguish for oneself whether a source is biased/focused on perpetuating certain ideals. However, when students are using ChatGPT—a platform that, by OpenAI's own admission, has an inherent emphasis on Western perspectives/stereotypes—they are not provided the opportunity to make their own judgments about a source. The purpose of this study is to gather information through researching bias in literacy instruction, surveying pre-service teachers on AI expansion, and directly experimenting with ChatGPT, concerning how the advent of ChatGPT could negatively impact culturally underrepresented students. Students using ChatGPT, as an easy means of completing assignments, could potentially have their voices overshadowed by the information gleaned from a training dataset that perpetuates “Western” values/norms.

## **Smiles and Visitations Beyond Bars: Incarcerated Fathers and Their Minor Children**

Presenter: Karla Zamora

Faculty Advisor: Ira Promisel, Instructor of Criminal Justice

In the United States, thousands of minor children experience the pain of living without a father due to incarceration. Allowing access to contact visitations in men's correctional facilities can work to reduce barriers such as financial hardships and institutional restrictions. Contact visitations work to produce pro-social/fatherly attitudes, decrease prison infractions, and reduce recidivism rates. Currently, nearly 2 million individuals are serving time behind bars, 93% consist of men. In January 2021, there were approximately 20,786 minor children in New York living with the consequences of having an incarcerated father.

Incarceration may cause multiple negative effects - it severs the incarcerated father's ties with the community, interrupts family dynamics, and increases institutional misconduct. Research suggests that paternal incarceration places a strain on parent-child relationships, increases the likelihood of child delinquency, poor academic achievement, and behavioral problems.

The benefits of contact visitation can be tied to the social bond theory. Social bonds with family can allow for better tolerance to strain during the incarceration period, as prison visitations maintain and strengthen positive bonds through face-to-face interactions. Additionally, they help prevent incarcerated individuals from engaging in criminal behavior after their release, as they allow for the preservation of restored family relationships.

To measure the impact of visits, an analysis will be conducted at Sing Sing Correctional Facility. A survey will be conducted among the incarcerated population with minor children and the types of visits they receive, if any. Data will be collected from the New York State Department of Corrections.

### **The New Normal: How Technology Has Affected Students of Higher Education Post/During the COVID-19 Pandemic**

Presenter: Johnathon Lopez

Faculty Advisor: Carolyn Fraker, Assistant Professor of Sociology

My research is centered on the impact of technology on students of higher education. I investigate both the negative and positive effects of increased tech usage during and after the COVID-19 pandemic. Before I began my research, I predicted that students would report that the increase in technology did not impact them negatively, and I also predicted minimal benefits. This research was a qualitative and micro study that used a semi-structured interview guide.

Two research questions guided my research: (1) How did students of higher education use technology to benefit themselves in school? And (2) How did technology impact the way students of higher education learn during/post pandemic? My research discovered three major findings. First, that students who were forced to use technology during the pandemic used that technology to their advantage, including an increased rate of cheating on class material. Second, that students seemed to embrace earning a “watered down degree” if it meant the process to earning the degree was easier. Finally, I found that online schooling helped reduce anxiety and stress, improving the students’ overall mental health. This study contributes to a growing body of research on the impact of the COVID 19 pandemic on higher education.



# CORNUCOPIA

**AN INTIMATE DINNER PARTY WITH  
HUDSON VALLEY'S CULINARY BEST**

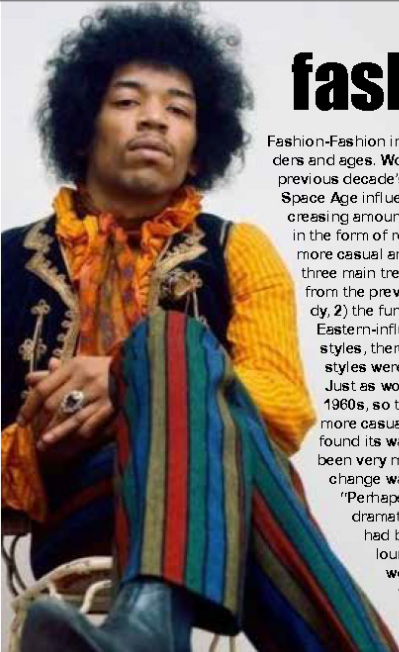
**A BENEFIT FOR MEALS ON WHEELS**

**ROCKLAND**

**VISUAL COMMUNICATIONS IN GRAPHIC DESIGN**

Dyson Hardwick

# fashion



Fashion-Fashion in the 1960s became progressively more casual across all genders and ages. Womenswear followed three broad trends: a continuation of the previous decade's ladylike elegance, the youthful styles of Mary Quant and the Space Age influence, and the late 1960s "hippie" style. Menswear saw an increasing amount of color and pattern, military influence, and new fashion icons in the form of rock stars. Children's wear saw less change, but also became more casual and bright in color and pattern. Broadly categorized, there were three main trends in 1960s womenswear: 1) the lady-like elegance inherited from the previous decade seen on the likes of First Lady Jacqueline Kennedy, 2) the fun, youthful designs popularized by Swinging London, and 3) the Eastern-influenced hippie styles of the late 1960s. Along with these diverse styles, there came a shift in the way that women shopped and for whom the styles were created.

Just as womenswear became more casual and colorful throughout the 1960s, so too did menswear. While menswear began moving towards a more casual style in the 1950s, the frenetic energy of Swinging London found its way with bright prints and colors for men. As there had not been very much movement in men's fashion for over a hundred years, the change was striking. The V&A writes,

"Perhaps the most remarkable development in 1960s dress was the dramatic change in menswear. For the past 150 years, clothing for men had been tailor-made, and plain and sombre in appearance. Now, colourful new elements were introduced, such as the collarless jacket, worn with slim-fitting trousers and boots" (History of Fashion 1900-1970).



## VISUAL COMMUNICATIONS IN GRAPHIC DESIGN

Davontae Johnson

## **XLab: Telling the Story of STAC (1952-Present)**

Presenters: Andrew Dacuba, Katherine Cording, Amanda Pivonka, Franklin Praschil, Izsaak Gonzales

Faculty Advisors: Dr. Staci Shultz, Professor of English; Dr. Stacy Sewell, Professor of History; Nina Bellisio, Professor of Visual Communications; Sr. Peggy Scarano

In Fall 2020, a committee came together to revise STAC's twenty-year-old Mission Statement. What this process revealed was just how little the campus community knew about the history of the College. And so, once the mission was revised, the committee set out to remedy that disconnect. Professors Shultz, Sewell, and Bellisio, along with Board of Trustee Member Sr. Peggy Scarano, established an interdisciplinary XLab Project devoted to telling the story of STAC. Students from History, Visual Design, English, and Communication Studies came together to begin collecting artifacts; they conducted interviews with those members of the community integral to the founding and evolution of the College; they began collecting items to be included in a physical archive; and they started working on designing an interactive, multimedia timeline. The project aims to reveal the history of the college- its roots in the "tradition of study, reflection, and service" as articulated by its founders, the Dominican Sisters of Sparkill-and, in doing so, to deepen the community's connection to the college and to its new mission.

The presentation for Ignite 2023 will involve a creative display:

1. A poster that displays the revised Mission Statement, images from old newspapers and yearbooks, and quotations from the interviews conducted;
2. A few artifacts from the archives on display;
3. A video with clips from some of the interviews we have conducted. We think this kind of creative display will best capture the work we've been doing this past year or so.

## **XLAB: VR, A Virtual Reality Law Enforcement Training Simulation**

Presenters: Meghan Ruane, Shane Cawley, Joseph D'Esposito, Stephen Saffioti

Faculty Advisors: Dr. Benjamin Wagner, Associate Professor of Psychology; Dr. Robert Vermilyer, Professor of Computer Science; Nina Bellisio, Professor of Visual Communications; Dr. Evan Matthews, Associate Professor of Music; Ira Promisel, Instructor of Criminal Justice

As new technology emerges, its applications to the criminal justice system are brought to the forefront of discussions in regard to solving dilemmas related to the field. Virtual reality may be particularly relevant to law enforcement as a new way to train officers for emergencies. Benefits of virtual reality for law enforcement training include cost savings, increased officer safety in



training, and the ability to simulate events that are unable to be simulated in live training. To better determine the specific needs of officers in such training, the XLAB: VR team developed a test environment similar to a FEMA tabletop training exercise. In it, the participant (officer) is tasked with assessing a crowd whose tension and hostility is increasing and making decisions based on resources available and injects (additional problems added to the environment over time) that occur. The goal of this simulation is twofold: to establish that this environment, as a pilot project, has elements that can qualify it as an effective police training tool; and to provide officers that participate with the opportunity to explore this emerging technology as a potential training modality for their department(s). The XLAB: VR team utilized the platform Unity to create the environment, and conducted interviews, both formally and informally, with emergency management professionals, police officers, and information technology professionals in the law enforcement field to develop the environment's narrative.

## **Odocoileus virginianus Browsing Effect on Native and Non-Native Flora Biodiversity in Rockland County, NY**

Presenter: Colleen Stevens

Faculty Advisor: Dr. Bianca Wentzel Associate Professor of Biology

*Odocoileus virginianus* (white tailed deer) is a keystone species native to the Eastern United States that can significantly reduce understory vegetation growth and is capable of affecting the overall biodiversity of the area by preferential browsing. It has been shown that preferential browsing can facilitate the success of non-native plants due to the disproportionate consumption of native plants, as well as decreasing competition for resources. In this study, we hypothesized that if *O. virginianus* are excluded from a woodland area via fencing, then that specific site will obtain a greater level of biodiversity, increased native species composition, and increased floristic quality. In February 2023, five 10x10m fenced plots and five 10x10m open plots were established in Kakiat Park in Rockland County. Weekly browsing activity was recorded in all ten plots. Vegetation surveys using a nested quadrat design are planned for May and August 2023 (beginning and end of the growing season, respectively), after which the floristic quality, biodiversity, and proportion of native plant species will be compared. The results of this study will provide important information about the impact of this keystone species in local ecosystems, as well as information that can be used in vegetation conservation and park management efforts.





## **A Cost Comparison of LEED-Certified and Non-certified Buildings**

Presenter: Isabella O'Hara

Faculty Advisor: Dr. Meghan De Witt, Associate Professor of Mathematics

As LEED accreditation becomes increasingly popular, the implication on college campuses increases as well. The purpose of this study is to compare the annual resource cost of a LEED-accredited building to an equivalent non-accredited building on a college campus. The comparison will be made with resource data and will be done using cost benefit analysis on Excel. The analysis will compare non-accredited cost to accredited cost over a chosen amount of time. The hypothesis for this study is that the LEED accredited buildings resources will be reduced compared to non-accredited buildings.

## **A History of the Western Prison: Studying “Angola”**

Presenter: Meghan Ruane

Faculty Advisor: Dr. Neerja Chaturvedi, Professor of History

Louisiana State Penitentiary- dubbed “Angola” as a reference to the slave plantation that was once in its place- has gained notoriety for its history, architecture, and religious culture that characterizes the prison- and particularly its former warden, Burl Cain. In this presentation, one looks to examine the first amendment religious liberties violations that have been perpetrated against the incarcerated individuals of Louisiana State Penitentiary and explore how these first amendment infringements are contextualized by that of the western prison. How has the western prison, particularly the American prison, been shaped by imperialism; by religion? How have the tenets of Enlightenment-era thinkers and their students been used to create the penal system known today? Utilizing the works of Cesare di Beccaria, father of criminology; Jeremy Bentham, Victorian-era utilitarian; detailing of the history of the American prison; and the religious liberties violations contemporarily faced at Louisiana State Penitentiary, one can connect the penal practices of Imperialist Britain to the lawsuits filed on behalf of those incarcerated at Angola by the ACLU today. In studying Angola in this manner, one must posit the implications of such a contextualization: What drives these violations of religious freedoms? What allows them to continue?

## **Exploring the Support Systems for English Language Learners in New York State**

Presenters: Kayla Cordero, Kayla Lemus Marroquin, Amilinda Rivera

Faculty Advisor: Nydia Prishker, Assistant Professor of Childhood Education

The New York State Department of Education has laws protecting bilingual students that mirror federal education laws, and which align with New York

State Next Generation Standards. The aim of a Bilingual and/or English as a Second Language (ESL) program is to support students labeled as English language learners or emergent bilinguals to make progress to academic proficiency. The data and information compiled and analyzed in this study describes the impact that these intended programs have for both English Language Learners and Bilingual Students. Investigation of these laws led to the finding that there is a disconnect between districts across the state on how they assess culturally and linguistically diverse populations to classify them as Bilingual or ESL. Based on such classification districts offer an array of different supportive programs for Bilingual and English Language Learners. This poster describes the Bilingual and ELL populations served by three different neighboring school districts and the specific programs offered to these culturally and linguistically diverse students.

### **The Effect of Implied Social Norms on Pro-Environmental Behavior**

Presenters: Phoebe Hemmerling

Faculty Advisor: Dr. Benjamin Wagner; Associate Professor of Psychology

This study aims to investigate if knowing the social norm affects the participant's behavior when choosing to donate money to an environmental organization. When participants agree to sign up for the study, they are informed that they will receive \$1 as compensation for their time. Upon completion of a questionnaire gauging their environmental opinions, they will be provided with an option to donate to an organization that uses donations to help the environment. One group of students will be provided a message implying that most people choose to donate. It is hypothesized that those provided with this message will, on average, donate more to the organization.

### **Biofuel Production with Synthetic Yeast**

Presenter: Karolina Jaruseviciute

Faculty Advisor: Dr. Stephanie Lauer, Assistant Professor of Biology

2022 has been one of the sixth warmest years on record due to greenhouse gas emissions. Deforestation and fossil fuel burning has led to a vast increase in carbon dioxide, methane, and nitrous oxide emissions contributing to global warming. In order to decrease reliance on fossil fuels, scientists are investigating the use of materials from the environment that are less harmful. Specifically, there has been a focus on biofuels which can be created from plants, such as corn, that are processed using a series of techniques in order to make ethanol for fuel. In my research I will be focusing more on the technique of fermentation with the help of synthetic yeasts in order to break down the biomass. Yeasts are cheap, easy to grow, and capable of fermenting sugars into ethanol, which allows

us to blend it with gasoline in order to decrease carbon monoxide emissions. The biomass will consist of a plant organism that will be broken down for its cellulose using a genetically modified yeast in order to increase its efficiency in fermentation to produce ethanol. In previous studies, people have altered gene expression of alcohol dehydrogenase, changed metabolic pathways of fatty acid synthesis, and used a variety of yeasts with different ethanol tolerance. In this project, we propose genome modifications to the budding yeast, *Saccharomyces cerevisiae*, in order to create biofuels. With this research we will be able to make strides towards helping to sustain our environment and decrease global warming.

### **XLAB - Bystander Effect in Virtual Reality**

Presenters: Matthew Otterstedt

Faculty Advisors: Dr. Benjamin Wagner, Associate Professor of Psychology

The study proposal will test the theory of the bystander effect (see Latané & Darley, 1968) in virtual reality. The bystander effect is a phenomena where individuals are less likely to help when in the presence of others. The hypothesis is the bystander effect will not be demonstrated due to circumstances of being in virtual reality. In virtual reality, there are many barriers to helping an individual. For example, they will not be able to physically help, they are anonymous, and they may see a virtual reality space like a video game where participants who do check out the distress do it when they would not do it in real life. The project was created with a multidisciplinary team of XLAB students.

### **The Effects Of Certain Phytochemicals On The Longevity Of *Caenorhabditis Elegans***

Presenter: Eliza Mulder

Faculty Advisor: Dr. Clara Toth, Professor of Biology

Bioactive phytochemicals can be found, among other things, in raspberries, blueberries, and cranberries and are compounds produced by plants. Research has shown that phytochemicals have a positive influence on the health of our bodies. They help protect cells from damage that could lead to cancer, slow the growth of cancer cells, reduce inflammation and regulate hormones. *Caenorhabditis elegans* are tiny worms that can be grown on media and use *Escherichia coli* bacteria as their food source. By adding fruit extracts containing phytochemicals to their nutrition, they are able to tolerate stress, have a smaller risk of developing illness, and therefore live longer. *C. elegans* is a good model organism for research because it has the physiological properties of an animal, a short life cycle, and it can replicate human diseases. Therefore, if *C. elegans* do live longer due to the actions of phytochemicals on the health of their body, human bodies can benefit from the positive effects of phytochemicals.

## **Analysis of Plastics using Fourier Transform Infrared Spectroscopy**

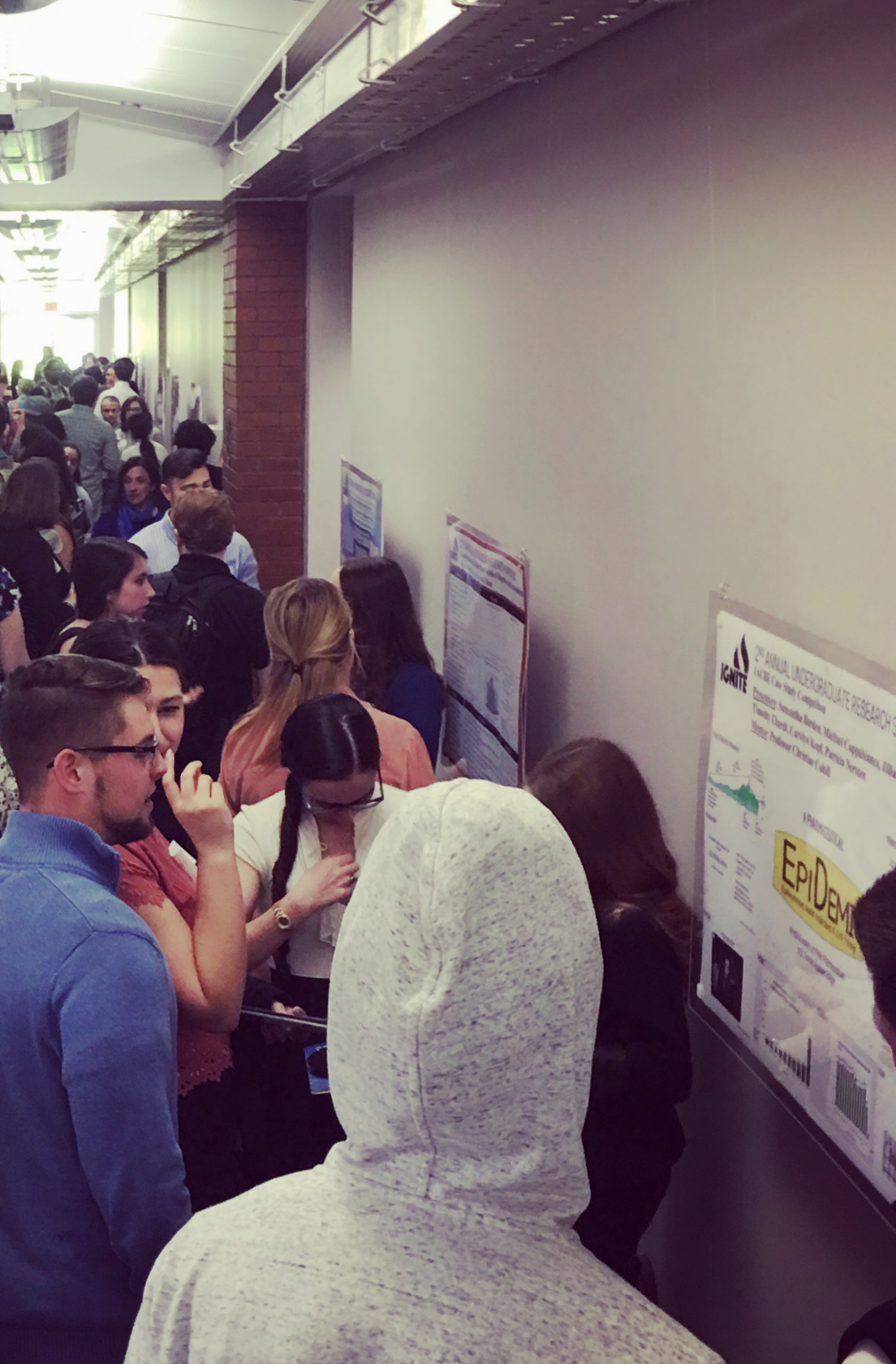
Presenter: Eliza Mulder

Faculty Advisor: Dr. Steve Burns, Professor of Chemistry

FTIR is a technique that provides infrared spectra from different samples which can be used to identify or qualify a sample. An infrared spectrum can be seen as a chemical composition “description” of the specific structure of a sample. This structural representation is based on the fact that FTIR uses infrared light, which either transmits through the sample or gets absorbed by the sample. FTIR makes use of interferometry which is the method of receiving information about a sample in the IR beam based on the phenomenon of interference of waves (light). This information is then converted into a spectrum. Some bonds in the analyzed material absorb or transmit the radiation and thus they will create different IR spectra. Plastics can be distinguished from each other by the polymer composition and arrangements which will show in the IR analysis. Analyzing certain plastics with FTIR creates a library so unknown plastics can be easily identified.







# AZARIAN MCCULLOUGH ART GALLERY

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AZARIAN MCCULLOUGH  
ART GALLERY

 ST. THOMAS AQUINAS COLLEGE

