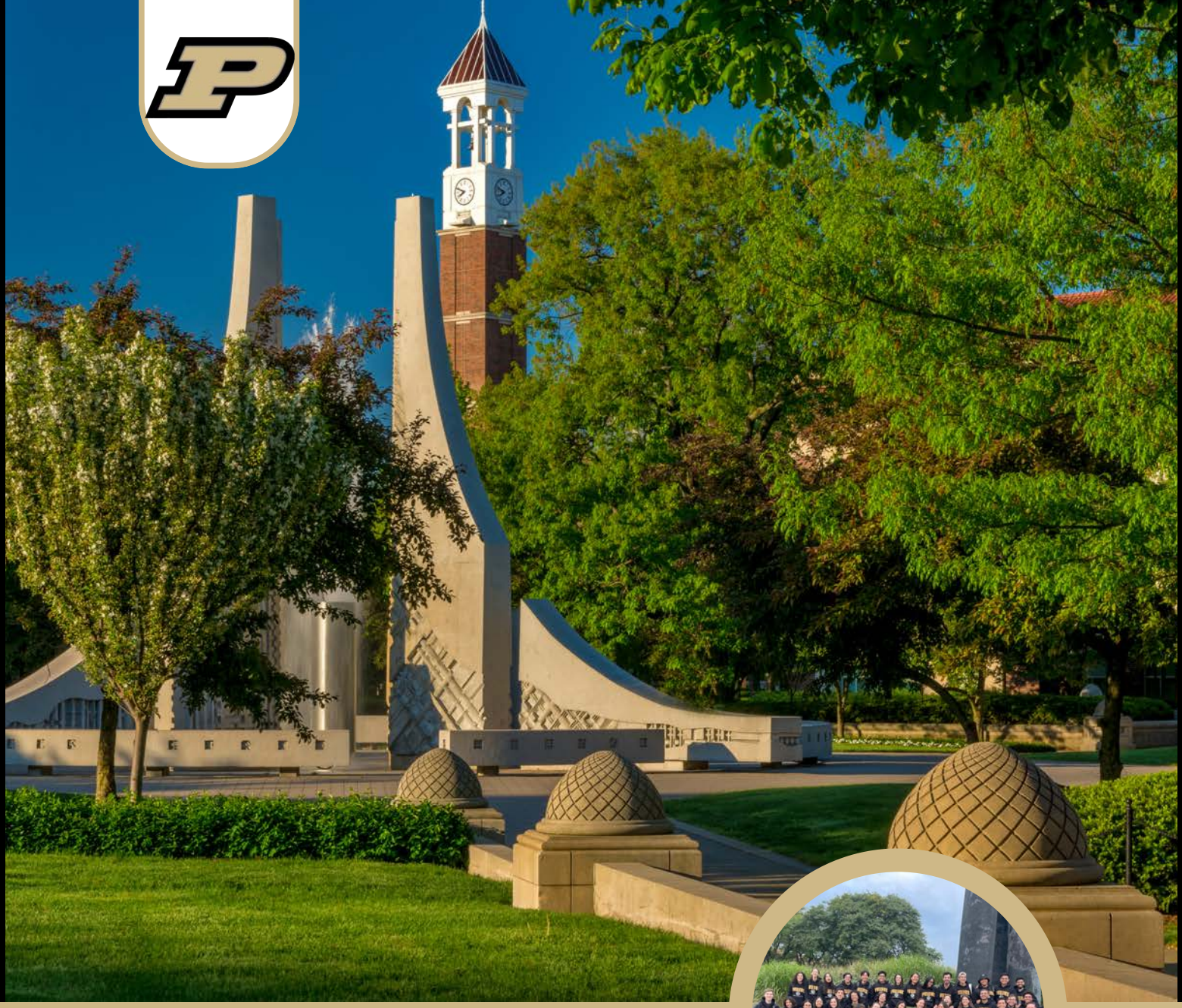

2023-2

UREP-C & NEXO CALDAS

FINAL SYMPOSIUM

UNIVERSIDAD NACIONAL DE COLOMBIA
UNIVERSIDAD DE CALDAS
UNIVERSIDAD ICESI
UB
IHS
Pontificia Universidad JAVERIANA Bogotá
UNIVERSIDAD EAFIT
Universidad de los Andes

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ABOUT UREP-C & NEXO CALDAS

The Undergraduate Research Experience at Purdue - Colombia (UREP-C) is a forward-thinking program that offers students from different universities in Colombia, the opportunity to take part in a research group at Purdue University. The calls for applications are open twice a year and students are subjected to several selection filters to finally be accepted by a professor who works in the corresponding area of knowledge and who will be his or her advisor for the entire research stay (six months).

Initially, the program was only open to a few students from the Universidad Nacional de Bogotá. Subsequently, other universities in the country were included, such as the Universidad Nacional in Medellin, Universidad Icesi, Universidad Javeriana, and in this occasion, Universidad de Los Andes, Universidad EAFIT and Institución Universitaria de Barranquilla, welcoming the biggest group that the program has seen so far.

Nexo Global Rural of the University of Caldas is a program that seeks to promote scientific vocations for students with academic excellence from Caldas through research experiences at Purdue University. To date, 35 undergraduates enrolled in programs related to rural studies have had the opportunity to be part of this mobility program. Purdue University welcomes the sixth cohort from the Nexo Global Rural program.

Both programs allows visiting scholars to strengthen their research abilities by developing projects guided by qualified professionals and to take part into the amazing cultural scene that Purdue offers. This unique international experience makes inclusion a reality and creates a bridge between countries by generating transformative projects in a variety of fields.

JUAN DIEGO VELÁSQUEZ DE BEDOUT

Juan Diego Velásquez joined the Office of Global Partnerships in 2018 and currently serves as the Assistant Director, Global Partnerships; Director, Latin American Programs; and Director, Colombia Purdue Partnership (CPP). He is a connector of people, a builder of strong relationships, a dedicated facilitator of partnerships, and an innovator of programs that reach across the university and across Colombia. He is passionate about bringing Purdue to Colombia and Colombia to Purdue. He currently assists the Colombian Student Association at Purdue and is the academic advisor for the Society of Hispanic Professional Engineers.

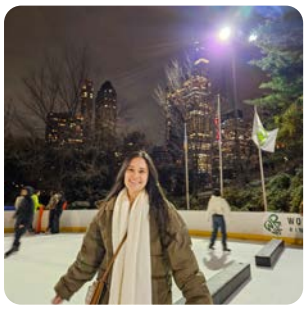
We want to recognize and thank Juan Diego for all his work during this version of UREP-C 2023-2. He gave us the opportunity to come to Purdue, guided us during the process and supported us throught our stay here, helping us to develop as better professionals and persons, to make new wonderful friends and to create beautiful memories that will accompany us during our whole life. Thank you Juan Diego!

LUZ INÉS TASCÓN-VILLA

Lucy holds degrees from Universidad San Buenaventura, Universidad EAFIT, as well as a Master of Science in Telecommunications from the University of Colorado at Boulder. She joined Purdue in December 2021 when she started working for the Arequipa Nexus Institute, and since June of 2022 she is also helping the Colombia Purdue Partnership and the Office of Global Partnerships.

Lucy was an incredible support during this last few months, we could always count on her and she made the adaptation process easier for all of us. She and her husband Gabriel are an inspiration to all of us and we will be forever grateful for the part they took during our stay. Thank you Lucy and Gabriel!

COLLEGE OF AGRICULTURE



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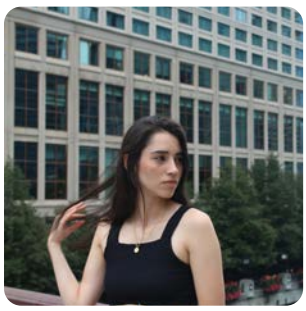

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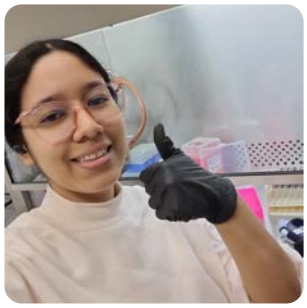

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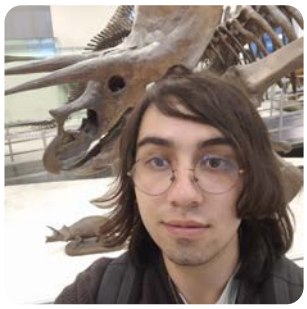

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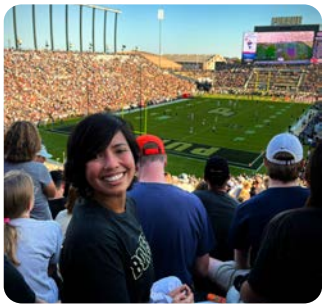

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COLLEGE OF AGRICULTURE

ALEJANDRA ARIAS LÓPEZ

AGRONOMY

ENHANCING SOIL LIFE THROUGH ORGANIC SILVOPASTORAL SYSTEMS: A COMPARATIVE ANALYSIS WITH TRADITIONAL EXTENSIVE SYSTEMS

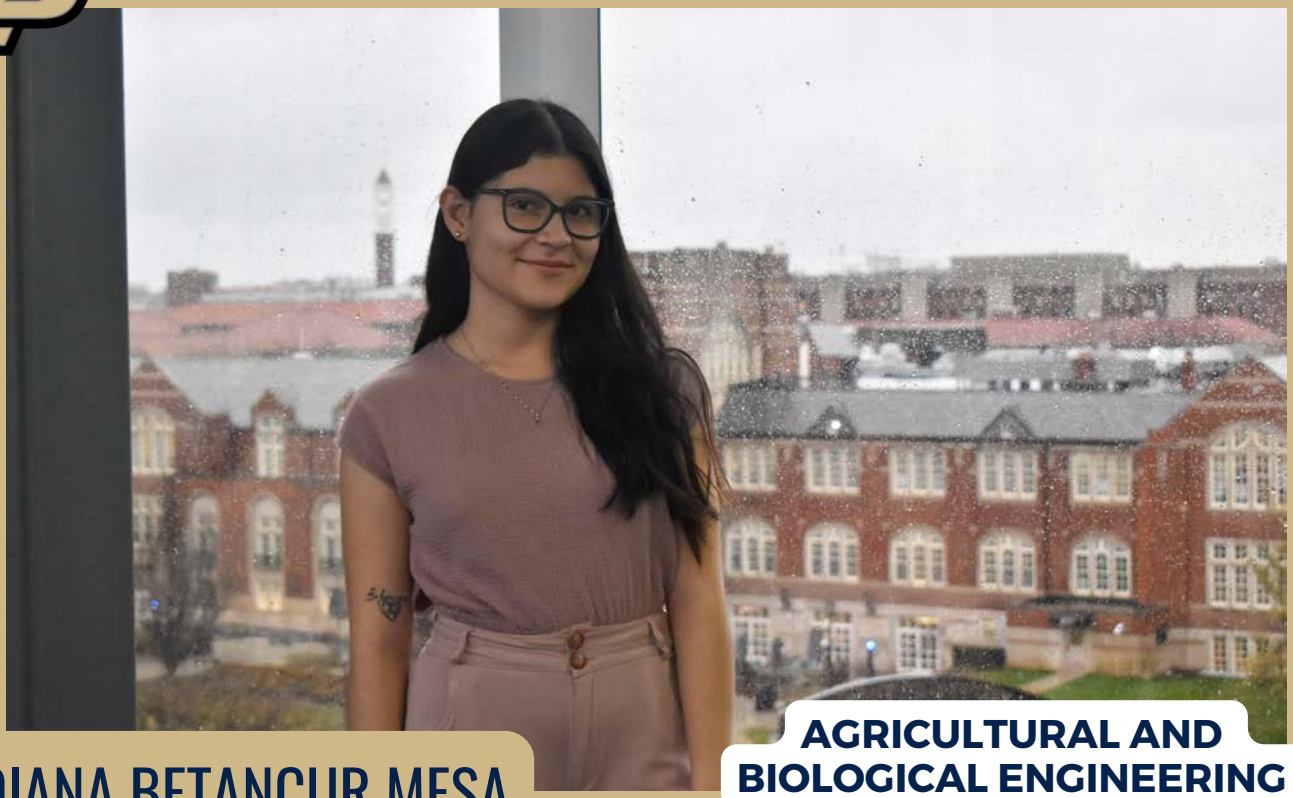
Advisors: Dr. Jeffrey Volenec & Dr. Carolina Zamorano

My concern about the environmental crisis transformed into a desire to contribute to the search for solutions; when I started my undergraduate studies at Caldas University, I knew that there was a lot to do in my field. The way in which traditional livestock farming is carried out has an impact on the environment and this is why agro-sustainable systems such as silvopastoral systems that integrate native trees and forage have become relevant. In that sense I was interested in evaluating the impact that implementing these systems in livestock productions can have in the soil life. Here at Purdue, I had the opportunity to work with Professor Jeffrey Volenec and his team, with whom I learned about different measurement techniques such as compaction, temperature, greenhouse gases, soil nutritional analysis, which are carried out to learn more about detailed soil structure, microbial diversity, and nutrient availability. With this I hope to contribute to the future, to have a more sustainable land management in my country, prioritizing both, agricultural productivity, and soil health.

I know that this semester at Purdue University marks a before and after in my life since I have acquired skills and knowledge that no other experience would have given me. I feel the most important skill I developed is my ability to adapt to change, I believe that the only constant in everyone's life is change, and therein lies the importance of knowing how to overcome the adversities that arise daily, facing each of them with maturity, and making decisions that bring us closer to our goals and dreams.

I want to thank Caldas University and Purdue University for this opportunity. Thank to my advisor Jeffrey Volenec, and Niki, Malley, Mayara and Mandana with whom I worked during this time and who gave me all their support and help. They have been fundamental for my growth and training. I am grateful for my family, colleagues, and friends who were the ideal company to overcome the different obstacles. Finally, thank you to the Colombia Purdue Partnership team for the great management they do to make everything work in the best way.

-- Something I will never forget is the trip I made alone to Chicago to go to my favorite artist's concert on my birthday.



DIANA BETANCUR MESA

AGRICULTURAL AND BIOLOGICAL ENGINEERING

PRODUCTION OF ORGANIC ACIDS BY MICROORGANISMS / SMALL SCALE LIQUEFACTION OF CORN STOVER.

Advisors: Dr. Michael Ladisch & Dr. Rigoberto Ríos Estepa

Interning at Purdue University in the Laboratory of Renewable Resources Engineering (LORRE) under the guidance of Dr. Michael Ladisch has been an enriching and transformative experience. Working alongside my mentor, Diana Ramirez, a PhD candidate, has provided me with invaluable insights into the world of renewable resources and bioengineering. My primary responsibilities involve contributing to the enhancement of the small-scale liquefaction process for corn stover biomass utilizing enzymes. This work not only aligns with sustainable practices but also delves into the realm of bioenergy and alternative resources. Additionally, I have actively participated in the development of a protocol for fungal organic acid production, a project that adds a layer of complexity and significance to my internship.

One of the highlights of this internship has been witnessing positive results emerging from our research efforts. The small-scale liquefaction process improvements have shown promise, and the design of the organic acid production protocol has yielded encouraging outcomes.

As we move forward, our focus is now on the development of a downstream process for organic acid recovery. This phase represents a crucial step in translating our laboratory findings into practical applications, bridging the gap between research and real-world impact.

On the other hand, I found myself incredibly captivated by the opportunity to learn how to operate advanced laboratory machines. The prospect of delving into these sophisticated analytical instruments is not only exciting but also a pivotal step in enhancing my analytical skills. The intricacies of HPLC (High-performance liquid chromatography) and its counterparts present a unique challenge and an invaluable learning experience, especially as I aim to navigate through the technical language associated with these instruments. In conclusion, my internship at LORRE has been instrumental in shaping my understanding of renewable resources engineering, and it has fueled my passion for sustainable solutions.

-- Something I will never forget is the girls who helped me when I didn't know how to ask for help.

CRISTIAN CAMILO CABRERA CASTELLANOS

ENTOMOLOGY

EVALUATION OF THE PERSISTENCE OF ENTOMOPATHOGENIC NEMATODES, STEINERNEMA FELTIAE & HETERORHABDITIS BACTERIOPHORA IN MINT POTS

Advisors: Dr. Elizabeth Long & Dr. Carolina Zamorano

I am inspired by finding answers to agricultural problems and I feel motivated to contribute to the development of rural societies. This allowed me to be part of a great academic experience in the entomology department at Purdue University. My time here never stopped surprising me, and transcended from a personal experience to impacting every corner of what makes me a person. I didn't feel like I had a limit to what I wanted to do. I will never want to forget meeting people from many parts of the world, learning a new language, deepening my professional knowledge and allowing me to achieve my dreams.

At Purdue, I had the meaningful opportunity to work hand in hand with Dr. Elizabeth Long and her team, in the evaluation of the persistence in the soil of entomopathogenic nematodes. As a potential biological control alternative for the control of an important pest that causes economic losses in mint cultivation in Indiana, known as Asiactic Garden Beetle (AGB).

Together, we had the opportunity to work in the field and laboratory to learn about pest monitoring techniques in mint crops, reproduction of nematodes in the laboratory, and observation of the infection symptoms in hosts.

Expanding my ties with great professionals in the area makes me feel confident that I want to be part of a prepared academic society that is dedicated to research.

I feel like I do not have the words to thank all the people who made my life more colorful these months. Thanks to Isabella, Juan, and Saif for being my daily smile, sharing my adventures and supporting me when I needed it. Thank you to Dr. Long and Connor for guiding me, teaching me, and motivating me to do research. To my family, thank you, for always supporting me and giving me love from a distance.

-- Something I will never forget is every person I met, every laugh with my friends, the fall and winter, the eight states visited, and every new experience will be a wonderful story to always smile.

JUAN PABLO CARDONA SOTO

AGRONOMY

IMPACTS OF ECOLOGICAL INTENSIFICATION PRACTICES ON SOIL ACTIVE CARBON IN ORGANIC GRAIN PRODUCTION SYSTEMS IN THE UPPER MIDWEST

Advisors: Dr. Yichao Rui & Dr. Carolina Zamorano

Agricultural soils are the pillar of global nutrition; ensuring healthy soil conditions will be reflected in better quality foods. Organic grain production in the upper Midwest is typically very simple and recognized by high tillage, which generates a deterioration. Ecological intensification improves the soil health using beneficial microorganisms in seed treatment and the reduction of tillage, for a better soil properties and crop productivity. The objective of this research is to evaluate the relationship that ecological intensification practices have on active carbon content and their effects on soil health in the Upper Midwest.

During my six-month internship, I participated in several soil samplings in Indiana, processed and stored them for lab analysis. The laboratory that I worked in focuses on agroecology, chemical and biological properties of the soil by evaluating the active carbon content, enzymatic activity and DNA.

Being at Purdue has been one of the most enriching experiences of my life. My personal, cultural, academic, and professional growth during this time will shape my future. I would like to express my gratitude to everyone who has been part of this journey. Special thanks to the Nexo Global Program, Caldas University, Purdue University, my research group, and, especially, my advisor, Professor Yichao Rui. He welcomed me with open arms into his laboratory and provided unwavering support and guidance throughout these months. I also want to extend my thanks to the entire Colombia Purdue Partnership team and my English professor, Hannah Bush, for their invaluable help and dedication. Finally, heartfelt thanks to all the amazing people we met during these six months, especially Aleja, Cris, and Diva, who have become cherished individuals in my life.

-- I will forever cherish every moment spent with my friends, the meaningful conversations, the exciting trips, the shared laughter, and the unforgettable experiences. These memories are etched in my heart with profound affection.

CARLA VICTORIA CUETO YEPEZ

FORESTRY AND NATURAL RESOURCES

IDENTIFYING AND CLASSIFYING PLANTABLE SPACE IN THE CHICAGO REGION

Advisors: Dr. Brady Hardiman & Clara Villegas

Trees have recently been considered to be critical infrastructure in cities, because they provide a great number of ecosystem services and social benefits that are key to urban residents' quality of life. But because we now know inequality to be a shaping factor of cities, it is increasingly evident that factors such as income, race and education are related to uneven distribution of canopy cover. It is within this context that new policies seek to establish, particularly in underserved communities, the critical infrastructure that trees represent in cities. To do so, a crucial step is the identification of grass areas where trees could potentially be allocated, and an exploration into the characteristics of plantable spaces that serve as a valuable resource to city planners. To achieve it, technical activities to find plantable space and understand the characteristics of these areas involved using GIS, remote sensing techniques and data analysis to calculate NDVI values, generate height masks, and classify grassland cover using a Random Forest algorithm.

The most important finding was that disadvantaged neighborhoods exhibit a higher plantable ratio compared to non disadvantaged ones. This finding challenges historical narratives of environmental disparities, and suggests that communities traditionally deprived of the benefits of trees may, in fact, hold the potential to reverse this trend. This experience was very meaningful for me, both academically and personally. I gained insights into a previously unknown area of study, built connections with incredible individuals, and forged friendships that will accompany me for a lifetime. I want to express my gratitude to Juan Diego Velásquez and Lucy Tascón for the logistical support that enabled me to live this experience, and to the Forest and Urban Systems Ecology laboratory for opening its doors to me and for teaching me so much during my time at Purdue.

-- Something I will never forget is just as the trees I studied, I felt myself transforming. I learned from them the art of letting go, and trusting the promise of renewal that comes with each spring.

MARIA CAMILA ESCOBAR HERRERA

BOTANY AND PLANT PATHOLOGY

UNDERSTANDING COTTON FIBER DEVELOPMENT BY IMPROVING TISSUE CULTURE AND TRANSIENTLY GENE EXPRESSION PROTOCOLS

Advisors: Dr. Daniel B. Szymanski & Dr. Johana Carolina Soto

The cotton fiber produces more than 90% of the value in a cotton crop, representing an economically important product worldwide. Cotton is the most common natural fiber in the textile industry. It is employed in a wide range of products of daily use, especially in our clothes. The development of cotton fibers is highly regulated by different expressions of the genes. Most of them are transcription factors since they are master regulator proteins associated with the development of phenotype expression. Understanding profile gene expression during the developmental time course of fiber cotton provides a closer approach to discover candidate genes associated with growth in cotton.

During my internship I have participated in several projects aiming to understand cotton fiber development in cell and protein scale.

Doing an immersion at Szymanski lab, our goal required the implementation of a methodology that aids strengthening tissue culture and transiently gene expression protocols. This helped us to validate candidate genes and link them to known phenotypes of main stages in the development of cotton fibers. Our methodology involves not only the amelioration of protocols such as culture ovules as an efficient in vitro growth system, but also particle bombardment commonly known as transient gene expression. I have used this technique as an innovative tool to express target genes in plant tissues such as cotton ovules, particularly expressing genes in fiber cells. Furthermore, I sought to obtain positive results with known fiber specific expressed promoters through the promoter-reporter systems.

During my time at Purdue, I was able to learn different laboratory and research strategies in order to improve my academic and professional skills. While working at Szymanski Lab and being guided by Prof. Daniel B. Szymanski, postdocs Alex Howell and Youngwoo Lee, and research laboratory colleague Eileen, I gained strong skills to continue my journey as a woman in research. I am grateful for being part of such a special group that provided me with their mentorships, patience and willingness to share their knowledge. Many thanks to all the people that made this experience even better than I expected.

-- I will always remember every single night, sharing my deep thoughts to my lovely roomies, sitting on the floor next to the kitchen and my door

ANGELLY ZHARICK GUARIN PAVA

AGRONOMY

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS): BEHAVIOR, DETECTION, AND CASE STUDY IN THE WABASH RIVER

Advisors: Dr. Linda Lee & Dr. Santiago Cardona

Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic chemicals that have globally proliferated since the 1940s, widely used in various industrial and commercial applications such as firefighting foam, clothing, manufacturing, and non-stick cookware. Their chemical properties make them versatile but have led to pervasive environmental presence, bioaccumulating in humans, animals , and ecosystems, raising concerns about health effects even at low exposure levels.

During this period, we conducted the processing of samples from the Wabash River and its tributaries to measure PFAS levels. Applying the SPE methodology (solid-phase extraction), we successfully separated this contaminant from the aqueous phase for subsequent drying and analysis through LC-MS. Obtaining these data provides crucial insights into the pollution levels affecting both inhabitants and ecosystems.

Furthermore, this analysis enables us to identify potential sources of contamination, contributing to a deeper understanding of environmental issues in the region.

I want to express my sincere gratitude to Dr. Lee, my advisor, for being a cornerstone and an essential guide throughout this process. I consider myself fortunate to have had the opportunity to work alongside her team, which undoubtedly has significantly contributed to my professional development. I also wish to acknowledge the valuable contributions of Juan Diego and Lucy, who have excelled in managing all the necessary aspects to bring this experience to life. My heartfelt thanks go out to each of my UREPC partners, who have shared this journey with me, turning it into a rewarding and unforgettable experience. To all of you and the friends I made in this process, I want to convey that you always hold a special place in my heart.

.

-- Something I will never forget is the day we made empanadas for our host Familly's lunch and we ended up eating at 10 pm.

NATALIA LUCIA LOZANO BERNAL

FORESTRY AND NATURAL RESOURCES

IMPACT OF ECONOMIC GROWTH ON COLOMBIAN FORESTS: AN EMPIRICAL STUDY, TESTING THE EKC THEORY

Advisors: Dr. Mo Zhou & Paula Andrea Navarro

Deforestation in Colombia is a growing concern, particularly in 2019 when the country lost an area equivalent to 400 football fields, with 58% of this occurring in the Amazon region.

Recognizing the magnitude of this issue, in collaboration with Dr. Mo Zhou from the Department of Forestry and Natural Resources at Purdue, we examined the applicability of the "Environmental Kuznets Curve" (EKC) to the Colombian context. Our study focused on the relationship between economic growth and deforestation at the departmental level, exploring influencing factors.

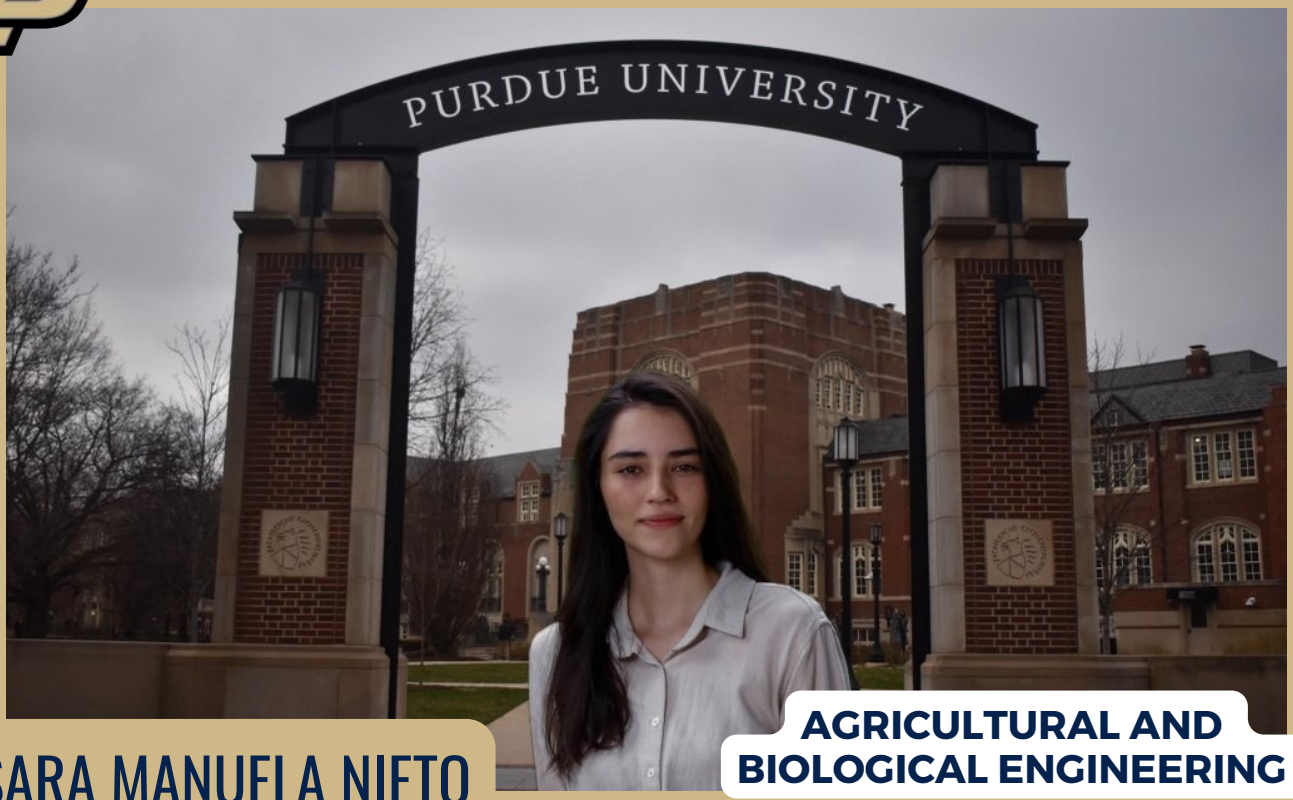
During my research at Purdue, I conducted a comprehensive non-experimental study, including defining the research scope, collecting data from various sources, reviewing environmental economic literature, and organizing databases. Using R Studio, I applied econometric and statistical techniques to analyze results from three regression models, selecting the most fitting one. The process concluded with hypothesis verification and interpretation of findings.

Additionally, I took a class on remote sensing at Purdue, gaining insights into forest changes and hands-on experience with Erdas Imagine software.

Beyond academia, this experience fueled my passion and shaped my personal and professional goals. Being part of Purdue's salsa group not only improved my dance skills but also expanded my social circle, creating treasured friendships. Furthermore, I had the opportunity to travel to three cities in the US, including Chicago, New York and Indianapolis, where I gained valuable exposure to diverse cultures and shared unforgettable moments.

I express heartfelt thanks to God, my family, the program, Purdue University, my friends and my roommates for making these six months the most enriching period of my life.

-- Something I will never forget is the moment when I danced salsa in Times Square, New York. It brought me joy, as I indulged in my favorite hobby amidst the vibrant atmosphere of one of the most iconic cities for this genre.



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AGRICULTURAL AND BIOLOGICAL ENGINEERING

IDENTIFYING WILD RICE (MANOOMIN) USING MULTISPECTRAL SATELLITE IMAGES IN THE GREAT LAKES REGION.

Advisors: Dr. Keith Cherkauer & Dr. Edier Aristizábal

Great Lakes Native Nations are particularly vulnerable to coastal change because water and coastal ecosystems are crucial for their livelihood, sustenance, cultural practices, and well-being. This project seeks to improve our understanding of Manoomin (wild rice). Utilizing high-resolution multispectral satellite images to determine the areas in lakes where Manoomin grows, providing a tool that can be used to better understand Manoomin and contribute to further its resilience.

For this project, I collected multispectral satellite images from sources such as USGS and Planet, applying filtering based on visualization parameters, as well as spatial and temporal conditions. With the use of ArcGIS Pro and ENVI, I conducted postprocessing of the satellite images, this involved adjusting the extent, enhancing image quality, and executing band operations to compute the RNDVI index for Totagatic, Pacwawong, and Dilley lakes during the months of May and August, in which the Manoomin is sprouting from the water and ready for harvest, respectively. I iterated through this process for the years spanning from 2018 to 2023.

This research stay has been a remarkable journey, it not only helped me improve my language skills but also allowed me to learn and appreciate a new (and a bit eccentric) culture. I'm grateful for the chance to experience firsthand how the academic world works and realize the number of opportunities that are within my grasp. The knowledge I acquired during these 6 months has been immense, and I'm sure it'll be most valuable for my future projects. Thanks to Colombia-Purdue Partnership team for their unwavering and selfless support, to the Purdue Hydrological Impact Group and everyone else who was a part of this journey.

-- Something I will never forget is how startling the natural beauty of the country is. Some sights and landscapes will remain among the fondest memories of these months.

SARA NORATO CRUZ

HORTICULTURE AND LANDSCAPE ARCHITECTURE

EXPLORING THE IMPLICATIONS OF NANOPLASTICS ON ROOT-ASSOCIATED MICROBIOMES.

Advisors: Dr. Lori Hoagland & Dr. Alejandro Caro Quintero

Nanoplastics are a type of small-sized contaminant present in multiple environments. These particles that might represent a threat for human health have been found in some edible plant organs of different species, however, further efforts are still needed to gain understanding around the implications for plants from nanoplastics exposure, especially around factors that may influence plant health, as is the case of the microbial communities associated (better known as plant microbiome).

Dr. Hoagland Soil Microbial Ecology Lab has been conducting experiments that aim to understand the effects of nanoplastics exposition on the root microbiome of lettuce and tomato plants under controlled conditions, and to which I had the opportunity to collaborate during my time at Purdue. This research project and other ongoing investigations at the laboratory allowed me to acquire experience on the usage of different molecular biology techniques and bioinformatic tools involved in the study of plant microbiomes through targeted sequencing workflows for microbial phylogenetic markers.

UREP-C has definitely been an experience that I will cherish with great affection, since it certainly marked a before and an after in my personal and professional life, allowing me to delve into research topics that I am passionate about, but at the same time giving me the tools to immerse myself in a multicultural environment and have a broader perspective of my field of study. I would like to extend my sincere thanks to the Dr. Lori Hoagland and all the lab members for receiving me and kindly guide me through this unique research experience, to the Universidad Nacional de Colombia and all the team behind the UREP-C program for granting me this opportunity, and lastly but not least to my family, God, my friends and all the people that I meet during this journey for their support, advices and comprehension.

-- Something I will never forget is how enriching this experience was on a personal level, which through the days taught me the importance of adapting to change and never stop pursuing my dreams or goals.

JUAN DAVID PEÑA RONCANCIO

BOTANY AND PLANT PATHOLOGY

DEVELOPMENT OF PREDICTION TOOLS FOR DISEASES AND MYCOTOXINS AFFECTING CORN TO BETTER INFORM MANAGEMENT DECISIONS AS PART OF THE NATIONAL PREDICTIVE MODELING TOOL INITIATIVE (NPMTI)

Advisors: Dr. Darcy Telenko & Dr. Adriana Gonzalez Almario

Tar spot poses a growing threat to corn cultivation throughout the United States, induced by the fungal pathogen *Phyllachora maydis L.*, an obligate biotroph. This disease has now established a presence in various states within the Midwest corn belt, resulting in substantial yield losses. Despite its escalating prevalence, our comprehension of the disease's biology and complete life cycle remains incomplete. Nevertheless, it is apparent that *P. maydis* can overwinter, thriving under specific weather conditions conducive to disease development. To effectively manage and alleviate the impact of tar spot, the development of epidemiological predictive models is imperative. These models will facilitate informed decision-making and the implementation of integrated disease management strategies, encompassing debris management and the forecasting of epidemiological patterns. In Dr. Darcy Telenko's laboratory, efforts are directed towards this objective through field trials conducted in various locations. One particularly intriguing trial, in which I had the opportunity to participate, focused on establishing the association between inoculum intensity, disease development, and weather in small plot trials. The project aims to predict tar spot risk by monitoring not only tar spot but also other diseases like gray leaf spot, northern corn leaf blight, and ear rot in corn. I was responsible for identifying and rating disease severity, collecting samples and data on field and data analysis.

My motivation to study agronomic engineering has always been to equip farmers, food producers, and decision-makers with practical and useful tools. I strongly believe that the experience gained in Dr. Telenko's laboratory has broadened my perspective, bringing me a step closer to achieving these objectives. It has inspired and motivated me to advance in my academic and professional development.

I would like to express my sincere gratitude to Dr. Darcy Telenko, Sujoung Shim and the rest of the lab team for their invaluable lessons and unwavering support, which have made this experience truly enriching and rewarding.

-- Something I will never forget is visiting the locations from movies I've always loved in Chicago. However, the best part was undoubtedly sharing birthdays and casual get-togethers in the living room with my new brothers Alejo, Pipe, and Nico --

SARA PÉREZ VÉLEZ

AGRICULTURAL AND BIOLOGICAL ENGINEERING

SURFACE SCIENCE APPROACH AND DUST CONCENTRATION ANALYSIS OF COAL DUST

Advisors: Dr. Teresa Carvajal & Dr. Oscar Jaime Restrepo

My experience here at Purdue focused on two projects about the better understanding of the impact that coal dust has on health and safety.

The first project is based on a good understanding of flowability and wettability properties using physical, physicochemical, and surface characterization analytical tools. This research employs various techniques, including particle size distribution analysis and scanning electron microscopy, to study the morphological characteristics of coal dust particles. Flowability is assessed through powder rheology measurements, while wettability studies involve contact angle and dynamic vapor sorption measurements.

The second project is based on the explosion risk in mines due to suspended dust. In this project, depending on the variation of dust concentration and intensity of light, a digital camera was used to measure the extinction coefficient of the light which is correlated with the dust concentration that is suspended to estimated dust concentrations in confined environments.

This research experience has helped me to understand much better my future goals and what I want to achieve in my professional life in the next few years. I think it is a really valuable opportunity to be open-minded and explore the variety of opportunities that Purdue and hundreds of other universities can provide.

I would like to express my gratitude to my advisor for the support over these six months and for the opportunity to learn about surface science of materials. Also, I want to thank Ph.D student Mike Sserunjogi and Dr. Kingsly Ambrose for their strong support in my project, as this topic is of great importance in the field of mining and metallurgy. Finally, to the Department of Agricultural and BIological Engineering and the Colombia-Purdue Partnership for the opportunity to be at Purdue.

-- Something I will never forget is having the opportunity to visit Niagara Falls and experience this incredible place with my friends was truly one of the most magical moments in my life, a memory that I will value forever.

CRISTIAN FERNANDO PINEDA MENESES

FOOD SCIENCE

MANUFACTURE AND ANALYSIS OF FERMENTED NON-ALCOHOLIC CANARY SEED-BASED BEVERAGE

Advisors: Dr. Andrea Liceaga & Coralia Osorio

Humanity is increasingly placing more importance on the way it eats, whether it is related to limited consumption of certain compounds such as lactose or gluten because of food intolerances, or lifestyles such as veganism or vegetarianism, or the current knowledge of the effects of animal product's consumption on the planet; there's a greater awareness of the origin of the products we consume, which translates in a need in the market to create alternatives that are free from certain common compounds. This is the context in which we proposed the creation of a canary seed-based product. This seed has been used for poultry feed; however, thanks to its high nutritional value, it has awakened interest as an alternative gluten-free cereal. In this way, it is proposed to create a product using this resource with the objective of analyzing its physical-chemical characteristics and its respective sensory analysis.

The technical activities carried out were the food product development and formulation, as well as the physicochemical procedures of analysis such as humidity, pH, acidity, colorimetry, rheometry and finally, sensory analysis.

The personal and professional impact that this experience has given me goes far beyond what I expected. I have learned so much from numerous people along the way. I am grateful for all the people I met, from each one of them I take a moment, a learning experience or at least a smile that made this process what it was. Above all I thank my advisor, Dr. Andrea Liceaga for allowing me to come and do this project and Dr. San Martin for helping me at various times during my research, I am immensely grateful.

-- Something I will never forget is walking alone in the middle of Manhattan listening to music on my headphones at midnight.

DIANA GABRIELA PUERRES NARVÁEZ

AGRICULTURAL AND BIOLOGICAL ENGINEERING

A REAL-TIME NASBA ASSAY TARGETING XCD GENE FOR RAPID DETECTION OF VIABLE SALMONELLA ENTERICA SUBSP. ENTERICA SEROVAR TYPHIMURIUM FROM FOOD.

Advisors : Dr. Mohit Verma & Dr. Gloria Cadavid

Salmonella enterica serovar Typhimurium, a prevalent foodborne pathogen, is transmitted between animals and humans. This gram-negative bacterium induces various health issues, including enteritis, gastroenteritis, inflammatory diarrhea, vomiting, fever, and stomach cramps, making it a significant contributor to global disease-related mortality. The presence of even a single colony-forming unit of Salmonella in foods poses a serious threat to consumer health. Molecular-based assay methods, like Nucleic Acid Sequence-Based Amplification (NASBA), emerge as vital tools for the rapid, precise, and sensitive identification of this strain.

NASBA stands out due to its ability to determine cell viability, focusing on RNA as the main detected molecule. This is crucial as RNA, outside of live cells, is prone to degradation. The overarching goal is to develop a NASBA-based detection test that is not only rapid but also cost-effective and user-friendly. Such a test would find extensive applications in the food industry, agriculture, and public health sectors. During my internship at The Verma's Lab, I acquired the necessary wet-lab skills, including q-PCR, RNA extraction, bacterial inoculation, and harvesting. Additionally, I gained insights into the research process and learned the importance of good practices in experimental procedures. The experience emphasized the significance of meticulous record-keeping in a lab book, the role of creativity in problem-solving when faced with experimental challenges, resilience in overcoming obstacles, and the importance of seeking and receiving feedback.

The impact of this research experience on both my personal and professional development has been profound. I extend my gratitude to the UREP-C program for their support, my mentor Simer, the lab-mates, and the friends who accompanied me during this transformative journey.

-- Something I will never forget are the novenas and singing together the villancicos. The trip to Chicago and NYC; the smiles, the talks and the company of my friends at Celery Bog. The tea time. Playing with the snow at -29C. The hugs I got and gave :) If I continue it could never end... ; Gracias

ISABELA RAMÍREZ ORTÍZ

FOOD SCIENCE

EFFICACY OF POST-HARVEST SANITIZERS ON THE REDUCTION OF MICROBIAL LOAD IN WATERMELONS

Advisor: Dr. Amanda Deering

Outbreaks of foodborne illnesses in the United States comprise around 48 million cases each year according to the FDA. Cases related to fresh produce contaminated with bacterial pathogens are mainly associated to *Escherichia coli*, *Salmonella* Typhimurium and *Listeria monocytogenes*. The CDC estimates these pathogens cause a high percentage of the foodborne illness' cases in the U.S. While these bacteria cause common symptoms such as diarrhea, fever and stomach cramps that can be treated at home, children, the elderly and the immunocompromised are the ones with a higher probability of developing more severe cases of these symptoms that could even end up in death. Measures must be taken by the producers and the consumers to reduce the risk of illness. This is why my project aimed to evaluate the efficacy of post-harvest sanitizers to reduce the bacterial load on the surface of watermelons, focusing on human pathogenic bacteria such as *E. coli* O157:H7, *S.* Typhimurium and *L. monocytogenes*.

My work involved processing of the watermelons, preparation of selective culture media, adjustment of colonies' concentration, pouring media, serial dilutions, plating of inoculated solutions and other procedure common in a microbiology lab. The results of this project suggest post-harvest sanitization practices offer significant effects in mitigating the risk of contamination by foodborne pathogens in watermelons. In this wonderful experience I also learned about general managing of a greenhouse experiment and about general concepts of food science related to the formulation of food products. With the postdoctoral researcher we made passion fruit butter and wrote a publication for Purdue Extension. I'm thankful for all my experiences in both research and getting to know a new culture and new people, experimenting the seasons, going to festivals, trying new food and having the opportunity to learn more about myself.

-- Something I will never forget is the opportunity to witness the beauty of Indiana's natural landscapes, the sunset, the starry nights, the arrival of fall, the falling snow, and share all of it with wonderful people.

JUAN MIGUEL VALENCIA HERNÁNDEZ

ANIMAL SCIENCES

INVESTIGATING THE GENOMIC BACKGROUND OF HAIR CORTISOL IN LACTATING SOWS RAISED UNDER HEAT STRESS CONDITIONS

Advisors: Dr. Luiz Brito & Dr. Carolina Zamorano

As a result of climate change and rising temperatures, the adoption of intensive and closed pig production, added to the inefficient accommodation conditions and facilities that exist in many farms, heat stress is a frequent problem in pig farming, which generates economic losses caused by low feed consumption by pigs, poor body development, low milk production, difficulty in achieving pregnancy, etc. To improve this situation, this project seeks to quantify and analyze hair samples from ~1,600 lactating sows to establish capillary cortisol as a biomarker for genetic selection to improve pigs' heat tolerance.

Among the activities that I have carried out in this project are a review of scientific articles related to heat stress and cortisol measurement, extraction of capillary cortisol from bristle hair, quantification of capillary cortisol in ~1,600 samples by spectrophotometry, analysis of data with software, evaluation of factors statistically associated with cortisol levels in hair in lactating sows, presentation and writing of reports. Also, I attended seminars, classes, and literature reviews at the "Quantitative Genetics and Genomics laboratory", which has helped me deepen and consolidate my knowledge.

I´ll give all my gratitude to Dr. Luiz Brito for integrating me into his research group during this time, in addition to guiding me academically; Dr. Jay Johnson, research leader at the USDA laboratory at Purdue, for allowing me to carry out my activities in his laboratory; to Ph.D. students Rick Hernandez and Mary Kathryn Byrd for their help in adapting me to the lab.

-- Something I will never forget is the travels, attending the last Kiss concert in Indianapolis and playing a rugby game as part of the Purdue team --

WANDA TATIANA VILLACORTE GALLEGO

FOOD SCIENCE

COMPLEMENTATION OF THE AMBER MUTATION IN A MUTANT P22 BACTERIOPHAGE FOR DETECTION OF SALMONELLA SPP.

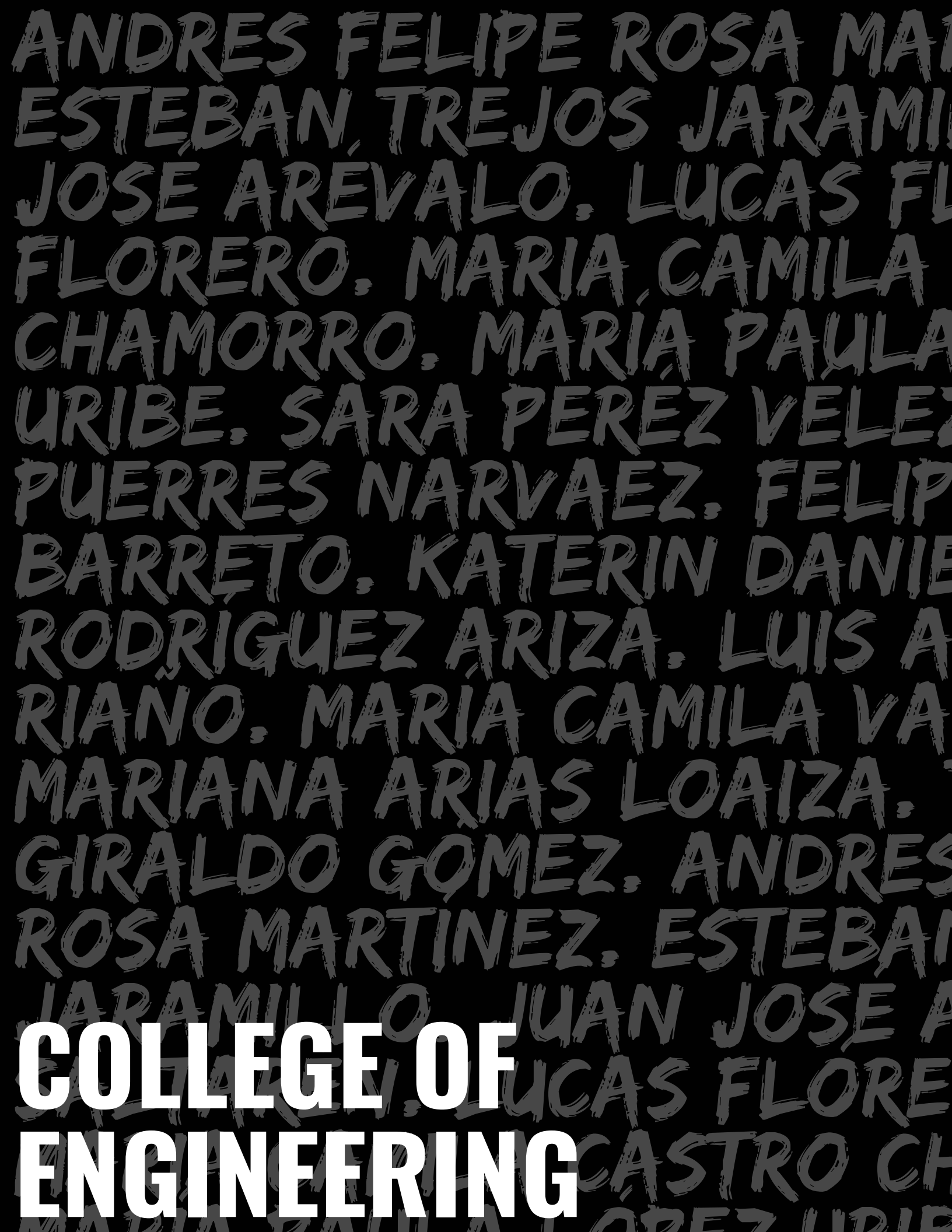
Advisor: Dr. Bruce Applegate

The research projects carried out within the research instance were framed around the phage based detection of the foodborne pathogen Salmonella. Foodborne pathogens continue to be a challenge for public health, and current detection methods are labor intensive and involve high costs. Reporter phage offer the possibility of rapid, high-fidelity, low-cost detection of these pathogens. The objective of this work was to generate a recombination vector which would allow for the insertion of reporter genes in the mutant P22 phage by complementing the amber mutation in the lysis gene. The resultant vector will aid in the construction of numerous P22 based reporter phages.

The general techniques used in order to fulfill the objective are: preparation of different culture media both liquid and solid, different inoculation and culturing methods (isolation, large scale, among others), preparation of agarose gels and electrophoresis, plaque assays for enumerating bacteriophage, restriction enzyme digestion, isolation and purification of DNA, bacterial transformations by electroporation. Specific methods include complementation assays using the mutant p22 bacteriophage for detecting the resultant recombinant bacteriophage.

The research experience at Purdue has contributed greatly to my education, both professionally and personally. Putting my knowledge into practice, learning about new techniques and different forms of execution. In addition, the enrichment produced by cultural exchanges, the opportunity to strengthen English as a second language and meet people from all over the world. For all these reasons and the great experience, I would like to thank my advisor, Dr. Bruce Applegate, his great and diverse laboratory team, and Juan Diego and Lucy, who initially made this dream possible.

-- Something I will never forget is the wonderful diversity of cultures that inhabit West Lafayette, the friends from all over the world that I made, and I must close the car doors more carefully.



COLLEGE OF ENGINEERING

JUAN JOSÉ ARÉVALO SALTARÉN

INDUSTRIAL ENGINEERING

INDIANA ELECTRIC VEHICLE PRODUCT COMMISSION

Advisors: Dr. Stephan Robert Biller & Dr. Wilson Adarme Jaimes

As part of the transition process from ICE (internal combustion engine) vehicles to EVs (electric vehicles) the state of Indiana established the Indiana Electric Vehicle Product Commission as the organization in charge of researching and promoting this process, with Purdue University as one of its main participants. In this project I was assigned to work with Professors Stephan Biller and Steven Dunlop, and primarily with Mr. Dutt Thakkar, we focused, first, on the EV battery recycling process (its main component), in relation to issues such as ways of recycling, recycling policies and waste management; and then on the supply and demand of the principal elements of the battery (lithium, cobalt, nickel and manganese), trying to predict how future supply and demand will be.

I worked mainly on researching, collecting and organizing information and data related to the EV battery recycling process and the historical supply and demand of its main elements.

The qualitative data was used as a basis for writing a summary document on the subject, while the quantitative data was used to predict future scenarios of the battery market. This experience had a very important impact on my life both personally and professionally. On a personal level, I met and bond with people from different cultures and mindsets, and I was able to learn a lot from them. On a professional level, this internship at Purdue University gave me the opportunity to work with top level scholars and researchers and see their day to day life. Lastly, I would like to thank Professor Stephan Biller, Professor Steven Dunlop, and Mr. Dutt Thakkar for letting me work with them. To the Colombia Purdue Partnership team, specially Juan Diego and Lucy, for the internship opportunity. To my family for their support and for always believing in me, and to all the people that I met, whom I am proud and thankful to call my friends.

-- Something I will never forget are the beautiful and diverse landscapes and cities of the United States and the people who accompanied me on those journeys.

MARIANA ARIAS LOAIZA

CIVIL ENGINEERING

INNOVATIVE MATERIALS: HIGH-PERFORMANCE 3D PRINTED CONCRETE

Advisors : Dr. Pablo Zavattieri & Dr. Ary Hoyos Montilla

The materials development sector in the scientific community actively explores high-performance solutions with extended service life and environmental friendliness. This study focuses on formulating a mixture for large-scale 3D printing such as structural elements, aiming to replace limestone filler significantly and introduce cellulose nanomaterials as additives. This blend enhances rheology and mechanical properties, improving sustainability, durability, and cost-efficiency.

Given the environmental impact of cement production, especially the resource-intensive and CO2-emitting clinker production process, exploring alternatives is crucial. Limestone, rich in calcium carbonate, partially substitutes clinker, aligning with the broader goal of minimizing the ecological footprint of traditional cement production. The inclusion of cellulose nanomaterials (CNMs), known for their biodegradable nature and cost-effectiveness, enhances the eco-friendly approach.

At Purdue, I dedicated a substantial time to the Charles Pankow Materials Laboratory. I experimented with various concrete mixtures varying in its composition proportions and introduced admixtures like limestone filler (LF), cellulose nanofibrils (CNF), and silica fume (SF) to assess their impacts on performance. I conducted chloride diffusion tests per the ASTM C1556-22 standard, collaborated with the chemistry laboratory for titration procedures, and managed data processing.

This experience has been fundamental for my personal, professional, and academic growth, providing tools to navigate in materials research. I am vehemently grateful to Yu Wang, Pablo Zavattieri and Ary Hoyos for providing me a welcoming space within their research groups; they patiently and wisely guided me during my academic experience at Purdue, along with supportive friends and family who have illuminated my life with their presence.

-- Something I will never forget is the urban views of Chicago and New York, the architectural landmarks, the buildings and houses designed by Frank Lloyd Wright and the walks full of curiosity with my friends that made me laugh so much.

LUISA ANDREA CAMPOS FRANCO

INDUSTRIAL ENGINEERING

PICKING PLANNING FOR RETAILERS WITH EXPRESS DELIVERY

Advisor: Dr. Reem Khir

In the fast-paced world of e-commerce, supply chain efficiency is key to ensuring customer satisfaction. Within this dynamic, the project focuses on a fundamental aspect of logistics: order picking. The importance of this focus is driven by the increasing demand for fast deliveries and the intensifying competition to meet ever-tighter delivery deadlines. The project was carried out under the mentorship of Dr. Reem Khir who developed the base model for planning sorting. Under his guidance, this linear programming model was adapted to a different logistics function: order picking.

This model facilitates meticulous order picking planning in retail warehouses that service online orders. It not only generates order-to-resource assignments, but also designs a schedule, ensuring that orders are prepared efficiently and on time for delivery. The scope of this project could be expanded to other logistics operations for future projects, particularly vehicle routing.

-- Something I will never forget about UREP-C are all the people who became friends and life partners.

MARIA CAMILA CASTRO CHAMORRO

CHEMICAL ENGINEERING

CATALYTIC LIGNIN DEPOLYMERIZATION OF CORN STOVER

Advisors: Dr. Enrico Martinez & Dr. Ángela Ruiz

Biomass is organic matter, of plant or animal origin, that can be used as a source of energy or in the production of value-added products. This represents an alternative to address environmental and energy challenges, given the need for alternative energies and new renewable raw materials that reduce greenhouse gas emissions. With the use and transformation of biomass, the development of an alternative chemical industry to that of petroleum is sought, which is technically and economically competitive.

In this case we work on the transformation process of "corn stover", one of the most representative agro-industrial wastes in the State of Indiana. Specifically, the depolymerization reaction of lignin was studied, which is one of the main components of the plant cell wall. Depolymerized lignin is used as the main component of a resin that represents a safe alternative to formaldehyde in the production of composite boards and wood adhesives.

For this, multiple temperature conditions were studied, and the reaction products were analyzed by gas chromatography with flame ionization detector (GC-FID) where 10 compounds of interest were identified. Using mass balances, the percentage progress of the reaction was calculated. Likewise, a mathematical model of the reaction kinetics was obtained, which allows its subsequent study through computer simulation for reactor design and process optimization. This experience meant one of the best opportunities I have had on an academic and personal level. Knowing an academic and research space outside of Colombia allowed me to consider the infinite possibilities I have for my future. My sincere thanks to Professor Enrico Martinez and Rajdeep Deka, as well as to the UREP-C program that allows Colombian students to transform our realities through research and science.

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-- Something I will never forget is walking and enjoying the colors of each of the seasons on campus and having made new friends for life --

LUCAS FLÓREZ FORERO

CIVIL ENGINEERING

INVESTIGATE SAFETY PERFORMANCE OF NON-SIGNALIZED TRAFFIC CONTROL STRATEGIES

Advisors: Dr. Samuel Labi, Dr. Andrew Tarko & Dr. Kumares Sinha

During my research experience at Purdue, I had the privilege to work alongside distinguished professors and colleagues, who served as my mentors throughout these months. My research was developed at the Center for Road Safety associated with Lyles School of Civil Engineering. The project I worked on aimed to evaluate the effectiveness of the installed conflict warning systems on 17 intersections around Indiana State in late 2020 and early 2021. This involves a comprehensive comparison of the frequency and severity of all crashes that occurred before and after the system installation on the treated intersections and in some control intersections with similar physical and traffic characteristics. I collected detailed information for each intersection, such as road type, physical attributes, and AADT, also I developed a visibility index for each approach, among others. After all, statistical modeling was made to identify the conditions that justify the installation of the system in more places around the state.

I will always be grateful To Dr. Samuel Labi, Dr. Andrew Tarko, and Dr. Kumares Sinha for sponsoring my experience and teaching me a lot of research skills including effective communication, data analysis, time management, and autonomous work. I want to thank deeply to UREP-C program, and its coordinators Juan Diego and Lucy for being the constant support we needed before and during the internship. I would also like to express my appreciation to Javeriana University for allowing me to come here and enhance my academic formation. Finally, I want to thank all the new friends I made here, without them, the whole experience would not have been the same, and they are one of the main reasons UREP-C became something unforgettable to me. .

-- I will never forget the feeling I got when I saw for the first time the wonderful Niagara Falls.

TATIANA GIRALDO GÓMEZ

CHEMICAL ENGINEERING

ADDRESSING MECHANISTIC STUDIES ON ELECTROCHEMICAL CO_2 REDUCTION BASED ON ATR-SEIRAS

Advisors: Dr. Brian Tackett & Carlos Sánchez

Strategies to reduce net CO_2 emissions have had a significant progress in recent years. In particular, electrochemical reduction of CO_2 (CO_2RR) presents a sustainable path to produce valuable fuels and industrially relevant chemicals while contributing to the process of global decarbonization. Our project aimed to advance our understanding of this mechanism by exploring the molecular interactions on the catalyst (electron conductor) and the electrolyte (ion conductor) interface with an in-situ/operando approach. For this we conduct experiments with a surface-enhanced technique called ATR-SEIRAS, supported by material characterizations and electrochemical performance testing, which are also critical to shed light into key intermediates during CO_2RR. On my six-month stance I was involved in every step of the process to achieve strong SEIRAS activity, carrying out annealing techniques to ensure the crystallinity of our electrode, peforming electrodepositions of different metals and characterizing them with XRD and SEM. I operated the reduction reaction of the CO_2 with different electrolytes and studied the electrochemical and spectroscopy responses of it.

Purdue meant a lot to me these last few months and I´ll be forever grateful with the National University of Colombia for the support. I met incredible people whom I'll carry in my heart forever, special thanks to Adriano Braga who was an incredible mentor to me, to Dr. Tackett for this great opportunity and to all the amazing friends I made who would be too many to list. This was a life-changing experience that equipped me with invaluable skills that go beyond my academic path and made me grow on a professional and personal level. I have a completely different mindset from the one I arrived with and I can say with certainty I dream bigger after UREP-C.

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-- Something I will never forget is Chicago, NYC, feeling snow for the first time, and how I said I'd never make Harry's line and ended up making it all the time.

MARÍA PAULA LÓPEZ URIBE

MECHANICAL ENGINEERING

ENERGY FREE WATER HARVESTING ENABLED BY RADIATIVE COOLING SURFACES

Advisors: Dr. Justin Weibel & Dr. Lina María Gómez Echavarría

In the past six months at Purdue my perspective on life has changed, the personal and academic development is significant because I work in incredible laboratories with very qualified people who teach me a lot. I've also made friends that I hope will be with me for the rest of my life, living abroad is such an enriching experience.

As a Chemical Engineering student, I explored a completely different field from my area of studies at Purdue. I worked at the College of Engineering in the School of Mechanical Engineering at CTRC (Cooling Technologies Research Center) with thermal sciences, focusing on Purdue's white paint application, called radiative cooling.

Water condensation is a crucial application of radiative cooling and an unconventional method for obtaining fresh water without using any energy source. My research involved actively participating in experiments about condensation and optical spectra to continue in the exploration of the ultra-white paint. In these experiments, samples of the paint are applied to different surfaces and subjected to a controlled environment of temperature and humidity.

What UREP-C leaves me with is the idea of pursuing a PhD as I thoroughly enjoy research, and working in a lab brings me joy. I can spend the entire day in the lab without feeling tired. While studying more about thermal sciences, I realized that I really like this topic, and I envision myself working in this field in the future.

-- Something I will never forget about UREP-C, the first time we were on campus and we were surprised with everything, and going to New York with my roomies and walking on the Brooklyn Bridge with the sundown.

FELIPE MARTÍNEZ BARRETO

CHEMICAL ENGINEERING

MORPHOLOGICAL ANALYSIS OF ACID TREATED H-BEA (15) ZEOLITE FOR ETHANOL-TO-HYDROCARBON (ETH) REACTION USING HCL AND EDTA

Advisors: Dr. Rajamani Gounder & Dr. Gerardo Rodríguez

It is an undeniable fact that, due to the climate crisis, the world and especially academia have had to embrace new environmentally friendly technologies. In the case of Catalysis, the focus is on developing new materials capable of mitigating the production of harmful pollutants, reducing energy consumption, and maintaining both conversion and selectivity to ensure the economic viability of the process.

In the group led by Professor Gounder at the Davidson School of Chemical Engineering at Purdue, of which I was a part, this is their fundamental pillar, as well as understanding in detail the intricate world of crystal structures from their inside and how such physical and chemical configuration conditions a particular chemical reaction. I supported the Catalysis for Sustainable Aviation Fuels (CSAF) project by performing acid treatment on an H-BEA (15) type Zeolite with HCl and EDTA at different concentrations, times, and structures with the intention of studying the process of selective dealumination of extraframework Al (EFAL) using a weak acid and later studying the effect of Bronsted Acid Sites (BAS) on (ETH) reaction. or morphological analysis, I conducted tests such as N2 Adsorption, XRD, ICP, TPD, to obtain information about the inside of the structure: surface area, volume and pore size, quantity of active sites, percentage of Si and Al, and the state of the crystalline structure post-treatment.

And, like the acid to the zeolite, UREP-C has transformed me, I am simply not the same person who arrived, and I will never be. It opened my mind from academia to personal matters and how interesting it is to travel the world, meet new people, places, languages, and cultures. There is nothing left but to thank the program, Professor Gounder, Professor Gerardo Rodriguez, my family, and partner for providing and accompanying me in this beautiful experience in my life.

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-- Something I will never forget is the idea that there is no impossible goal or place I cannot visit. Because at some point, I doubted being fit for this opportunity, and now that it's ending, it opens my eyes to pursue much larger projects.

LUIS ALEJANDRO RIAÑO MOLINA

MECHANICAL ENGINEERING

STUDY THE DYNAMIC CRACK PATH IN MATERIALS UNDER THERMAL SHOCK LOADING BY PHASE-FIELD MODELING.

Advisors: Dr. Marisol Koslowski & Juan M. Mantilla

In my research project, I delved into the fascinating world of the use of numerical tools such as finite elements and phase field methods to predict the behavior of materials, from atoms to structures. In addition, solving multi-physics problems that encompass mechanical response, thermal transport, phase transformations, fracture, and chemical reactions.

Professor Marisol and my labmate Ph.D. Student Chongxi Yuan made an initial setup of the project, then they guided me on my learning process, where I immersed myself in an extensive literature review, sourcing material properties, mathematical models, and the final model setup. Learning to navigate the Software MOOSE (Multiphysics Object-Oriented Simulation Environment), was essential to simulate the model. The objective was to study the dynamic crack propagation in a material through the Phase-Field Modeling method, exploring how factors like the radius of the heating zone or the heat source value could influence the results.

This endeavor provided not only academic victories but also a deep cultural experience. I could gain insights into how graduate school life looks and be close to a professional and independent environment outside my comfort zone. I had the chance to join the Purdue Run Club and even run my first Marathon. Despite being challenging, from my perception, I was able to find a balance in my life.

To my advisors Marisol Koslowski and Juan Miguel Mantilla with whom I was able to learn the necessary skills to succeed in research and develop into a well-maturated student, to my labmates Chongxi, Andrew, Diane, Rossel, Alexis, Jennifer, Josh, Fariha, and Jack which always were open to help. To all my family and friends for their constant support and love. My deep gratitude to all the people behind the administrative process of the program.

I am a different person now than the person who arrived here 5 months ago. Let's see what the future holds.

-- Something I will never forget is: In my whole experience here at Purdue I was able to run 525 Km, which is 2.5 times the distance between Alight Apartments and Navy Pier in Chicago. That let me meet incredible hidden places and marvelous people with them.

KATERIN DANIELA RODRÍGUEZ ARIZA

CHEMICAL ENGINEERING

COPOLYMERIZATION AND DEPOLYMERIZATION OF POLYMUCONATES FOR ENHANCED RECYCLING

Advisors: Dr. Letian Dou & Dr. Néstor Algecira

Out of the annual 400 million tons of plastic produced, only about 9% is recycled. This project focuses on the development, processing and characterization of chemically recyclable materials, offering significant advantages for the closed-loop recycling process, as the materials can be used again without losing their properties.

As a Visiting Scholar, I conducted polymer and copolymer synthesis of muconate esters through melt polymerization under ultraviolet light, followed by depolymerization to obtain the raw material. By manipulating reaction variables such as time and reactant ratio, we observed their impact on molecular weight, polymer ratio, glass transition temperature. With this information and its analysis carried out using H-NMR, GPC and DSC techniques, we enhanced the yield, meaning the amount of the resulting product.

Being at Purdue has been a completely grateful and enriching experience. Working alongside some of the most highly recognized scientists has been both an honor and a unique opportunity.

I discovered independence, self-management, the art of multitasking and improved my English, made friends, and realized that I can learn anything from the beginning. It brought me closer to academia, opened my eyes to the outside world, revealed the potential within me, and showcased immense opportunities. Therefore, for the next UREP-C generations, I would say, you possess more strengths and skills than you think. No dream is too big!

Finally, I express thanks to God for providing me this wonderful adventure, to my parents and family for their unconditional support and love. Special thanks to my advisor, Dr. Letian Dou, and the research group for opening the doors to the field of polymer science, and congratulations to the Colombia Purdue Partnership, for your outstanding work, especially to Juan Diego and Lucy, thanks for doing everything possible to accompany us. I feel like a growing seed which becomes in a bearing fruit tree!

-- Something I will never forget is singing Christmas carols, playing guitar with friends during Christmas Novenas and enjoying Colombian food, It felt like home, even being so far away!

ANDRÉS ROSA RODRÍGUEZ

CIVIL ENGINEERING

IMPROVEMENT OF TECHNIQUES AND PARAMETERS FOR MEASURING THE QUALITY OF DRINKING WATER

Advisor: Dr. Chad T Jafvert

In my experience at Purdue University I have worked to support the improvement of drinking water parameter data analysis techniques. The problem on which my idea revolved even before arriving at Purdue was the problem of water for the rural areas of Caldas, always keeping in mind the social and economic factor of the remote areas outside the metropolitan center.

The objectives were to contribute to the improvement of the parameters technically in the research with design and assembly of electronic circuits, tests, data analysis, creation of new configurations and provide opinions to strengthen the project. whose focus is the comparison of the samples of a CT meter (a machine on the market with a price of more than 2,400 dollars) versus an applicable, practical and economical electronic system (which does not exceed the assembly price of 200 dollars) that would be capable to take, using light sensors, the amount of residual light from the refraction of samples of formazin and other chemical components resembling future samples of contaminated water from rural areas with different values of NTU (Turbidity) processed numerically to obtain positive values all this with an electronic control circuit from Arduino, electrical resistors, programming and external programs such as PLX data.

I was in the laboratory together with my tutor, Professor Chad Jafvert, and my research partner, the doctoral student Sruthi Dasika. The knowledge obtained was incomparable and his professional quality was always excellent. Dr. Jafvert joked in classes saying phrases like "it's just like breaking bad" and that it was "science and not magic." As an experience I can say that from the first moment I felt the responsibility on my shoulders for the chemical component. That has never been my strong point was one of the greatest points and the level and discipline from the first training was an academic and cultural awakening.

-- Only one phrase comes to my mind at this moment: "Trust is reciprocal but even more valuable with the right people and one's own will can change the world."

ESTEBAN TREJOS JARAMILLO

BIOMEDICAL SCIENCES

STRESS MITIGATION: WIRELESS RESPIRATION MONITORING.

Advisors: Dr Chi Hwan Lee & Dr. Carolina Zamorano

Respiratory symptoms are one of the most common consultations in veterinary practice. These can be related to multiple factors that affect the lungs and subsequently, the body's homeostasis. Importantly, manipulation-induced stress during physiological parameters assessment in dogs (e.g., heart and breathing rate (BR), temperature, weight, etc.) can exacerbate respiratory distress or precipitate respiratory arrest. However, respiratory assessment, in conjunction with clinical examination and laboratory tests, can be a predictive tool of the animal's general well-being serve as a valuable gauge of their health status.

In monitoring patients with respiratory distress, it is crucial to consider several key factors such as temperature, respiratory sounds, and BR. Studies have shown that rectal temperature reading typically considered the conventional method, is stressful for patients. However, other methodologies of temperature readings from different sites have provided inconsistent results and inadequate data.

While there is some potential for using sound sensors to track BR and respiratory sounds, further research is necessary. Wireless BR has also been studied to a limited extent, with no widespread implementation yet. Therefore, we aim to mitigate manipulation-induced stress and enhance prognosis through wireless monitoring respiration by fabricating stretchable electronics and evaluating its efficacy in monitoring dogs.

During my time at Purdue, I was fortunate enough to gain valuable insight into the world of research and explore the fascinating field of biomedical sciences. My investigations into sensors highlighted their ability to enhance animal healthcare. I am pleased to apply my newfound knowledge to my graduate studies and further my efforts to improve animal health. I extend special thanks to Dr. Chi Hwan Lee for his generosity and guidance in bringing our knowledge together to enhance the project. Lastly, thank Ph.D. Seokkyoon Hong for his mentorship, patience, kindness, and willingness to teach me.

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-- Something I will never forget are the lasting friendships I've made here. They made my experience rich, and I thoroughly enjoyed every moment spent with them.

MARÍA CAMILA VARGAS MELO

MATERIALS ENGINEERING

AIRBORNE PATHOGEN PARTICLE COLLECTION AND DETECTION SYSTEM

Advisor: Dr. Lia Stanciu

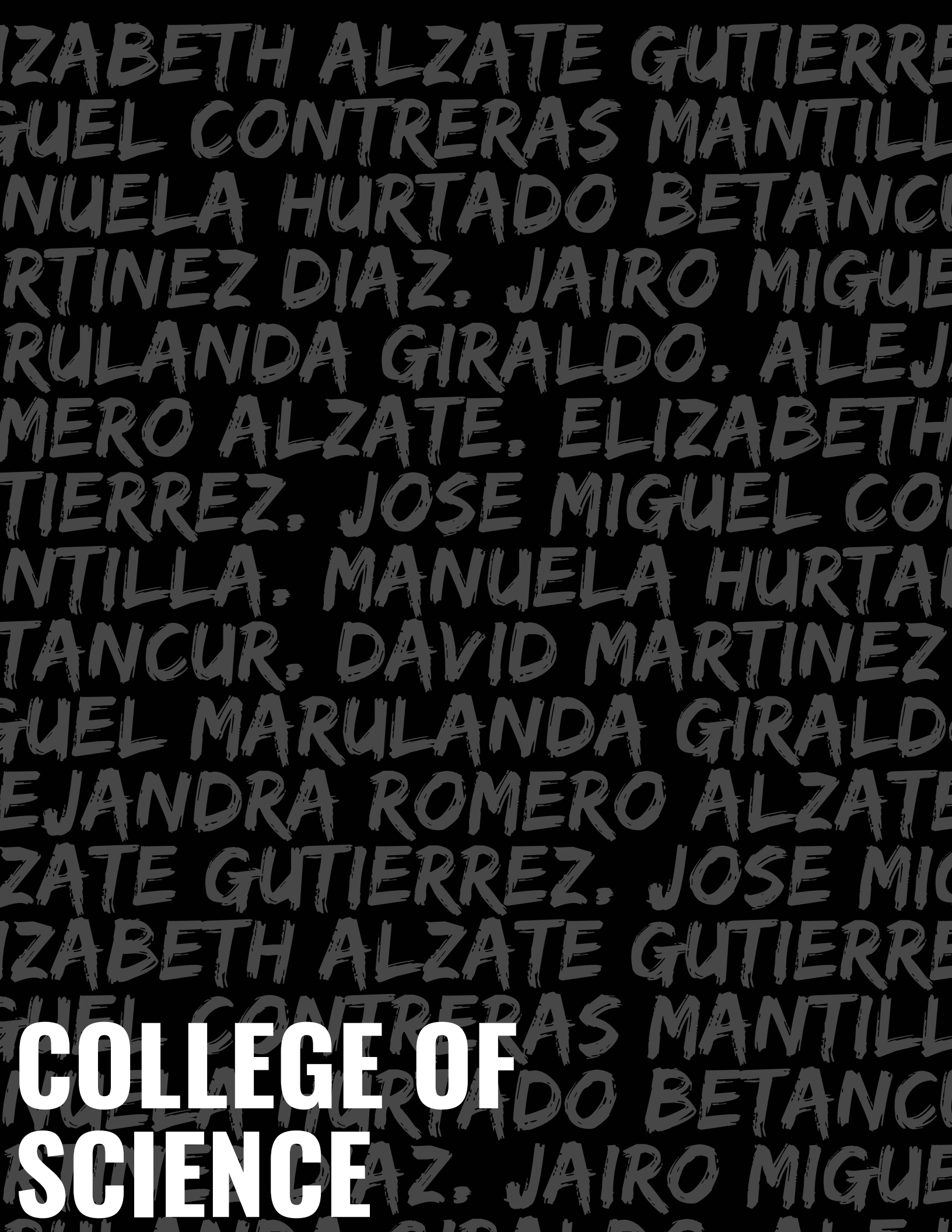
In today's world, a vast number of viral pathogens are lurking in the air, transmitted through aerosols, originating from an infected person's speech, cough, sneeze, or simply their breath. Yet, there are no effective methods to monitor these aerosols in enclosed spaces. The methods in use today have limitations, including lengthy periods for sample transportation, incubation, and analysis. Therefore, Stanciu's PhD student, Abbey Koneru, is aiming to create an innovative airborne pathogen particle collection and detection system that uses colorimetric and electrochemical aptamer biosensors.

During my stance I helped Abbey to optimize parameters used for the electrochemical aptamer biosensor. The optimization was based on electrochemical impedance spectroscopy to measure changes in resistance of the electrode. I also partook in the synthesis of nanoparticles used for the colorimetric biosensor and I was involved in microscopy characterization of them.

Moreover, I designed a microfluidic device to integrate the electrochemical and colorimetric biosensors.

From this research internship I gained further understanding about the research field, not only in laboratory skills but also in research thinking. This internship turned out to be a wider point of view for future possibilities. I also gained professional connections with my advisor, the research group students and also with all the UREP-C group and with more people I met. I improved my English skills during this time. Furthermore, this experience offered me cultural exposure. I met great people from different countries, we showed each other our own culture, mainly music, traditions and food. I got to travel to very iconic places too. Considering all that, I really encourage people to have this enrichening experience.

-- Something I will never forget is when without planning it, I turned out dressed in a traditional Indian dress eating at AppleBees with a group of unknown ladies



COLLEGE OF SCIENCE

ELIZABETH ALZATE GUTIERREZ

EARTH, ATMOSPHERIC AND PLANETARY SCIENCES

EARTHQUAKE DETECTION AND RELOCATION AT PAVLOF VOLCANO

Advisors: Dr. Xiaotao Yang & Dr. Gaspar Monsalve Mejía

During my academic exchange at Purdue University, I had the opportunity to work in the Computational Seismology and Tectonics Laboratory under the supervision of Professor Xiaotao Yang. My research focused on a seismological analysis of the 2021 eruption of Pavlof Volcano, Alaska, emphasizing the assessment of magma pathways and volcanic activity. Pavlof Volcano, known for its andesitic composition and frequent eruptions, deviates from typical Aleutian arc volcanoes in its magma feeder structure orientation. Utilizing seismic processing tools, this research investigates the seismic activity before and after the 2021 eruption.

Throughout my internship, I developed skills in detecting and relocating low-magnitude earthquakes. I learned to manage various software programs and improved my programming skills, which were essential for processing and visualizing seismic data.

Additionally, I audited courses and participated in seminars in the Department of Earth, Atmospheric and Planetary Science, broadening my knowledge in related fields.

This experience was also a journey of personal growth. Living in a multicultural environment allowed me to see the world from different perspectives, which, combined with academic learning, have profoundly impacted my life, expanding my personal and professional horizons. I received support from all my laboratory colleagues, who were crucial to my stay at Purdue. I would like to thank my tutor, Dr. Xiaotao Yang, for all the knowledge he kindly shared with me, and also express my gratitude to Juan Diego Velázquez and Lucy for making this dream possible and for opening new opportunities for Colombian students.

-- Something I will never forget is the first time I saw snow and the starry nights of West Lafayette.

JOSE MIGUEL CONTRERAS MANTILLA

MATHEMATICS

METRIC LATTICES FROM A MODEL THEORETICAL PERSPECTIVE

Advisors: Dr. Thomas Sinclair & Dr. Andrés Villaveces

Motivated by the work of Alexander Berenstein and C. Ward Henson, in their 2023 article “Model Theory for Probability Spaces” the professor Sinclair and I have been studying the theory of metric lattices, a type of mathematical object which is more general than Probability Spaces, with the objective of finding an axiomatization and framework strong enough to use the model theoretical tools used in the study of metric structures.

Mathematics doesn’t need a lab, so my research was pretty different. First, I read about model theory for metric structures, the work of Berenstein and Henson and studies about metric lattices . I met with my advisor weekly to discuss what I have learned, to ask some questions and to get new material to read. At the end of this part I did a talk about what I learned in the Model Theory Seminar here. After that the dynamic changed. In our meetings Professor Thomas and I would discuss different approaches to axiomatize
the metric lattices and each week he left me new problems to think about. We started to make a document to save our progress and share new ideas any time, shared new references to find useful information and tried to solve together different problems that arose during the investigation.

This experience renovated my love for mathematics, from learning new math things to face new challenges that arose from my own work. It also strengthened my resolve to become a professor and researcher in mathematics and helped me develop a lot of useful skills for grad school, skills in math and in other aspects, like being a more orderly and self-sufficient person, a better English speaker and a more sociable person. I met a lot of new amazing people, visited a lot of new places and in general created many new wonderful memories that I will never forget. I have been really fortunate to be here and for that I want to thank Juan Diego, Lucy for the opportunity, my family and girlfriend for their support and my advisors for their guidance.

-- Something I will never forget is my trip to the corn maze at night. Watching the red moon on the horizon and the starlink satellite crossing the sky like a UFO was an outworld experience worthy of Halloween!

MANUELA HURTADO BETANCUR

EARTH, ATMOSPHERIC AND PLANETARY SCIENCES

LOCAL AND TELESEISMIC RECEIVER FUNCTION TECHNIQUE APPLIED TO THE EASTERN CORDILLERA OF COLOMBIA.

Advisors: Dr. Jonathan Delph & Dr. Gaspar Monsalve

Our research investigates the crustal structure beneath the Eastern Cordillera of the Colombian Andes through the application of P-wave radial local and teleseismic receiver functions. Collecting data from the National Seismological Network of Colombia and the Modeling, Seismology, and Igneous Geochemistry in the Colombian Andes (MUSICA) project, we aim to enhance our understanding of the intricate relationship between seismic data and geology/tectonics. The technical aspect of our activities centers on applying Receiver Functions (RFs) as a method to isolate converted arrivals arising from Earth structure discontinuities.

In our project, P-wave RF analysis is conducted using broadband waveforms recorded by a three-component seismometer. The goal is to identify P-to-S and S-P conversions originating from discontinuities beneath the station, subsequently reverberating beneath the receiver. This process involves the development of codes in bash shell scripting and Python programming languages and the utilization of tools such as seismic analysis code, mapping tools, and MATLAB. Executing these codes and interpreting results based on literature and discussions form essential components of our technical approach. Through these comprehensive endeavors, we aim to advance our understanding of the geological dynamics in the Colombian Andes and their implications for seismic characteristics and tectonic interactions. Since I was part of the MUSICA project by assisting the installation campaign of seismographs on two seismic lines in the Eastern Cordillera of Colombia, being able to process the data from the stations that I installed in my country, coupled with the experience, presence and support of my advisor at Purdue, Jonathan Delph, and my advisor at National University of Colombia, Gaspar Monsalve, for the interpretation of these data, made my experience unique, and for this I am grateful. Special thanks also to Lara Wagner, Juan Diego and Lucy, who made it possible to live this dream.

-- I will never forget my lab partners, who in the process became friends and I will never forget that when I looked at the horizon I never saw mountains around me and I will never forget having met an astronaut in my department.

DAVID MARTINEZ DIAZ

EARTH, ATMOSPHERIC AND PLANETARY SCIENCES

ACTIVE AND PASSIVE SEISMIC DATA PROCESSING AND ANALYSIS WITHIN KENTLAND IMPACT CRATER

Advisors: Dr. Douglas Schmitt & Dr. Luis H Ochoa G

Indiana's geological history is characterized by significant erosion stages caused by multiple glacier periods in recent geological eras. The most documented of these periods is the Wisconsin glaciation, marked by the advancement of the Laurentide ice sheet around 24,000 years ago. This glacial activity nearly wiped out all geomorphological features in the region, including our project focus, the Kentland Impact Crater.

The Kentland Impact Crater, formed by a meteorite impact between 419 and 2.6 million years ago, remains a challenging subject for study due to the glacier's erasure of all geomorphological evidence. Our project aimed to investigate this crater's structure using geophysics, seeking to gather more information, data, and models.

Our attention was directed towards two distinct passive and active geophysical datasets collected in the Kentland Area.

One dataset focused on modelling the contact and velocities within the till deposits and nearby carbonates near the quarry.

Our findings unveiled velocity variations between 600 to 800 m/s for the till deposits and 3000 to 4500 m/s for the carbonates, with the contact situated approximately 10 meters below the subsurface. The other dataset involved developing a workflow to convert SAC files to SEG-Y format, exploring the possibility of adapting them into a 3D seismic array, and conducting seismic tomography to enhance our understanding of the structure.

Throughout my academic journey, I actively sought opportunities for a study abroad experience. When this opportunity materialized, I recognized its potential impact on my personal and professional growth. In conclusion, I extend my gratitude to my advisors, Dr Douglas Schmitt, and Dr Luis H. Ochoa, for their guidance in the research process, making this experience truly unforgettable.

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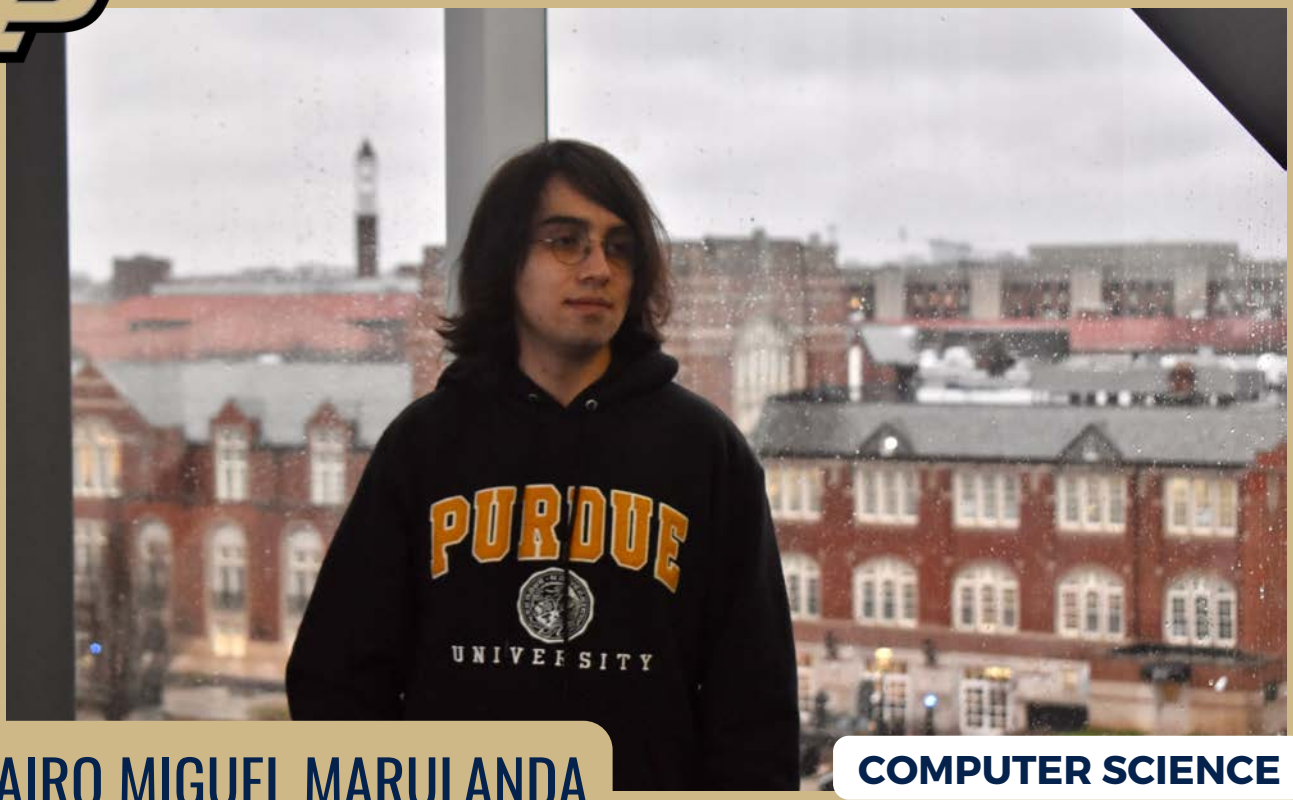
-- I will never forget when I almost got trapped for the night in a snow storm.



JAIRO MIGUEL MARULANDA GIRALDO

COMPUTER SCIENCE

ROOF PITCH ESTIMATION USING A SINGLE SATELLITE IMAGE

Advisor: Dr. Daniel Aliaga

Roof shape reconstruction is crucial for applications such as urban planning and solar photovoltaic potential assessment. However, the conventional methods are often expensive, relying on Lidar data accessibility. We developed an innovative approach that leverages a single satellite image. We developed an innovative methodology that requires only a single satellite image, mixing numerical methods and machine learning. This approach offers a cost-effective and efficient alternative for roof shape reconstruction, particularly in situations where Lidar data availability is limited.

During my stay at Purdue, I started by developing an algorithm to identify vegetation and shadows, to clean average roof pixel colors. Since, I spent most of my time experimenting with the Oren–Nayar reflectance model, to approximate both light direction on the image and roof pitches and azimuths.

My approach consisted of building and approximating a system of equations through linear and nonlinear optimization methods, as well as moving through the RGB and YUV color models.
Applying my knowledge to solve a real-world problem, while living alone for the first time, was challenging. Yet this was a distant dream come true, that has opened life-changing paths and prospects. Additionally, I had the chance to meet top students from incredibly diverse backgrounds and learn from experts in the field of computer science. I am deeply grateful to Juan Diego and my professor, Daniel Aliaga, for giving me this opportunity. Additionally, I want to thank Tanner Waltz, Ph.D. student, for his patience, guidance, and friendship.

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-- Besides academics, in these six months, I made many friendships that I hope will last for the rest of my life. People like Joel Florez, Jorge Askur Vazquez, Sei, Mark Holstrom, Jose Miguel Contreras, Tanner Waltz, Steve Cuppy, and many more made my stay worthwhile just by giving me the chance to meet them. On the other hand, I had the chance to visit such amazing cities as Chicago and New York. These are experiences that I will keep near my heart always.

ALEJANDRA ROMERO ALZATE

BIOLOGICAL SCIENCES

ARE ANGIOSARCOMAS DEPENDENT ON FOXM1 TRANSCRIPTIONAL PROGRAM?

Advisors: Dr. Jason Hanna & Dr. Gloria Cadavid

During my research experience at Purdue, I had the wonderful opportunity of working in the Laboratory of Dr Jason Hanna, which studies angiosarcoma, a rare and highly aggressive cancer that occurs in endothelial cells. There is a lack of understanding of the genetic drivers and therapeutic targets that needs to be addressed.

FOXM1 is a critical proliferation associated transcription factor, involved in cell cycle progression, self-renewal, and tumorigenesis. Even though it has been found to be overexpressed in various human cancers, including angiosarcoma, and correlated with poor prognosis, the precise mechanism of FOXM1 dysregulation remains elusive.

My project aimed to determine the effects of the depletion of FOXM1 in mice and human angiosarcoma cell lines. We employed inducible and constitutive expression of short hairpin RNAs (shRNAs) to genetically knockdown FOXM1. The validation of knockdown, and the assessment of cellular phenotypes, were conducted using a range of techniques, including western blot analysis, quantitative PCR (qPCR), clonogenic colony formation assays, and CellTiter-Glo assays. I am incredibly thankful for every single member of the Hanna Lab. Their kindness, patience, willingness to teach, and welcoming demeanor made this research experience the most enriching one. Through my time in the Hanna Lab, I deepened my passion for cancer research, solidifying my decision to pursue this field in the future.

Coming to Purdue was the best thing that ever happened to me; it opened the doors for incredible possibilities and taught me so many things. I express my eternal gratitude to Juan Diego and Lucy for making this experience possible, to Dr. Jason Hanna for his belief in me even before we met, to Nimod for his patience and trust, to Ant, Basilia, and Annaleigh, for always being there for me, and always having something to chat and laugh about, and to Dr. Gloria Cadavid for her unwavering support.

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-- Something I will never forget is all the people that it allowed me to get to know. Each and every one of the other UREP-C and my labmates made my time here incredible.

ALVARO HERNANDEZ MARTINEZ. LAURA MELISSA NARANJO MOLANO.

DANIELS SCHOOL OF BUSINESS

ÁLVARO HERNÁNDEZ MARTÍNEZ

BUSINESS MANAGEMENT

DESIGN AND SIMULATION OF A HYBRID GREEN BOND EXCHANGE USING CONSERVATION PRINCIPLES

Advisors: Dr. Alok Chaturvedi & Julián Ramírez

The rise of tokenized bond markets offers a revolutionary opportunity to boost liquidity and democratize investments, particularly in green bonds. During my stay at Purdue, addressing the complexity and recent market challenges, I collaborated to develop a robust financial model incorporating energy conservation principles for stabilizing cryptocurrency and blockchain-based financial systems. Successfully simulating a single bond's dynamics, this model established the foundation for broader applications, encompassing multi-year maturity bonds and the interaction of multiple bonds. By introducing entropy as a pivotal factor, we enhanced stability and transparency in our hybrid bond exchange, contributing to the burgeoning field of retail investment in green bonds. This research pioneers a sustainable and resilient path forward for the tokenized bond market, safeguarding against fraud and market collapses while fostering a greener investment landscape.

As a Visiting Scholar, I immersed myself in diverse activities to enhance my academic and personal growth. I delved into advanced topics in artificial intelligence and big data analytics, engaged in labs, assignments, and projects, gaining hands-on experience in cloud-based technologies. With this experience, I delved into Generative Artificial Intelligence (GAI).

I explored Google Cloud Platform's infrastructure, applying AI techniques to BigQuery SQL and BigQuery Machine Learning for practical insights into integrating AI into Big Data analysis. Building on this, we create real-time data flows, emphasizing seamless integration of Pub/Sub with BigQuery.

Purdue University significantly influenced my professional and academic journey. Working with cutting-edge technologies and infrastructure opened doors for my future. Collaborating with seasoned professionals exposed me to advanced practices. Beyond professional growth, it allowed me to travel, experience diverse cultures, and connect with impactful individuals. I'm now more focused on my specialization and career goals. Gratitude to my advisor, Purdue University, my family, Universidad Nacional de Colombia, and my mentor for their unwavering support

-- Something I will never forget is that I always dreamed of studying abroad and learning from the best, getting to know life beyond my home. Being here made me realize that not even the sky is the limit.

LAURA MELISSA NARANJO MOLANO

ECONOMICS

METRICS IN INNOVATION: THE EFFECTS OF MENTORSHIP PROGRAMS ON STARTUP PERFORMANCE

Advisors: Dr. Amir Sariri & Juanita Villaveces

In the modern era, science-based start-ups are the primary driver of technological change. Due to the high failure rate, mentorship programs, such as incubators and accelerators, have been created to provide start-ups with managerial knowledge. Our goal was to investigate the effects and mechanisms of these mentorship programs to improve their efficiency. Our first objective was to clarify metrics used in previous literature. To do this, we conduct a literature review in economic journals to establish a sturdy basis for our study. After performing the literature review, we worked on materializing into usable forms. Since we had different metrics, we developed multiple techniques, including string comparison, rudimentary agent-based learning models, linear regression analysis, and data collection with web scrapping. Alongside my research, I attended a PhD seminar about the Economics of Innovation, which reassured me of my abilities and increased my theoretical background.

Purdue has been and will be a monumental stepping stone in my professional development as an economist. Studying economics has led me to various positions and internships, but none have been as impactful as the six months I have spent here at Purdue. Purdue has elucidated my interest in innovation and finalized my decision to pursue economic research as a career. This experience has sharpened my technical skills toolbox and allowed me to discuss and grow connections with high-level researchers within my field. I am so grateful to my advisor here at Purdue for his continued support, advice, and trust throughout this experience; I could not have done it without him. Also, the wonderful community at Purdue has been amazing and made Indiana feel like home.

-- Something I will never forget is that Purdue has open my eyes to the wealth of possibilities before me. Now, I know my only limits are those that I set myself. I will never forget that differences don't cause divides, and that we are much more similar than I could imagine. Most of all, I will never forget my language lessons.

COLLEGE OF HEALTH AND HUMAN SCIENCES

NICOLÁS ALEJANDRO CUEVAS JIMÉNEZ

NURSING

RURAL FAMILY CAREGIVING: BUILDING SELFCARE AND RESILIENCY OF RURAL WOMEN FAMILY CAREGIVERS FOR OLDER ADULTS

Advisors: Dr. Nasreen Lalani & Dr. Sonia Carreño Moreno

This study focuses on the challenges faced by women caregivers in rural communities who take care of family members affected by chronic illnesses. According to previous studies (Sarrasanti et al., 2020), 36% - 43% of rural female caregivers prioritize the needs of those they care for over their own. In addition, CDC 2019 reveals that more than 53.8% of female caregivers are 65 years or older and suffer from multiple chronic diseases, sleep, and mental health problems. It means that while they perform an invaluable activity with their families, their health and well-being are being affected.

The study aims to assess the self-care, resilience, and well-being of these women caregivers. It employs a mixed-method approach, combining cross-sectional surveys with qualitative interviews, to explore the social, ecological, and cultural factors influencing their experiences. The goal is to understand the relationship between self-care, resilience, and well-being in the context of rural female family caregivers.

Responsibilities within the research included tasks related to learning new statistical software and research methods through participation in 2 nursing school courses. In addition to participation in translation activities for the Latino population involved in the research. Also supporting data and participant collection, designing materials for dissemination, and implementing surveys and interviews with women who meet the research profile.

In terms of learning, the experience as a research assistant and the theoretical approach during the courses allowed me to recognize my abilities in academia and to awaken in me a taste for research. I thank my advisor in the US Dr. Nasreen Lalani, and my advisor in Colombia Dr. Sonia Carreño Moreno for trusting me and for accompanying me in this experience. Also, to my family and friends who were part of the whole process that I carried out in Colombia to make this dream come true.

-- Something I will never forget is: This is my first international trip, I remember singing the song On Top Of The World on top of the Edge Building in New York, that was one of the best moments of my life.

ELOÍSA HERRERA OSPINA

HEALTH AND KINESIOLOGY

EFFECTS OF EXERCISE ON THE MUSCLE RECOVERY PROCESS IN AGING AND OBESITY CONDITIONS

Advisors: Dr. Timothy Gavin & Edgar Cortés

I performed my research stay in a research group focused on understanding microvascular dysfunctions in disease and chronic conditions, under the guidance of PhD. Tim Gavin as part of the Exercise Physiology Graduate Program. The interest emerges because we know some diseases, such as obesity and aging lead to microvascular dysfunction. Our focus encompassed understanding the causes, treatments, and the impact of exercise intervention on microvascular dysfunction, particularly in the conditions mentioned above.

The laboratory's keen interest in this area stems from the recognition that microvascular dysfunction plays a pivotal role in exercise intolerance, impaired glucose handling, and muscle loss. There's a crosstalk phenomenon between specific muscle cells and endothelial cells, unraveling how chronic diseases influence this crosstalk has become a primary objective. In addition to hands-on laboratory work, I had the opportunity to engage in various activities, including advanced exercise physiology classes and laboratories, I actively participated in seminars and conferences that contributed to my professional and academic growth.

The affiliation with Tim Gavin's Laboratory provided an exceptional academic and research environment, fostering the development of autonomy, critical thinking, and effective communication skills. Engaging in high-impact research projects within the field of kinesiotherapy not only strengthened my theoretical knowledge but also honed my ability to work independently and collaboratively. This has been a journey of profound learning and skill development, experiences and invaluable lessons.

I would like to express my gratitude to the UREP-C program, to Juan Diego and Lucy for their immense support throughout this fulfilling experience; to Dr. Tim Gavin for believing in me and letting me make this dream come true; to Master's student Ivan Alonso, who guided me and fostered research skills everyday. To Dr. Igor Fernades for his dedication and confidence in my work. Finally my tutor professor Edgar Cortés from the National University of Colombia, for his unwavering support and guidance.

-- Something I will never forget is the majestic Niagara Falls, meeting my favorite band and all the laughter at Casa Caldas, forever grateful to NEXO.

ISABELLA PÉREZ MEJÍA. JUA
DIEGO VIRACACHÁ SUÁREZ.

COLLEGE OF PHARMACY

ISABELLA PÉREZ MEJÍA

INDUSTRIAL AND MOLECULAR PHARMACEUTICS

INVESTIGATING STABILITY OF PHARMACEUTICAL FORMULATIONS USING SOLID-STATE NMR

Advisor: Dr. Eric Munson

During my tenure at Purdue, I actively participated in cutting-edge pharmaceutical research initiatives by working in Dr. Eric Munson's laboratory at the Industrial and Molecular Pharmaceutics Department. Our mission is to contribute to the improvement of pharmaceutical products through advanced characterization.

This involves developing new formulations for small and large molecules, amorphous solid dispersions (ASD), lipid nanoparticles, manufacturing complex systems, as well as characterizing complex generics. Collaborative projects with other colleges, the FDA, and pharmaceutical industries such as Pfizer and Merck provided me with hands-on experience in analytical techniques to predict stability and study physicochemical properties.

Working alongside PhD Jianchao Xu we studied Indomethacin-PVP ASD's crystallinity in X-ray diffraction analysis. Additionally, we determined Nifedipine-PVP ASD Tg and T1 through Differential Scanning Calorimetry and Solid-state NMR, respectively.

In collaboration with PhD Rachana Sapkota and Dr. Nick Huls, we investigated the implications of sugar crystallization during lyophilization in a BSA-trehalose model. With PhD Abdullah Shamin, we studied the interaction between the iron III core and carboxymaltose in Injectafer® and evaluated the impact of critical quality attributes in carboxymaltose's variability to enhance its performance.

These projects have a significant impact on people's well-being as they contribute to understanding how molecular properties influence the physiochemical and biophysical attributes, providing scientific rationales for developing effective and safe drug products.

The UREP-C program granted me with the opportunity to collaborate with world-renowned researchers, which helped me transform my professional profile. This, in turn, positions me as an independent researcher who can lead advancements in the field. Beyond that, I developed cross-cultural competencies by interacting with people from around the world and bonding with the UREP-CITOS, who I am now fortunate to call my friends.

-- Something I will never forget are the rides in the Uber karaoke on our way to Cactus and our every-weekend road-trips.

JUAN DIEGO VIRACACHÁ SUAREZ

PHARMACY PRACTICE

THE DEVELOPMENT OF A PHARMACY PRACTICE VISITING CLINICIAN SCHOLAR PROGRAM

Advisor: Dr. Ellen Schellhase

DAs the Spanish-speaking population in the United States is increasing, the language barrier contributes to widening the social gap for the Latino population, hindering health access to quality services.

UREP-C and the Center of Health Equity and Innovation (CHEqI) of Purdue University proposed the VCS program offering advanced pharmacy practice experiences for Colombian pharmacists interested in addressing the public health disparities involved.

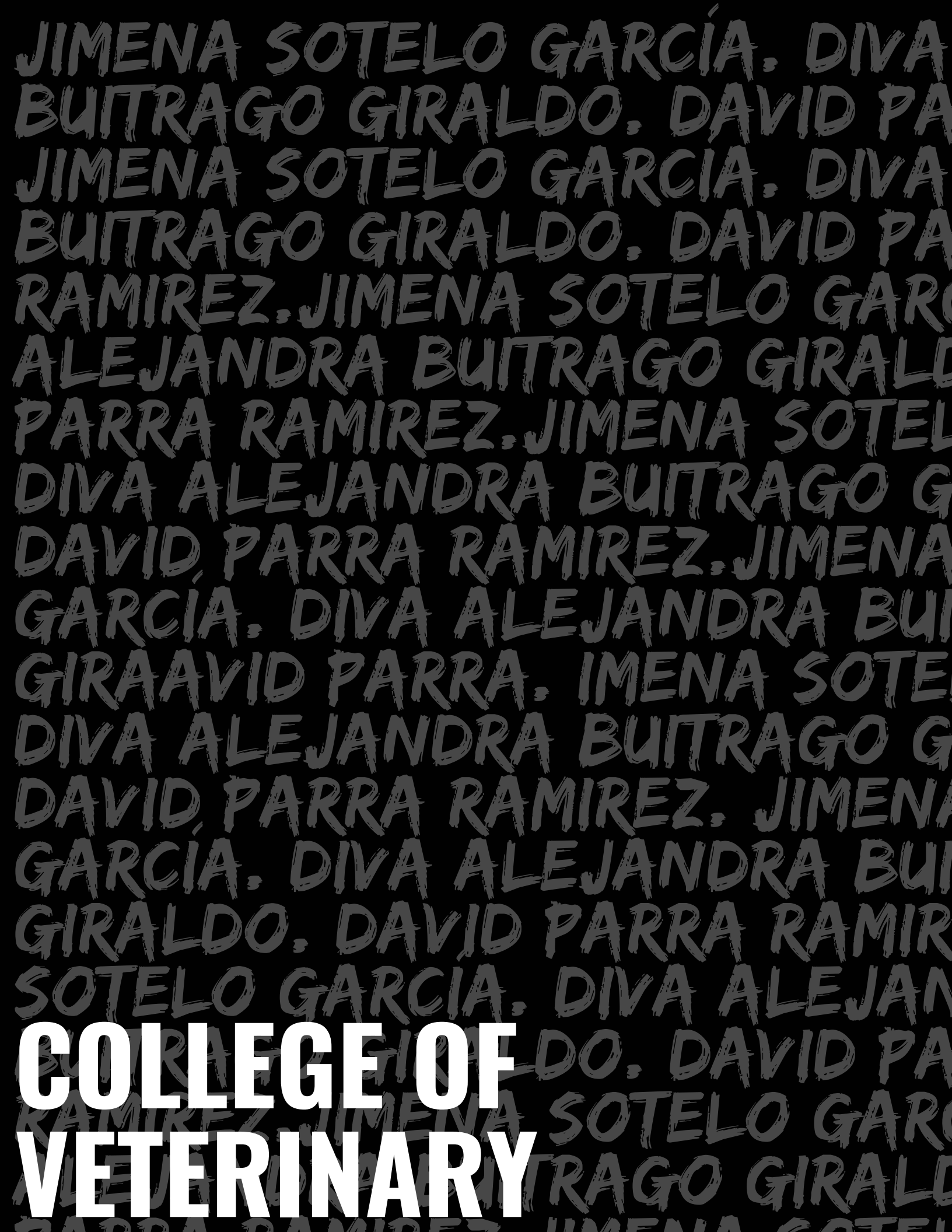
Seeking to positively impact underserved population's health outcomes I had the opportunity to take part in community activities such as vaccination and medication access events. Whereas in the clinical front, I was able to actively participate and learn about the U.S. pharmacy model providing clinical follow-up for Spanish-speaking underserved populations with high cardiovascular-risk disease in clinics based in Indianapolis, IN

The professional and cultural background that I had to offer allowed me to teach in CheqI's new experiential education program: Spanish Language Track.

A pioneer program dedicated to enhancing the ability and comfort of pharmacy students to speak Spanish. This also led to the establishment of a partnership with a local health service provider interested in using SLT students as interpreters for their services.

The approach to my Latino community in Indiana displayed a perspective of challenges I would like to continue approaching in my professional practice but also, provided personal growth by discovering the unknown reality of a new country, city, and culture. I feel proud to be one of the two Colombian Pharmacists who added efforts to build this initiative that nowadays is an open path to future interested participants. This would not be possible without the support and guidance of Dr. Ellen Schellhase, Dr. Jasmine Gonzalvo, and Dr. Monica Miller who could visualize and invite me to land this idea, and all the CHEqI fellows who helped in the process.

-- Something I will never forget is that I was led to the Hoosier community in Indianapolis who received me with arms wide open as if I was one of their family and supported me during my time there!


JIMENA SOTELO GARCÍA. DIVA
BUITRAGO GIRALDO. DAVID PA
JIMENA SOTELO GARCIA. DIVA
BUITRAGO GIRALDO. DAVID PA
RAMIREZ.JIMENA SOTELO GAR
ALEJANDRA BUITRAGO GIRALD
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DAVID PARRA RAMIREZ.JIMENA
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GIRAAVID PARRA. IMENA SOTE
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DAVID PARRA RAMIREZ. JIMENA
GARCÍA. DIVA ALEJANDRA BU
GIRALDO. DAVID PARRA RAMIR
SOTELO GARCÍA. DIVA ALEJAN
COLLEGE OF
VETERINARY

DIVA ALEJANDRA BUITRAGO GIRALDO

VETERINARY CLINICAL SCIENCES

INVESTIGATING THE ASSOCIATION OF POSTPARTUM LIVER TRIGLYCERIDES AND SYSTEMIC INFLAMMATION WITH MILK PRODUCTION OF TRANSITION DAIRY COWS.

Advisors: Dr. Rafael Neves & Dr. Carolina Zamorano

Our research project focused on the transition period of dairy cows. This period commonly involves a negative energy balance that predisposes the cows to display systemic inflammation and fatty liver. In the past these changes signaled a negative health status with a reduction in milk production; However, this is questionable today because some cows with both conditions still exhibit high milk production. The objective of this study was to analyze the hepatic triglycerides and albumin to globulin ratio of 67 cows with different levels of milk production from a parent study. We hoped to achieve a better understanding of the events that occur during the transition period of dairy cows.

Since starting my undergraduate studies, I have been interested in dairy production and the key roles that farmers play in our society. From the research field I want to improve the quality of life throughout rural communities and to find solutions to the environmental impacts of traditional systems of production.

During my research internship I heard different points of view, I immersed myself in other cultures, visited amazing places and met people from other countries. These experiences opened my mind to a big world with challenges that contributed greatly to my personal and professional growth. I'm grateful to Purdue University, the University of Caldas and the institutions that make the Nexo Global Rural program possible. I am thankful for having the amazing opportunity to live this research, cultural and linguistic experience at Purdue University, I am sure that it will contribute to my academic and professional future. I'd like to express my gratitude to Dr. Rafael Neves' support and for guiding me in this process. To all the professors who taught me during my internship. I'd also like to thank the team of M.Sc. and Ph.D. students for their warm welcome.

-- Something I will never forget is: All my days at Purdue will be my best history to tell, I'll never forget the colors of the leaves in the fall season.

DAVID PARRA RAMIREZ

VETERINARY CLINICAL SCIENCES

ENHANCING EQUINE RESPIRATORY HEALTH: EXPLORING THE IMPACT OF DUST MASK IN ASTHMA PREVENTION.

Advisors: Dr Laurent Coüetil & Dr. Carolina Zamorano

During this project, a significant challenge arose from the prevalent evidence showing that the bedding and feeding practices in horse stables, primarily using straw, contain an abundance of dust particles and potential pathogens such as viruses, bacteria, and fungi. This environmental issue contributes to inflammation in horses' respiratory systems, exacerbating the inherent inefficiency of their respiratory systems. To address this concern, our focus has been on developing a dust mask designed to reduce the inhalation of these particles, aiming to enhance horses' overall well-being and alleviate asthma-related problems.

In terms of technical skills, I acquired proficiency in performing Bronchoalveolar Lavage Fluid (BALF) techniques, interpreting results, conducting equine physical examinations, and synthesizing background information by reviewing and summarizing relevant articles. The testing of the mask involved the use of sensors to measure airborne particle levels both inside and outside the mask, providing a quantitative assessment of its effectiveness.

This experience has had a profoundly positive impact on both my personal and professional growth. It has been enriching to immerse myself in a new country, adapt to the organized academic environment at Purdue University, and cultivate independence. Exploring various cities and meeting diverse individuals has broadened my perspective on the profession in a different cultural context.

I would like to express my gratitude to Dr. Laurent Coüetil, Laura Murray, and Dr. Kathleen Ivester for their unwavering support, guidance, and for opening the doors of their laboratory, generously sharing their expertise. Special thanks to my friends Miguel and Esteban, whose humor and camaraderie made my stay more enjoyable, and to Ivan for being a reliable support system, offering valuable advice and always being there when needed.

This experience has undoubtedly left an indelible mark, shaping my future decisions and inspiring a deeper commitment to research and professional development.

-- Something I will never forget is: the journeys with my friends, the laughter in the apartment after a challenging day, the wonderful people I met along the way, and everything I learned at Purdue.

JIMENA SOTELO GARCÍA

VETERINARY MEDICINE

EVALUATION OF BEHAVIORAL EFFECTS OF THE EXPOSURE TO FENTANYL AND ALCOHOL IN FEMALE C57BL/6J MICE

Advisors: Dr Adam Kimbrough & Dr. Marisol Lamprea Rodríguez

The opioid crisis in the United States has intensified in recent years, becoming a lethal problem that expands globally and affects people's lives critically. Fentanyl, one of these opioids, has been commonly prescribed for post-surgical treatments or chronic pain due to its powerful analgesic action. However, its high addictive potential, caused by its activity in the dopaminergic reward system and its interactions with other substances of abuse, needs to be further studied. With this in mind, the experiment that I conducted sought to evaluate the possible behavioral effects generated by repeated and joint exposure to fentanyl and alcohol inC57BL/6J mice, using anxiety and locomotion tests as well as recording possible changes in alcohol intake. While in this lab, I learned different techniques for proper mouse manipulation, surgical procedures, and various behavioral tests which is the part that draws my attention the most.

Also, I was able to have a closer look at tissue-clearing techniques like iDISCO, which is very helpful in holistically understanding brain circuits. Mainly, I learned how to plan an experiment in this field, the processes that need to be done in advance, some of the difficulties that can arise in its elaboration, and the great effort involved in working with live animals.

More than all the science-related knowledge I acquired, I got to meet new friends and co-workers. I also collaborated with them, we cared for each other and solved problems together. I explored new cultures and places I had not seen before; I went to Indianapolis and Chicago with my roommates and traveled independently to explore Florida's amazing fauna and flora. I'm very grateful for this unforgettable experience.

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-- Something I will never forget is that I got to meet my favorite animal in the world! the red panda in the Indianapolis Zoo.

PURDUE POLYTECHNIC INSTITUTE

JOEL ADOLFO FLOREZ MOLINARES

SCHOOL OF AVIATION AND TRANSPORTATION TECHNOLOGY

EXPLORING FORESTRY FRONTIERS WITH UNMANNED AERIAL SYSTEMS AND GEOGRAPHICAL INFORMATION SYSTEMS

Advisors: Dr. Joseph P. Hupy & Vladimir Cudris

During my time at Purdue University, I embarked on an exciting research journey focused on exploring forestry frontiers with Unmanned Aerial Systems and Geographical Information Systems, our mission is to possess a better understanding of the health and identification of different types of trees in forested areas by intersecting forestry and technology to focus on the endangered tropical dry forests of Barranquilla and to answer a fundamental question: "How can UAS and GIS technologies be implemented to improve conservation efforts in these crucial ecosystems?".

Some technical knowledge that I have acquired during my research includes but does not limit to: drone mission planning, drone flight, drone image processing, 3D modeling out of drone imagery, image classification and analysis, image pattern recognition, cartography, geographical information manipulation, etc.

This experience has had a huge impact on my personal life. I have not only learnt new topics in a different language, but I have also experienced daily life aspects in a completely different culture. I have become more aware of the existence of unknown unknowns and it encourages me to learn more.

My professional life has also been impacted positively, as the knowledge acquired during this research period has broadened my skills and opened my eyes to new ideas and motivations for projects.

I would also like to thank my advisor and his family for inviting me to spend thanksgiving with them. I want to thank Juan Diego, Lucy and everyone involved in making the UREP-C program possible.

--Some things that I will never forget are when I flew a plane with my Host dad Steve Cuppy, when I saw dinosaur fossils in Chicago, when I did pumpkin carving and when I saw snow falling for the first time in my life.

SANTIAGO MOLINA HOYOS

SCHOOL OF ENGINEERING TECHNOLOGY

SIMULINK AND SIMSCAPE BASED SIMULATIONS OF ELECTRICAL SHIPBOARD POWER SYSTEMS

Advisors: Dr. Adel- El Shahat, Dr. Rajeswari Sundararajan, & Efraín Antonio Pérez Rojas

The simulation of a Shipboard Power System is typically done under one of the following three approaches: To estimate the performance of an existing system under different operating conditions, to complement the design process of a Ship, or finally, as part of a tool for teaching or training purposes.

In this order of ideas, during the program, I had the opportunity to learn about the representation and estimation through Software (Simulink and Simscape Electrical), of the operation of Electrical Power Systems in Ships, with the task of preparing an article that addressed a discussion about a simulation purposed for a Two-Zone Medium Voltage DC Electrical Power System Model, searching to contribute to the development of new documentation about the process of implementation, description, and analysis of such simulations.

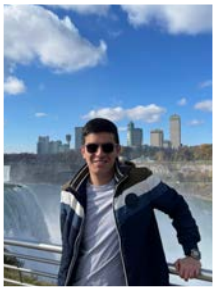
To meet the objectives of my project, my work was focused on two main aspects, the review of literature about aspects such as the modeling of these systems, their classification, characteristics, and operation, as well as, the study of the software documentation and consecutive development of simulations and reports.

Participating in the UREP-Cs program has been one of the greatest learning experiences in all aspects of my life. On the other hand, I feel very grateful for having the opportunity to get to know Purdue and its community, just as I was able to meet great people from all over the world. In particular, I want to express my sincere gratitude to my tutor professors, the Purdue Office of Global Partnerships staff, and the Faculty of Mines, of the National University of Colombia.

--As "UREP-CITOS" we were a very united group, and my partners gave me moments of great joy. Likewise, I won't forget my Host Family and their friends from Upper Room Fellowship, who always made my roommates and me feel very welcome.

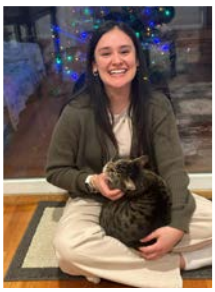
UREPCITOS 2023

Elizabeth Alzate
La bailarina



Juan José Arévalo
El omnipresente

Mariana Arias
La aesthetic



Mónica Arias
La bella durmiente

Diana Betancur
La doglover

Diva Buitrago
La loca de las ardillas

Cristian Cabrera
La reportera

Luisa Campos
La delulu

Juan P. Cardona
El limpiador compulsivo

María C. Castro
La paciente

José M. Contreras
El comprometido

Carla Cueto
La vegana

Nicolás Cuevas
El influencer

María C. Escobar
La parchadita

Lucas Flórez
El gomelo

Joel Flórez
El pai

Tatiana Giraldo
La más charra

Angelly Guarín
La más dulce

Álvaro Hernández
El geek

Eloísa Herrera
La carcajadas

Manuela Hurtado
La fashionista

María P. López
La entusiasta

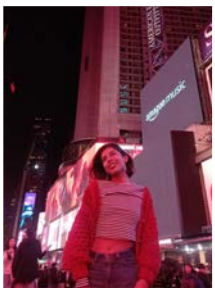
Natalia Lozano
La salsera

Felipe Martínez
El generoso

David Martínez
El chico ultimate

Jairo Marulanda
El chico discord

Santiago Molina
El más formal



Laura Naranjo
La hippie

Sara Nieto
La californiana

Sara Norato
La noble

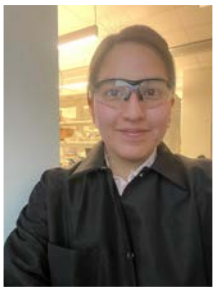
David Parra
El mono

Juan D. Peña
El sabio

Isabella Pérez
La rumbera coquette

Sara Pérez
La juiciosa

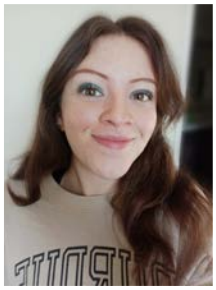
Cristian Pineda
El gymrat



Gabriela Puerres
La peace and love

Isabela Ramírez
La toche

Alejandro Riaño
El runner



Katerin Rodríguez
La cantante

Alejandra Romero
La hardworker

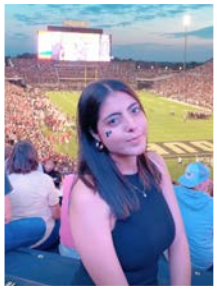
Andrés Rosa
El rockero

Jimena Sotelo
La k-poper

Esteban Trejos
El fotógrafo

Juan M. Valencia
El músico

Maria C. Vargas
La soñadora



Wanda Villacorte
La poeta

Juan D. Viracachá
El de la cicla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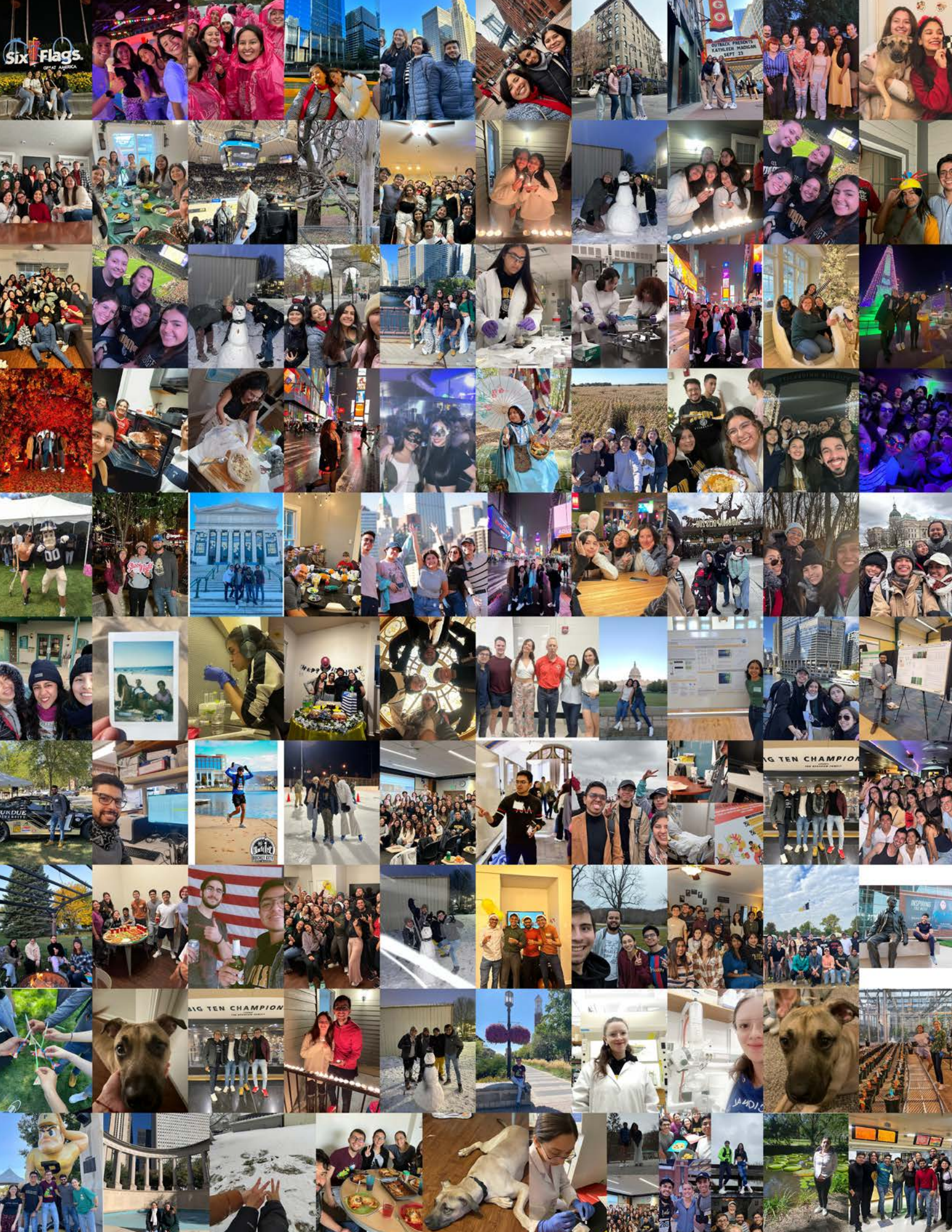
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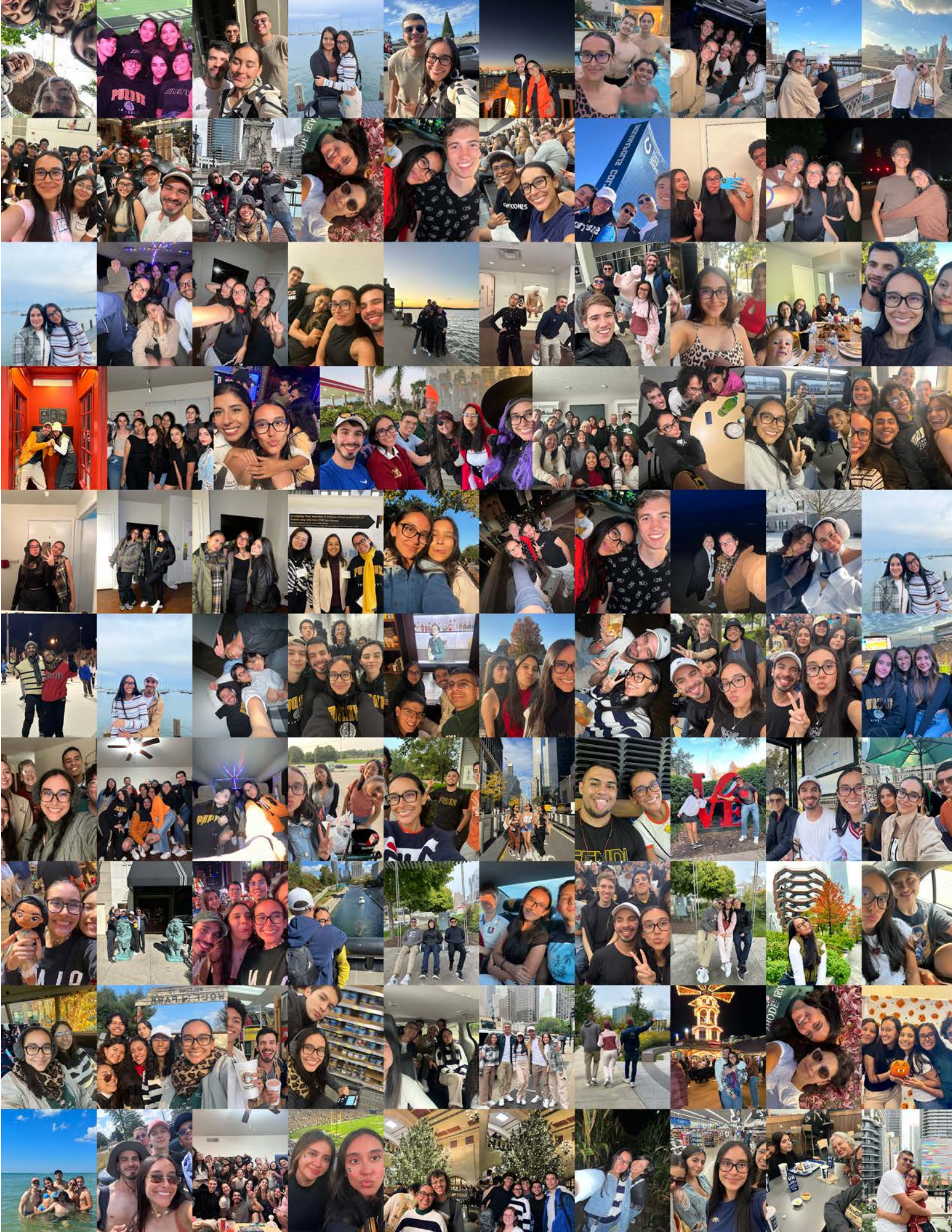
GREAT AMERICA
OUTBACK PRESENTS
KATHLEEN MADIGAN
SEPT. 23
BIG TEN CHAMPION
BIG TEN CHAMPION



EDITORIAL

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