UREPC

FINAL SYMPOSIUM

UNDERGRADUATE RESEARCH EXPERIENCE
PURDUE - COLOMBIA 2017

UNIVERSIDAD
NACIONAL
DE COLOMBIA

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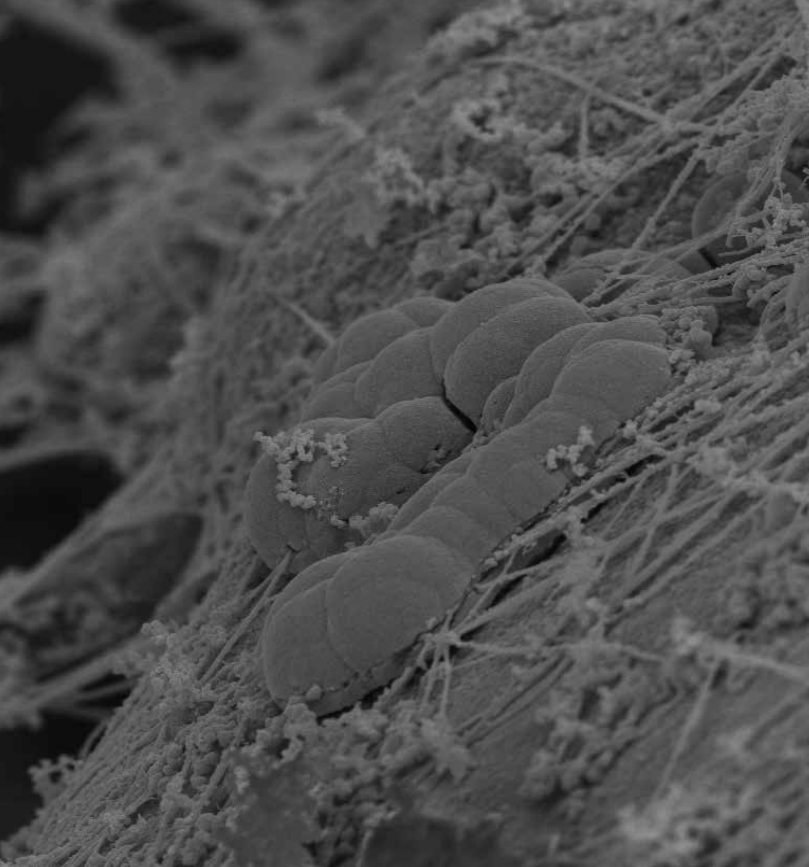
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ABOUT

UREP-C

The Undergraduate Research Experience Purdue Colombia, UREP-C, is a program through which undergraduate students from Universidad Nacional de Colombia can take part in research groups at Purdue University, being a life changing time for its participants, who are able to experience firsthand all the process of a research project in a world class institution, allowing them to gain abilities relevant to their career development.
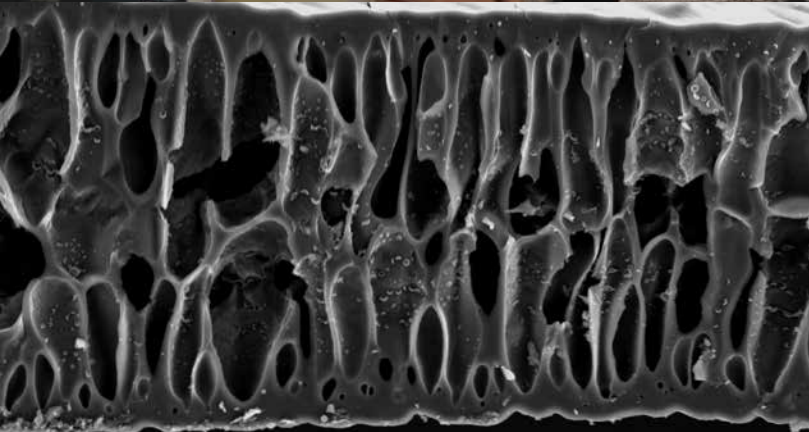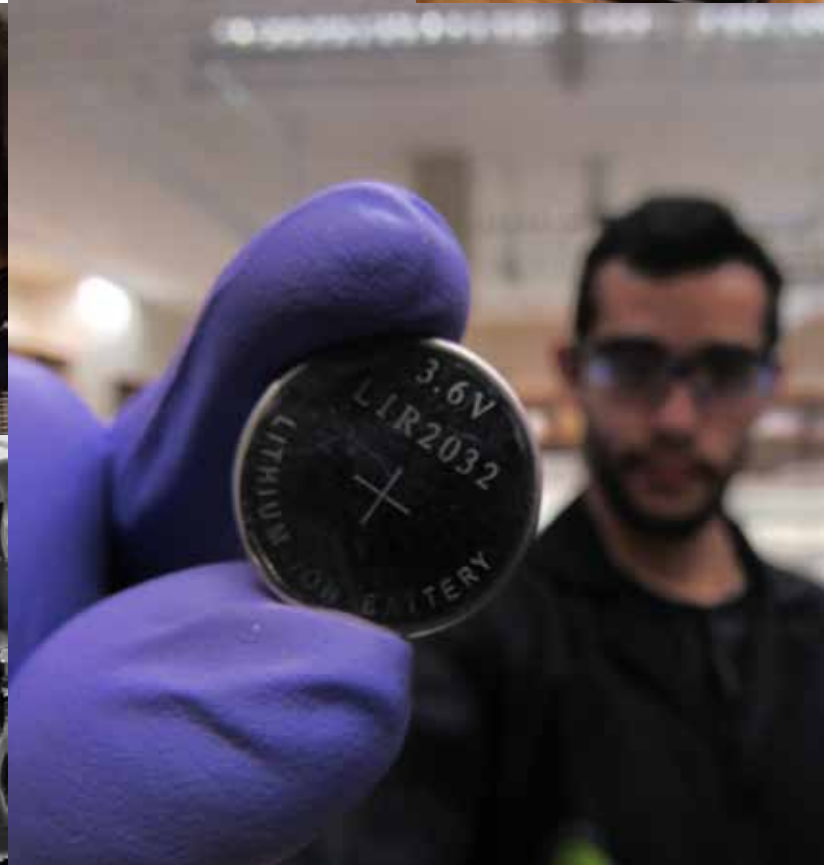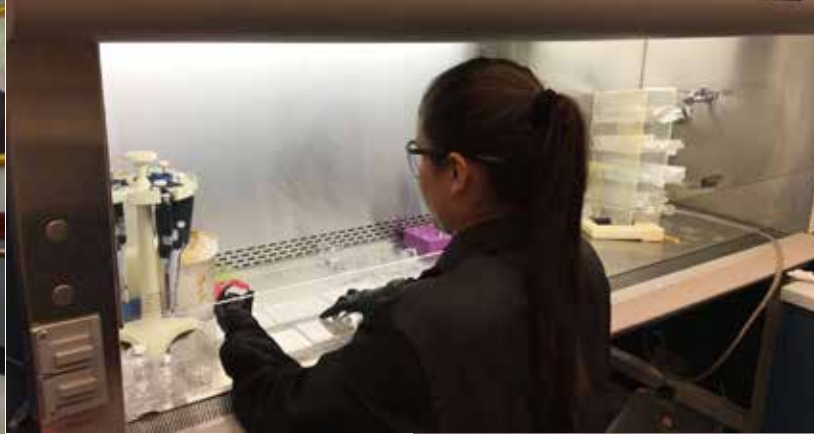
CONTENT

UREP-C 2017 PROJECT

Victor Hugo Pardo Bolaños

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Industrial Design

Dr.Dennis Flanagan (Advisor Purdue)

Dr.Gabriel Garcia Acosta (Advisor UN)

Design of a Soil Moisture Sensor for Crops

As a senior industrial design student, one of my main professional motivations is to use my discipline to improve people´s quality of life Agriculture is responsible for supplying food demand to a constantly growing world population. In addition, by 2040 global temperature is expected to increase by 4°C due to climate change, impacting the yields of the fields. During the literature review process, I noticed that irrigation efficiency is fundamental to maximize crop yield, so the relevance of this topic for farmers is a must nowadays. As a big portion of crops are grown in small land parcels, it is important to look for new technology methods for medium and small farmers especially in underdeveloped countries.

As a result, developing a soil moisture sensor for crops was my research focus during my stay at Purdue; consequently, ensuring the empowerment of knowledge and new alternatives for agriculture in Colombia and the United States.

María Camila Niño Muñoz

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Industrial Design

Chad Jafvert, Larry Nies & John Howarter (Advisors Purdue)
Gabriel García Acosta (Advisor UN)

Filtration & water purification for ruras schools & communities near Bogotá D.C area

Although I study Industrial Design, I always have had interest in biology and environmental sciences, and throughout my major, I have been learning how to combine these two sides of me, so I can create things to help people and other living beings, be curious and never get bored.

The water quality problem is huge in many ways worldwide, and there have been many initiatives to solve it, nonetheless, some of these initiatives fail due to a lack of consideration on the sociocultural characteristics of the beneficiaries and the sustainability of the projects. My project aims to solve this in some schools near Bogotá D.C area, by understanding how population & environmental characteristics interfere in the system, so we can improve it to make it more accurate, educate and empower people, generate appropriation and improve interactions and feedback to help us to evolve the system.

To me, this has been an amazing experience to grow up as a designer, as a person, learn from different fields of knowledge and cultures, so I always will be grateful because of this opportunity.

Ana Maria Ulloa Gomez
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Dentistry

Lia Stanciu (Advisor Purdue)
Martha Lucia Sarmiento (Advisor UN)

Enhancing Osteo-integration of porous/non-porous Fe30Mn coated with type I Collagen

As a dentistry student it has been of my interest researching in biomaterials and be an expert on it. UREP-C gave me the opportunity to get closer to my field of interest, and I could join to a wonderful research group in the School of Materials Engineering. During this period, my advisor Dr. Lia Stanciu, the Ph.D. student Sabrina Huang and I have been working in the development of a type 1 collagen coating to enhance the integration of an iron-based alloy to the bone. This Iron-based alloy has been studied in the last decade and seems to be a promising material for the manufacture of new implants.

These six months have been very enriching academically and personally, I hope to continue working in this specialty in the future. Thanks to Purdue University and Universidad Nacional de Colombia for making me part of this program.

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Economics

Ariana Torres (Advisor Purdue)
Liliana Chicaíza, Mario García Molina (Advisor UN)

Profitability of the Indiana Melon Industry

I During the last decades, the Indiana melon industry has stagnated. The fruits coming from other states and countries have limited the growth of this sector. With professor Torres and a group of researchers from the HLA Department at Purdue, we have studied several ways in which the situation of the Indiana melon growers can be improved. The team has tested different melon varieties and production techniques, and Dr. Torres and I have evaluated the economic feasibility of these changes from the point of view of the producer (analyzing its financial effects) and from the viewpoint of the customer (studying consumer preferences).

This experience allowed me to apply my knowledge in a tangible way, while I also learned about agriculture, biology, and a wide range of topics. This adventure –and the people I met– have inspired me to devote my career to economic research, focusing on improving the lives of others.

Nathalia Olivera Arenas
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Chemical Engineering

Dr. Jozef L. Kokini (Advisor Purdue)
Dr. José G. Carriazo (Advisor UN)

Study of the effect of Laponite addition on mechanical, surface and barrier properties of Kafirin films

I feel fortunate for having this opportunity, it was an enriching professional experience, which also inspired me personally. I got the chance to work with a group of really talented people in a place I could never have dreamt of. The Kokini Lab covers a wide range of cutting edge research like rheology of food materials, using quantum dots for fluorescent imaging, developing bio-degradable materials, and working on nanoencapsulation.

The aim to develop bio-degradable materials as an alternative to petroleum-based polymers is a hot topic. The development of bio-degradable films based on proteins from cereals follows this research trend. I worked manufacturing films from Kafirin, which is a protein found in Sorghum. Some of the current limitations with bio-degradable films are related with their mechanical, thermic, and barrier properties. My project studied how the properties of the Kafirin films are impacted by the addition of laponite, a synthetic clay.

Harif Fontecha
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Chemical Engineering

Prof. Vilas Pol (Advisor Purdue)
Prof. Jaime Aguilar (Advisor UN)

Facile and scalable recovery of carbons from plastic bags (PE) applied to secondary batteries

As chemical engineering student, I concede energy as the driving force to the transformation of the world. From the production of new materials to the progress of entire communities, energy is the most valuable resource.

During my stay at the Vilas Pol Energy Research (ViPER) group I had the opportunity to get closer to the battery technology and its current challenges. I studied the feasibility of upcycling polyethylene from plastic bags to produce cathodes -a fundamental component of energy storage devices-. The reaction process was optimized, and the product was characterized, all in order to give one more step forward to the next-generation batteries.

I look forward to having more opportunities to learn, share and apply knowledge related with the energy field to improve the current technology and, maybe one day, improve the life quality of vulnerable communities.

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Chemical Engineering

Dr. Yoon Yeo (Advisor Purdue)
Dr. Rubén Dario Godoy Silva (Advisor UN)

Nanoparticle antagonist for Lipopolysacharides

The curiosity to experience new ideas, concepts, environments and situations, has marked and led my pathway from a very young age. Feeling always attracted to the idea of overcoming the settled limits, learning what is yet unknown, telling what is not told and trying what has not been tried, have allowed me to meet some of the most influential people in my life, as professor Rubén Godoy, who is my mentor and advisor, yet also, my friend and role model. It was also how I decided to enroll on this program, in which I was fortunate of joining Dr. Yoon Yeo's lab. The formulation of a nanoparticle capable of act as antagonist of Lipopolysaccharides as a mean to systemic treat the pathogenesis of sepsis due to endotoxins, was the approach for this project collaboration. The process required continuous critical feedback and creativeness in order to route its course, all of which were possible thanks to the bright guidance and sense of excellence of Professor Yoon Yeo, as well as the patience, enthusiasm, willingness to teach, share and hear of M.Eng. Simseok Andrew Yuk.

Santiago Cifuentes
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Civil Engineering

Rao S. Govindaraju (Advisor Purdue)
Carlos Alberto Gonzalez Murillo (Advisor UN)

Application of the Soil and Water Assessment Tool (SWAT) model over Bogota river watershed

I do not believe Colombia is a poor country, in fact I believe it is one of the richest countries all over the world and it has everything to get in a better position. However the poor planning and decision making with some other factors do not let the country take off and not just this, that wealth that Colombians are "proud" of is getting stressed and leached. For that reason I want to make efforts for changing the situation and help to make a more competitive and sustainable region. The aim of my project is helping planners and decision makers to select the best choice in terms of land use practices and management for both economic growth and environmental protection.

About me, I like nature, arts, rock music, working out, juggling, and learning all kind of stuff.

Néstor Fabián Rodríguez Buitrago
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Civil Engineering

Jan Olek & Pablo Zavattieri (Advisors Purdue)
Ferney Betancourt (Advisors UN)

3D Printing and Performance of Cementitious Materials with Controlled Microstructural Architectures in Compression

The idea of being a Civil Engineer came to me after finding out how much I loved mechanics and chemistry, and after each one of my school teachers told me I was going to be an Engineer.

During my research stay at Purdue University I worked on the 3D Printing of Cementitious Materials with Controlled Architectures, one step ahead for the 3D Printing technology. With this research I learnt about different topics but also I met wonderful people from all around the world, so, getting to know them is one of the memories I will treasure forever.

This experience also gave me the opportunity to enjoy amazing experiences. I attended the games of the Purdue Football team, so I could watch live my favorite sport and teach it to my friends. Also sharing time with the kindest and most charming people I've ever known… BOILER UP!

COLLEGE OF **ENGINEERING**

David R. Villarreal B.
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Civil Engineering

Dr. Jon D. Fricker (Advisor Purdue)
William Castro Garcia C.E. (Advisor UN)

Analysis of pedestrians' behavior in uncontrolled crosswalks

I've known several places in my country with problems about the mobility conditions. Like a future civil engineer, I'm aware of the social implications and responsibilities of meeting the people's mobility demands. I've always been interested in transportation dynamics of cities and knowing about transportation systems in different places of the world. Nowadays, there have been quite progress in autonomous vehicles. These will be able to sense the presence of other users and predict their behavior, but the pedestrian behavior is the most difficult of predict. The research that I have conducted has the goal of finding the best practices to analyze the pedestrian behavior in uncontrolled crosswalks located at Purdue University and that way this methodology could be used in future studies about a context of autonomous vehicles.

The experience of being in Purdue University leave me one thought "Even if the world says no, one can accomplish their goals"

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Computer and Systems Engineering

Aly El Gamal (Advisor Purdue)
Cesar Augusto Pedraza Bonilla (Advisor UN)

Machine learning models for predicting Dynamic Stress Load values in sports training

I find appealing the possibility to build something out of nowhere, see it grow, functional and useful to the ones around me. In software development, robotics, and machine learning, I find that possibility within my reach. These areas found common ground in the late years to give us remarkable applications.Among them, Machine Learning has had an immense development becoming a relevant tool for a wide range of disciplines, thus, my motivation to research on it.

This experience has given me an insight of how this tool is used to create knowledge. My project is center on the improvement of soccer player performance, to that end, a prominent level of physical fitness is necessary. Being able to estimate Dynamic Stress Load (DSL), which is the total of the weighted impacts the player experiences during a session or game, can lead to design more efficient training sessions.

Mayerli Andrea Montes
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Electronics Engineering

Dr. David Janes (Advisor Purdue)
Dr. Carlos Perilla (Advisor UN)

Effect of superficial patterns over the spatial distribution of nanopores in porous anodic alumina template

UREP-C was a vast opportunity for me to recognize my abilities facing a different side of my major as it is electronic devices fabrication. I developed my research experience with Professor David Janes' group, which is focused on nanowires and their response in near-IR and visible sections of electromagnetic spectrum. The applications of this kind of structures go from solar cells to transparent conductors, which are nowadays ones of the most important topics in electronics approach.

I worked in production of templates for the deposition of nanowires and how spatial distribution of these templates can affect the response of nanostructures array. I feel pleased, because of the independence that I got working in a project by my own and the responsibility of the acquisition and validation of new results that can be useful in a field to which I was introduced thanks to this experience.

Juan David Ramirez Ortega

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Mechanical Engineering

Prof. Chad Matthew Laux PhD. (Advisor Purdue)
Prof. Carlos Julio Cortes PhD. (Advisor UN)

ISO Management systems as a vehicle for the implementation of Lean manufacturing and SixSigma

My current research is focused on learning the relationship between ISO Management systems and other improvement methodologies such as Lean Manufacturing and Six Sigma, the main objective is to establish a new perspective regarding the Operations Management field in order to encourage business improvement in Colombia and abroad. My interests are music, as a piano player and learning new languages.I have learned German, French and English so far. UREP-C has been a life changing experience for me and after that I see myself as an entrepreneur engaging in engineering projects and solving the different challenges that Colombian industry faces.

Jaime Leonardo Mejia
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Mechanical Engineering

**Jay Gore** (Advisor Purdue)
Fabio Emiro Sierra (Advisor UN)

Corn Stover CO_2 Gasification $Fe(NO_3)_3$ Catalyst Recovery

I am student of Mechanical Engineering; since I started my major, I have been interested in thermal systems and fluid mechanics. As an Engineer, one of my missions is to help communities to get easily and manage well their energy resources. There is no better feeling when you can help people by doing what you love.

UREP-C program gave me the opportunity of being part of Maurice Zucrow Laboratories students group at Purdue University, which is one of the most important research centers in combustion and gas dynamics around the world.

At Purdue, I am working in biomass gasification processes. My research focuses in catalyst recovery, which is a substance that promotes biomass conversion to carbon monoxide and Hydrogen.

Thank you UREP-C, because of you, I am at the place that I dreamt five years ago, when I arrived from my small town to the big city.
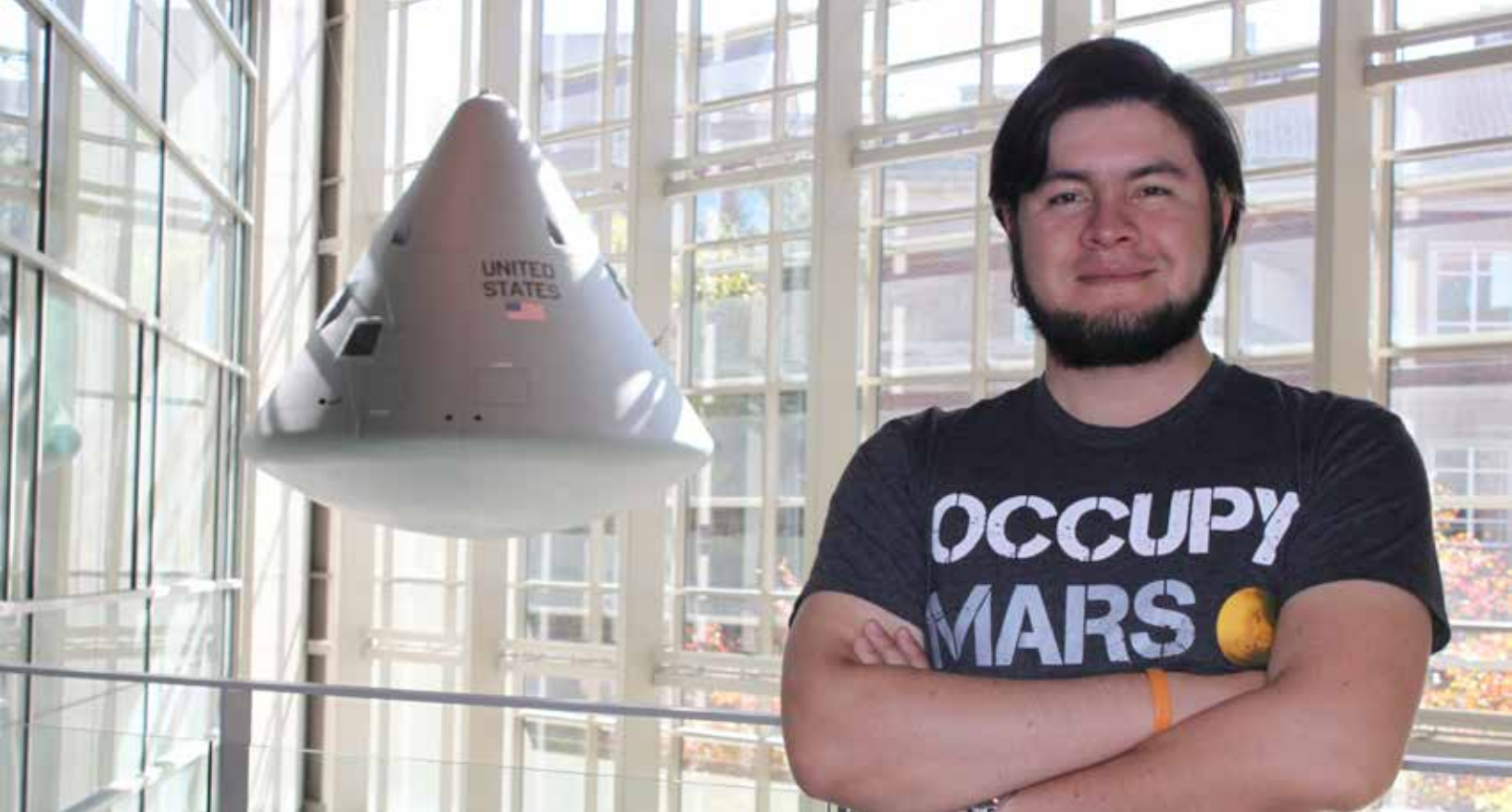
Oscar Ivan Ojeda Ramirez
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Mechanical Engineering
Pablo D. Zavattieri, Jan Olek (Advisors Purdue)
Juan Miguel Mantilla (Advisor UN)

Development of 3D Printing Techniques for Extraterrestrial Infrastructure Development via ISRU

Aerospace has been my passion my entire life. I believe the future of humanity is to explore the universe, and at our time, we're starting this journey. The development of space technologies not only will allow us to go further than ever before, but also to improve the quality of life here on Earth.

One of our first steps will be the exploration of our closest celestial neighbors, the Moon and Mars. Several developments must be made to achieve this goal. My Research at Purdue University aims to develop 3D printing techniques towards their utilization for infrastructure development with In Situ Resource Utilization.

The research was focused 3D printing of cementitious materials, the project consisted on improving the process by building a new 3D printer, and using Martian Soil Simulant to develop a printable substance to use as the basis for building infrastructure on Mars. A rover wheel using an architecture called PXCM was also developed.

PER ASPERA AD ASTRA.

Laura Daniela Vallejo Melgarejo

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Mechatronics Engineering

Jose M. García Bravo PhD. (Advisor Purdue)
Carlos Julio Cortés PhD. (Advisor UN)

Fabrication of lenses and diffraction gratings using DLP additive manufacturing technology

There are moments that mark our lives and have the power to change our way. I experienced one of these moments when I started to study materials science. Understanding that the change of a chemical element, the heat treatment or the manufacturing process could greatly change the properties of the material, and even the material itself, was like witnessing magic. From that moment, I knew that I wanted to study different materials and their applications.

The opportunity to apply my knowledge in materials science finally came when I was admitted as a visiting student at Purdue University and it was possible for me to work in the additive manufacturing of polymeric light-cured resins.

The whole experience at Purdue University represented challenges full of joy, hope, disappointments and a few tears. However, every success and mistake shaped my character and helped me to grow as a person and as a professional. This was, without a doubt, an experience lived without regrets.

Paola Medina
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Mechatronics Engineering

Teresa Carvajal (Advisor Purdue)
Carlos Narváez (Advisor UN)

Manipulator-mechanism design to pharmaceutical applications

During my time here at Purdue University I worked on the design of a robot manipulator used to pharmaceutical applications. But I learned much more than the engineering process to build a complex system. I learn that the most valuable resource when making research is not money, is people. I had the fortune to meet people from different places around the world. Wonderful people who did not hesitate to share their knowledge with me and help me when I did not know what to do or when an idea did not work. Even when they had different culture and other point of view I realized we all wanted work together to make this a better place to everybody. That is the core of the research work.

COLLEGE OF HUMAN SCIENCES

Gina Pineda Mora
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Linguistics

Olga Dmitrieva (Advisor Purdue)
Kelly Johana Vera Diettes (Advisor UN)

Production and Perception of the English Vowels /æ/ and /ʌ/ by Speakers of Colombian Spanish in English Language Immersion Context.

Bilingualism, diversity and language contact were some of the words that were stuck in my mind from past one year. Now, these words have come to life due to UREP-C 2017.

It is said that the English language differs significantly from the Spanish one as it has a more complex phonological system (Coe, 1987). The English vowels /æ/ and /ʌ/ (as in 'cat' and 'cut'), which are not part of the Spanish phonological system represent a big challenge for those who are learning the English as a foreign language. I am very thankful because this experience has given me the opportunity to not only research the effect of English language´s immersion on the production and perception of the aforementioned vowels in a group of Colombians, but also experience firsthand the cultural diversity, bilingualism, and language contact at Purdue.

COLLEGE OF **HUMAN SCIENCES**

Diana Marcela Lizarazo Pereira
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Psychology

Felicia Roberts (Advisor Purdue)
Ricardo Tamayo Osorio (Advisor UN)

Effects of frequency and emotional valence in word processing by Native and Foreign English speakers

I have always thought that health problems are closely related to social inequities. Healthcare team should affront not only physiological issues but sociopolitical ones too considering research in healthcare as one of the most important instruments to do so.

Nurses as part of this multidisciplinary team, have several skills and knowledge that support their interventions. Nurses are leaders and innovators by nature, which is useful in research.

One of my motivation to be part of UREP-C was to demonstrate how nurses can participate in research programs working ahead with others professionals. For me, this program has been the perfect opportunity to improve my competences and learn from many care perspectives. In this sense, my research experience was developed in U.S nursing homes (a distinct way of care delivery for me) where we can find one the most vulnerable populations, elderly people. Better quality of life and better care for them were the research's heart.

José Daniel Rengifo Martínez

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Law

E. Daniel Hirleman Jr. (Advisor Purdue)
Oscar Andrés Lizarazo Cortés (Advisor UN)

COLLEGE OF LAW, POLITICAL & SOCIAL SCIENCES

Legal Proposals upon Intellectual Property Management within a Bayh-Dole Act-Inspired Provision in Colombia

My interest in intellectual property law arose when I first learned about copyright, because it allowed me to work with two disciplines I feel passionate about: law and art. The challenge of learning from new disciplines immediately got me interested. And that challenge became bigger when I learned about patent law, because it required me to get involved into new disciplines in different fields of technology.

Today, intangible assets play an increasingly important role in economic growth, and that's why the protection of intellectual property is essential. A big part of innovation comes from university research, and thus it's indispensable to build a strong technology transfer platform in order to accomplish that goal.

My research at Purdue allowed me to identify the international and national legal provisions and university policies that are essential in order to successfully manage intellectual property rights upon innovation in public-funded research, and to elaborate proposals to implement equivalent provisions in Colombia.

Mariana Tique Álvarez
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Law

David Zwicky (Advisor Purdue)
Fredy Andrei Herrera Osorio (Advisor UN)

International Patent Law 101: Creation and update of instructional materials related with Patents and the Patenting Process in the legal regimes of the Andean Community, the European Union and the United States.

As many of you know, I am currently working with Patents and Patent Law. But what you may not know is that, before starting to study Law, I learned how to teach to little kids in my school, which was specialized on education. I have always felt an enormous passion about teaching, about explaining the relationship between the little pieces and the whole.

With my research project, I am trying to bring Engineers, Scientifics and, in general, researchers from all of the areas of knowledge, closer to the Patent Law and the way it functions around the world, in a conjunction of two of my biggest passions: teaching and law, all of which roots on the countless efforts that all of the people belonging to the UREP-C program have ever made for making this amazing experience possible. I would like to thank in a very special way to Professor David Zwicky, my advisor at Purdue University, who has inspired me and guided me through this complex yet satisfying path.

Germán Alarcón
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Nursing

Dr. Kathleen Abrahamson (Advisor Purdue)
Dr. Juan Carlos Diaz Alvarez (Advisor UN)

Non-pharmaceutical interventions to decrease use of psychotropic medications in nursing homes and assisted living facilities – a systematic review

I have always thought that health problems are closely related to social inequities. Healthcare team should affront not only physiological issues but sociopolitical ones too considering research in healthcare as one of the most important instruments to do so.

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Oscar Fernando Gomez H.
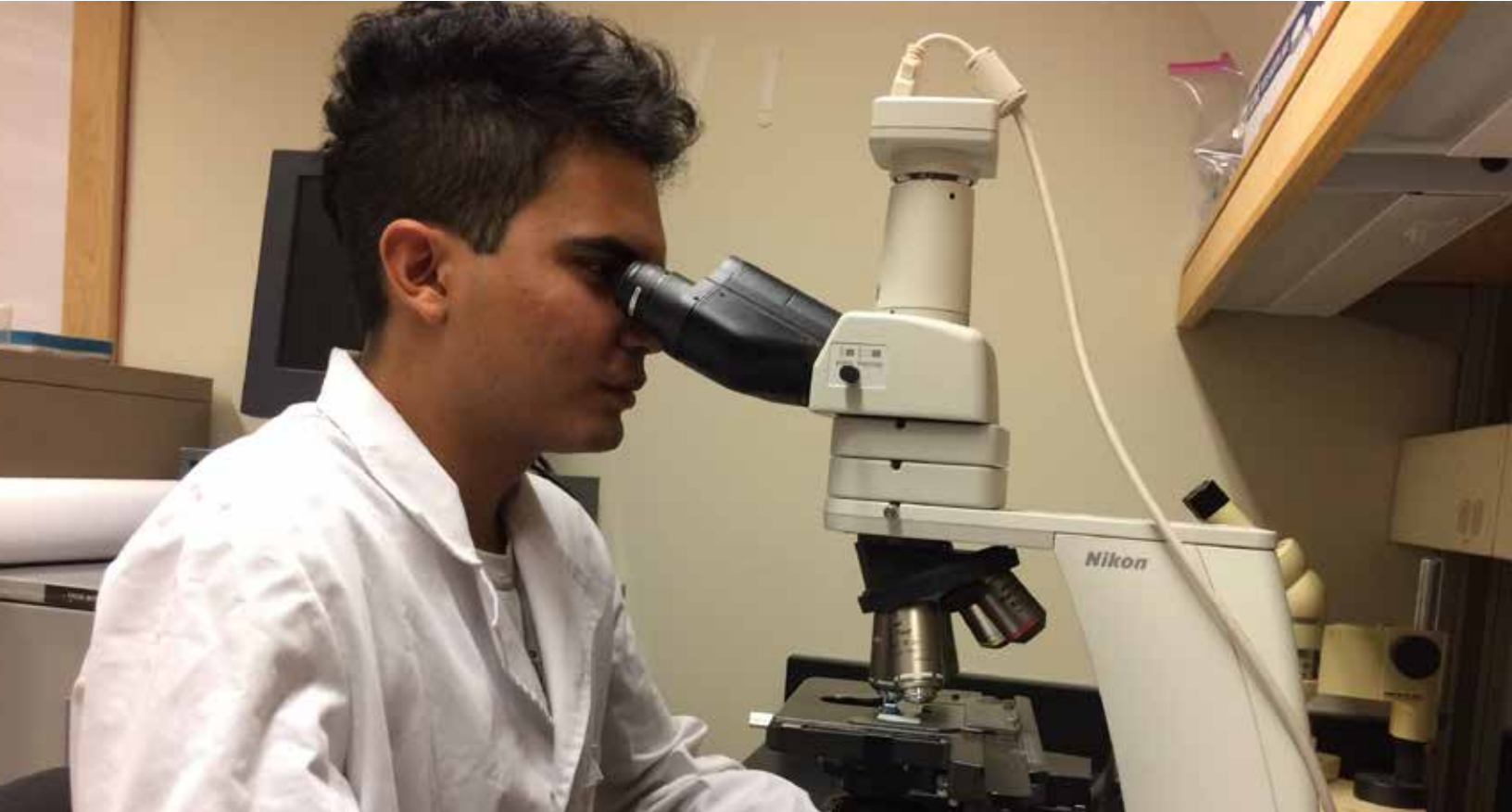
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Nursing

Yumary Ruiz PhD. (Advisor Purdue)
Sonia Carreño PhD. (Advisor UN)

Assessing Critical Thinking and Intention of Using Alcohol as predictors of Bullying

It has always been difficult to know which path to take or if what you are doing, you are doing right. The search for finding total wellness in the general population has been my primary goal in life. So many ideas come to me, and to figure out which health sphere is the most important has been my biggest challenge. I care about the mental health of the children and the opportunity to study their behaviors and help improve those habits, was the main goal of my experience at Purdue University. Public Health is the big umbrella in health sciences, where promotion and prevention take the most important roles. For it is well known that prevention of diseases is more effective and cheaper than treatment. Additionally, justifying and describing the activities that would improve the mental health of the youngest of our generation will have a strong impact in the future. We give the tools, they build the world.

COLLEGE OF **SCIENCES**

Jaime Manzano Alvarez
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Biology

Ximena Bernal (Advisor Purdue)
Enrique Zerda (Advisor UN)

The loss of parasites in an invasive species: The Cane Toad

It has always been difficult to know which path to take or if what you are doing, you are doing right. The search for finding total wellness in the general population has been my primary goal in life. So many ideas come to me, and to figure out which health sphere is the most important has been my biggest challenge. I care about the mental health of the children and the opportunity to study their behaviors and help improve those habits, was the main goal of my experience at Purdue University. Public Health is the big umbrella in health sciences, where promotion and prevention take the most important roles. For it is well known that prevention of diseases is more effective and cheaper than treatment. Additionally, justifying and describing the activities that would improve the mental health of the youngest of our generation will have a strong impact in the future. We give the tools, they build the world.

María Catalina Niño Bernal
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Chemistry

Dr. Andrea Liceaga (Advisor Purdue)
Dr. Coralia Osorio (Advisor UN)

Functional properties and antioxidant bioactivity of hydrolyzed cricket flour produced from tropical banded cricket (Gryllodes sigillatus)

I do not believe Colombia is a poor country, in fact I believe it is one of the richest countries all over the world and it has everything to get in a better position. However the poor planning and decision making with some other factors do not let the country take off and not just this, that wealth that Colombians are "proud" of is getting stressed and leached. For that reason I want to make efforts for changing the situation and help to make a more competitive and sustainable region. The aim of my project is helping planners and decision makers to select the best choice in terms of land use practices and management for both economic growth and environmental protection.

About me, I like nature, arts, rock music, working out, juggling, and learning all kind of stuff.

Laura Camila Chaves

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Geology

Briony Horgan (Advisor Purdue)
Thomas Cramer (Advisor UN)

Mineralogycal Analysis of Columbus Crater - Mars by NIR Spectroscopy

As a senior geology student I have been interested in mineralogy, petrography, planetary sciences and of course field trips, that is the reason why I have participated in several mineral deposits projects in Santander, Antioquia and Boyacá departments in Colombia during the last years. Here at Purdue University I'm doing research on Mars minerals with images acquired by NASA´s CRISM (Compact Reconnaissance Imaging Spectrometer for Mars) as evidence of aqueous processes in the red planet. Finally, I believe that this experience has become the first step to a life dedicated to research and scientific divulgation.
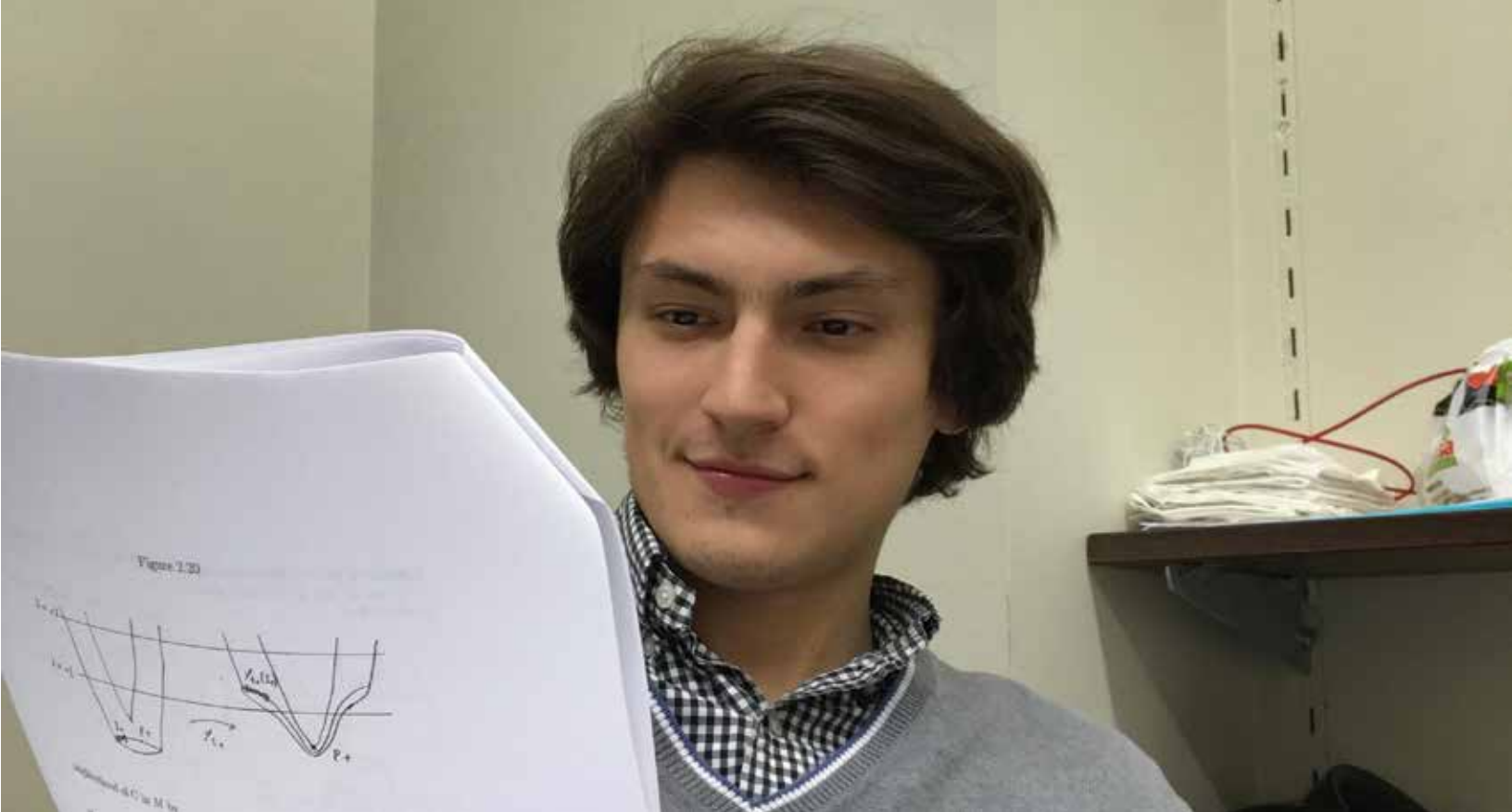
COLLEGE OF SCIENCES

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Mathematics

David Ben Mcreynolds (Advisor Purdue)
Victor Tapia (Advisor UN)

Some insights about Ricci flow proposed by R.Hamilton and G.Perelman

At the beginning of the previous century the french mathematician Henri Poincaré established a conjecture equivalent to a characterization of the 3-sphere: "Every simply connected, closed 3-manifold is homeomorphic to the 3-sphere". In 80's Richard Hamilton introduce the notion of Ricci flow and used it to characterize all the 3-manifolds with positive Ricci curvature. In 2002 and 2003 Grisha Perelman published two papers that revolutionized the field and allowed the classification of all the 3-manifolds using previous results proved and conjectured by William Thurston.Here at Purdue, in addition to learn about love, life and physics, I learnt a lot about this wonderful tool that links the geometry of a manifold with its topology: Ricci flow. I studied some particularities about it as its fixed point solutions (Ricci solitons), the properties of crucial estimates as the Li-Yau-Hamilton quadratic estimate, the Perelman's non-local collapsing theorems, the formation and classification of singularities, the short- and long-time solutions, etc.

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Pharmacy

Yoshie Hata (Advisor Purdue)
Rodolfo Pinal (Advisor UN)

Design of 3D-Integrated Pharmaceuticals for Smart Precision Medicine

The so-called 3D Integrated Pharmaceuticals (3D-IP) is an innovative technology that aims to tackle one of the most challenging problems in the pharmaceutical field: customization of solid oral dosage forms. The 3D-IP are assembled from prefabricated working parts in the form of polymeric films and personalization of the final dosage form is a simple task that requires the addition of the necessary functional films to the final dosage form. The present work describes a strategy that combines experimental design, optimization and multivariate statistical techniques to describe and predict the effect of physicochemical properties of drug and dose on the release of drugs from the final 3D-IP under standardized dissolution conditions.

COLLEGE OF SCIENCES

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Physics

Xiangxiong Zhang (Advisor Purdue)
Juan Galvis (Advisor UN)

High order DG methods with application to the incompressible/ compressible Navier-Stokes equations

My research was targeted mainly to studying the Discontinuous Galerkin (DG) method to solve Partial Differential Equations and to test some physical optimization ideas to construct a numerical quadrature. In the first part of the experience my aim was to study in detail both the algorithm and the analysis of

the DG methods for time-dependent linear and non-linear multidimensional systems of PDE. This with the objective of applying the method in problems like the incompressible/ compressible Navier-Stokes Equations.

For the Second part of the experience my focus was to construct a weak-positivity quadrature considering some ideas of electrostatic optimization problems. This quadrature may be suitable to implement in a positivity-preserving DG scheme for the incompressible/compressible Navier-Stokes Equations.

Catalina Herrera Cancelado
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Statistics

Michael G. Zentner, Gerhard Klimeck & Gustavo A. Valencia (Advisor Purdue)
Rubén D. Guevara (Advisor UN)

Effects of sample size, dimensionality and class separability in the classification of Gaussian distributed values.

Since I was little, I liked math and analyzing the world. When, at the age of 10, I discovered I could do both professionally, I found my passion for data analysis and knew I would become a Statistician. My main goal is to help researchers of other areas and learning many things from them. My project is a comparison between statistical and artificial intelligence classification models to show their weaknesses and strengths. My aim is to expand this to properly apply these models in real life.

I am proudly fluent in Spanish, English, Italian, French and R programming language and thanks to UREP-C I became a decent cook and biker. Through this experience I met unforgettable people, learnt a lot and explored the life of a researcher. After UREP-C I discovered my passion for machine learning and realized that there is still a lot for me to be done.

ACKNOLEDGMENTS
PURDUE UNIVERSITY

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ACKNOLEDGMENTS
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OUR EXPERIENCE