ELA, Humanities, MEC, Natural Sciences, and Social Science Department *present:*

Undergraduate Research Symposium

Date: Tuesday May 26, 2015
Room: E 500
Time: 2:30 p.m. to 4:30 p.m.

LaGuardia's first Undergraduate Research Symposium will highlight leading edge student and faculty work across multiple disciplines, including:

- Science, Technology, Engineering and Math (STEM)
- Social Sciences
- Humanities
- Education and Language Acquisition

Students will present posters that explain their research visually and discuss their work.

If you conducting research with a mentor or as part of a class project, then LaGuardia's first **Undergraduate Research Symposium** is for you!

Join us for afternoon of fun and interdisciplinary research. Refreshments provided.

For further information, please contact one of the Faculty organizers:

Mathematics, Engineering & Computer Science: Reem Jaafar (rjaafar@lagcc.cuny.edu) and Tao Chen (tchen@lagcc.cuny.edu)
Natural Sciences: Ian Alberts (ialberts@lagcc.cuny.edu)
Social Science: Karen Miller (kamiller@lagcc.cuny.edu)
Humanities: Dahlia ElSayed (delsayed@lagcc.cuny.edu)

LaGuardia Community College

CUNY

LaGuardia First Undergraduate Research Symposium
May 26, 2015

Humanities Department

Presenter: Joserichsen Mondesir
Collaborators: Brian Miller, Timothy Stater
Mentor: Joni Schwartz

Returning to school After Incarceration: Policy, Prisoners, and the Classroom

Abstract: This is an undergraduate collaborative inquiry and writing project that used archival, auto-ethnographic, and interview data to explore how formerly incarcerated students might be effectively engaged in adult education and college. From the theoretical framework of Critical Race Theory, this phenomenological research study examines the process of re-engagement to college through data collection at Wagner's Archives, the Fortune Society and individual participant interviews. Data analysis utilized a collective grounded theory approach. The final research writing was published as Chapter 7 in "Swimming Upstream: Black Males in Adult Education – a book in the New Directions Series published by Jossey-Bass in December of 2014.

Natural Science Department

Presenters: Gabriel Romero and Monika Vidaich
Mentors: Ian Alberts (NS) & Reem Jaafar (MEC)

Quantum Mechanical Prediction of the Energetic and Magnetic Properties of Complex Transition Metal Coordination Systems

Single Molecule Magnets (SMM), investigated since 1981, typically have a large magnetic anisotropy that impels the spin to point along a specific preferred axis. They are used in the application of magnetic clusters for quantum information elements and for magnetic storage devices in the field of quantum computing. We have conducted Quantum Mechanical calculations of an emerging new class, Bicoordinate First Row Transition Metal Complex Systems, of molecules, and are in the process of determining the energetics of the relevant spin states. The ultimate aim is to predict the magnetic properties, including the thermal barrier height, and, thus, to incorporate modifications to the coordinating groups in the complexes, in order to increase the anisotropic barrier. We plan to discuss our research in this presentation.

Presenter: Tabitha Rivera
Mentors: John Toland

Investigations of Magnetic Field Sensitivity of An Area Chirp Array Of Atom Intereferometers Via The Aharonov Bohm Effect.

Presenters: KARINA SANDOVAL, CHRISTINE PARK, MARYAM SHOUBIR, RAWIYAH JAMIL

Mentors: John Toland

Optimizing an Area Chirp Array of Atom Intereferometers For High Detection Of Geometric Phase Shifts

Presenters: Marcos Murdumbay & Shiran Hazan

Mentors: Maria Entezari, Lucia Fuentes

Microglia and macrophages: comparison of behavior following stimulation with LPS

Microglia are the resident macrophages of the brain and act as the main immune defense in the central nervous system (CNS). In response to chronic injury or inflammation microglia become activated contributing to a cycle of toxicity. In these cases, infiltrating macrophages assist microglia to attenuate inflammation in the CNS. Both microglia and macrophages participate in these responses, but the different function of these two populations under inflammatory stimuli remain to be elucidated. Since most brain macrophages are monoecious, we hypothesized that microglia and infiltrating macrophages have similar responses to inflammatory. The aim of this study was to compare the morphology and functional properties of macrophages and microglia in response to challenge with lipopolysaccharide (LPS). Our studies were performed using two cell lines, BV2 microglia and RAW 264.7 macrophages. Treatment with 100 ng/ml LPS did not affect viability of either cell line; 1 and 5 µg/ml reduced RAW cell viability. Both cell lines presented characteristic activated-morphology following treatment with LPS. Phagocytosis was determined following LPS treatment by counting the number of phagocytic cells as well as the number of particles per cell after incubation with zymosan; both cell lines presented increased phagocytosis; maximum values were reached at 1 µg/ml for BV2 cells and 100 ng/ml for RAW cells; BV2 cells also presented increased avidity at both of these concentrations compared to RAW cells. Our results show the importance of further investigating the behavior of different populations of macrophages to understand the particular mechanisms involved in inflammatory processes in the brain.

Presenters: CheeKay Cheong, Tseten Chokyi, Tristan Hardy, Asra Ismail, Kyuhee Kang, Yannick Lungo, Kelsey Payne

Mentor: Holly Porter Morgan

Investigating Contaminants in New York City Waterways: Service-Learning in a Capstone Course

Students in the Environmental Science capstone course, SCG250, are conducting individual research projects as part of an ongoing effort to monitor the nature and level of contaminants in New York City waterways. The project is a collaboration with The Citizen's Water Quality Testing Project (CWQTP), a citizen's science organization that provides information to the public about water quality by collecting weekly near-shore water samples. Capstone students have teamed up with the CWQTP to learn standard water sampling techniques. They have also learned the laboratory methods for determining the presence of Enterococcus bacteria, an indicator of sewage contamination, as well as how to conduct chemical tests of their water samples for trace metals and ions. While some of these metals are essential for the normal functioning of organisms, at high levels they can be toxic.

Presenters: Jesse Miller
Mentor: Holly Porter Morgan

Serving the Community through Citizen's Science: A Geospatial Analysis of Water Contaminants and Land Use Characteristics

This research is part of an ongoing effort to monitor the nature of contaminants in waterways across New York City. It is a collaboration with the Citizen's Water Quality Testing Project (CWQTP), which provides information to the public about local water quality and trains citizen scientists to collect samples.

Weekly water samples from the CWQTP were tested in the laboratory for the presence of Enterococcus, an indicator of sewage contamination, and for trace metals and ions. Geographic Information Systems software was used to delineate drainage areas or sewersheds for the combined sewage overflow (CSO) pipes in proximity to each sample site. Using lot-level data, a sewershed profile, detailing land usage within each of the sewersheds was compiled.

The following hypothesis was examined: The abundance of Enterococci in the water will be highest for sewersheds with a high proportion of residential lots. Results from this research will be important in determining management practices for New York City waterways.

Presenter: Jessica Jimenez
Mentor: Dionne Miller

Synthesis of N-Acetylcysteine-functionalized Gold Nanoparticles for Biomedical Applications

This project developed a method to synthesize gold nanoparticles (GNPs) functionalized with N-acetylcysteine (NAC). NAC is an antioxidant, which are molecules that combat reactive free radicals that cause oxidative stress in cells. Gold nanoparticles (GNPs) have a wide range of uses in current medical and biological research due to their unique physical and chemical properties. Many studies have demonstrated the potential of GNPs as drug delivery agents.

To synthesize the conjugate, the well-established affinity of gold with the -NH and -SH group on the NAC molecule was exploited by vigorously stirring 10 nm GNPs while varying conditions of heating, time and NAC concentration. For comparison, a second method, obtained from the research literature was used. This method involved reducing Au (III) ions with sodium borohydride in the presence of NAC (Li, et al., J. Mater. Chem., 2012, 22, 6546) to incorporate the NAC molecules directly into the GNPs as they are formed. In both methods, UV-VIS spectroscopy was used to probe whether the NAC-GNP composite was successfully formed by measuring the shift in the surface plasmon resonance (SPR) of the GNPs.

NAC-GNP composites were successfully synthesized by both methods as measured by significant shifts in the surface plasmon resonance of the GNPs. We found the optimal conditions to be stirring 1 mL GNP with 1 mL 0.025 M NAC while heating at 45 oC. The composites synthesized using our method were superior, exhibiting a greater shift in the SPR from 524 to 589 nm as compared with 524 to 536 nm using Li's method, suggesting more NAC molecules attached per nanoparticle. Additionally, our composite was stable for 3 days while the composite prepared using Li's method aggregated and precipitated hours after preparation.

Presenter: Elainie Lendebol
Collaborator: Angela Shen
Mentors: Ian Alberts & Janet Gonzalez

Beta Lactamase Inhibitors

Beta-lactam antibiotics are a broad class of antibiotics that include penicillins and cephalosporins. Bacterial resistance mechanisms involve the production of an enzyme called β-lactamase which degrades β-lactam antibiotics. Such bacterial resistance to β-lactam antibiotics is progressing at an alarming rate and is rapidly becoming a critical societal healthcare problem. Hence, there is an urgent need for the development of new classes of antibiotics and β-lactamase inhibitors to overcome bacterial resistance and provide new medicinal therapies. In this project, we combine computer-based drug design with complementary experimental approaches to develop new families of β-lactamase inhibitors in order to extend and improve current treatments for countering bacterial resistance to β-lactam antibiotics.

Presenter: Min Kyung Shin
Collaborator: Weily Lang
Mentor: Dr. Preethi Radhakrishnan

Antioxidants Boost Male Fertility: The Role of Reactive Oxygen Species (ROS) in Modulating Fertility and Sperm Viability in Drosophila melanogaster

Reactive oxygen species (ROS) in large amounts have been shown to cause peroxidative damage to tissues. ROS production is heightened in stressful environments, such as after exposure to toxins. Antioxidants have been previously found to reduce lifespan-related, peroxidative damage, inflicted by reactive oxygen species in the common fruit fly (D. melanogaster). Our study analyzes the effects of antioxidants in reducing the damaging effects of reactive oxygen species to rescue pre- and post-copulatory reproductive efforts in D. melanogaster. We hypothesized that if male fruit flies were fed antioxidant-enriched diets prior to a reactive oxygen species assault, then the antioxidants would quench the reactive oxygen species. This would then reduce the lipid peroxidation damage to male sperm, resulting in increased pre-copula and post-copula reproductive efforts. Two groups of fruit fly food were each infused with antioxidantts, lipoic acid (2.15mM) or melatonin (0.43mM) in 75% ethanol. 75% ethanol solution was used as a control. Males from all treatments were then fed an herbicide, paraquat, to shock their immune systems and increase ROS production. All males were then mated to virgin females and copula behavior, sperm viability and male fertility were assessed. Our results showed significant differences between treatments in sperm viability and number of offspring sired. However, there were no significant differences in mating probability or copula duration (both related to pre-copula sexual selection). These results draw light on the important interplay of ROS and antioxidants in the maintenance of reproductive health especially during stress.

Presenter: Weily Lang
Collaborators: Katherine Lam, Brittany Johnston
Mentor: Dr. Preethi Radhakrishnan

The Effects of Ethanol on Courtship, Mating Choice and Fertility in Drosophila melanogaster

Ethanol addiction is a common affliction with a strong genetic component. Though mammalian systems have provided significant insight into the molecular mechanisms involved in alcohol consumption and addiction, the effects of ethanol on reproductive behavior have not been well studied. Ethanol acts on multiple neural pathways in order to produce heightened behavioral responses. The fruit fly Drosophila melanogaster offers vast genetic resources, tools and databases in an insect model to investigate physiological mechanisms underlying behavior. The adaptive responses of flies have been shown to be strikingly similar to those of mammalian

systems such as rodents and human. This implies that ethanol affects the fly and mammalian systems in a similar manner. In this study, we have used D. melanogaster as a model to explore the relationship between extensive alcohol feeding and its effect on mate choice. Virgin male fruit flies were fed 5% sucrose and 5% yeast extract in either distilled water or 15% ethanol. The amount of food consumed was monitored over four days, after which each male fly was paired with a virgin female. Frequency of courtship behaviors and matings were noted for each pair. It was found that D. melanogaster showed consistent preference for ethanol food over non-ethanol food. The consumption of ethanol was also found to heighten courtship behavior and downregulate fertility, thereby reinforcing the important link between ethanol consumption and reproductive health. These findings provide novel insights into the physiological effects of ethanol on mating behavior and behavioral plasticity.

Presenters: Zoila Urena, Kelsey Payne
Mentor: Sarah Durand

Water Quality remediation of an urban waterway by habitat construction:A feasible approach?

The ribbed mussel, Geukensia demissa , is a key estuarine species of the US eastern seaboard. There is evidence that this suspension-feeding bivalve can remove from the water column cells as small as 1-2 μm as well particulate matter. Therefore this animal is positioned to limit the damage caused by algal blooms and bacterial contamination associated with combined sewage overflow (CSO) events. G. demissa is observed in limited numbers along the shoreline of the main waterway of Newtown Creek, a 3.5 mile extension of the NY-NJ estuary through Brooklyn and Queens that was designated a superfund site in 2010. Given the viability of G. demissa within the Superfund site, two questions arise: 1) What is the survivorship of G. demissa within the most polluted sites of upper tributaries that receive major CSO outfalls? 2) Can this species filter a major bacterial pathogen from CSO activity, the fecal indicator Enterrococcus faecalis? Our purpose in pursuing these questions is to explore the potential of G. demissa to contribute to estuarine habitat revitalization in an urban waterway. Our study site, the terminal basin of the Dutch Kills tributary and location of a Tier 3 CSO, presents a unique opportunity to address the above questions.

Mathematics, Engineering & Computer Science Department

Mathematics

Presenter: Furong Huang
Mentor: Tao Chen

Newton Basin

We will introduce the Newton method and Newton basins. We will explore the newton basins of polynomials of degree 2 and also investigate the complexity of polynomial of degree 3.

Presenter: Anastassiya Neznanova
Mentor: Shenglan Yuan
Classification of Some Cases of a Single-Vertex Flat-foldable Origami
Flat-foldable origami has drawn much attention in recent years with applications in science, engineering and industrial design fields. In this paper, we give a classification of single-vertex flat-foldable origami with up to 8 creases. That is, for a particular set of creases with a single vertex, we will give the number of possible ways that it can be folded flat.

Presenters: Gabriel Romero and Monika Vidaich
Mentors: Ian Alberts (NS) & Reem Jaafar (MEC)
Quantum Mechanical Prediction of the Energetic and Magnetic Properties of Complex Transition Metal Coordination Systems
Under Natural Science Department.

Engineering

Presenters: SILVIA TIRADO, CARL GORDON, DANNY HAVUGIMANA, AHMED AFIFI, MIAR ELASKANDRANY
Mentors: Dr. Yasser Hassebo and Dr. Reginald Eze
Micropulse Lidar System: Setup, Operation, and Applications

Presenters: NICOLE VAZQUEZ, REI KACANJA, MOHANAD OSMAN, ABDELRAHMAN ABBAS
Mentors: Dr. Yasser Hassebo and Dr. Reginald Eze
Earth Surface Temperature: Precipitation, Volcanoes, and Wildfires

Presenters: KRYSZTOF WADILEWSKI, SEJAL JAIN
Mentors: Dr. Yasser Hassebo and Dr. Reginald Eze
Satellite Earth Surface Temperature: Average Process and Validation

Presenters**:** KEVIN RODRIGUEZ, KELLY LAU, MOSAAB BENNANI, MAHIR CHOWDHURY, ANGELO ANGELES (EDUCATOR, THE SCHOOL FOR LEGAL STUDIES)
Mentors: Dr. Reginald Eze and Dr. Yasser Hassebo
Landmine Detection: Effects of Moisture and Terrain on Propagation of Radio Waves

PRESENTERS**:** HAIDER NAFEES (LAGUARDIA RESEARCHER), GEORGE SIVULKA (REGIS HIGH SCHOOL), ANGELO ANGELES (EDUCATOR, THE SCHOOL FOR LEGAL STUDIES)
Mentors: Dr. Reginald Eze and Dr. Yasser Hassebo
Remote Sensing of Subsurface Electromagnetically Penetrable Objects: Landmine and Improvised Explosive Device Detection

Presenter: DARLENIS VENTURA
Mentor: Dr. Yasser Hassebo
Statistical Analysis of Global Earth Surface Temperature from Satellite Observations

Computer Science

Presenter: Andrew Quijano, Abdu Thioye
Mentor: Yun Ye

Automatic Threat Detection for Apache Web Service

This project will demonstrate an automatic threat detection mechanism on the Internet web server, in order to prevent attackers from getting unauthorized resources. During the detection procedure, a watchdog program is created monitoring the real-time user activities on the server. Unusual behaviors are analyzed through comparing with multiple threat patterns in the database. Once a match is found, the system administrator is alarmed to take countermeasures. Further, both the false alarm the confirmed threats are added to the database, and the patterns are refined to better represent the characteristics of intrusion behaviors on a web server. To display the efficacy of the detection mechanism, we will establish the web server-attacker model with two Linux computers. One generates different types of attacks trying to access data from the server, and the other one runs the monitoring program on the targeted Apache web server. The threat pattern matching and learning algorithms will be explained using the runtime results extracted from the monitoring statistics.

Social Science Department

Presenter: Jordan Hadani
Collaborators: Shara Sand
Mentor: Dr. Bojana Blagojevic

Intergroup conflicts and binary mindsets: towards a new framework of reconciliation

The ideal of reconciliation between conflicted entities has been long examined and contested in various disciplines of social studies. The common notion of reconciliation pertains to the collective despite the fact that humanity, human perspectives and interpersonal connections are observed more successfully on the individual level. While the collective signifies power and control as well as a strong sense of identity within a conflict, the power of individual connections are able to transform relationships to incorporate common, human perspectives and therefore invoke reconciliation. We argue that the predominant concepts, structures and processes of reconciliation provide a binary framework that inadequately corresponds to the complexities of addressing the root causes of conflict and transforming relationships among belligerent groups. In addition, we claim for an alternative, multidisciplinary and inclusionary approach to how we envision, categorize, and communicate human Identities – it is an approach that transcends the exclusionary "us" v. them" categories, captures people's common humanity, and promotes strengthening of human rights and human development. We draw upon relevant literature from the fields of psychology, communication and political science, in order to explore human cognitive perception, limitations of language and political frameworks, as well as investigate the nexus between the role of binary thinking and expression in causing conflict and the hurdles posed by it to implement reconciliation. In constructing the new framework, we also examine how human rights education, social integration, information technology and social media such as Facebook, play a role in transforming binary mindsets ad narratives across contexts and cultures. We attempt to mediate between local narratives and global human rights standards and examine ways in which local and global ideas and mindsets overlap or complement each other. Through a

multidisciplinary lens, the goal of our research is to identify the gaps in the existing reconciliation frameworks and to outline the beginnings of a new framework for restoring broken societies.

Presenter: Steven Garcia,
Collaborator: Ray Cortez
Mentor: Soloman Kone

Market Failure vs Goverment Failure

All humans beings want to maximize satisfaction to its fullest in all its aspects. With this idea in mind, economics defines how we allocate scare goods and services through the use if the market system. In the market system we have economic agents (government, sellers and consumers) who want to maximize their own self-interest. For government their self-interest includes, making sure people elect an individual to office through the idea of equalizing wealth and opportunities for all. One-way government attempts to equalize wealth is through the regulation of the market (price caps, quotas etc.). Sellers want to maximize profit and reduce cost at all times. Maximizing profits comes at an all time high when there is less government activity in the market. De-regulation of the market promotes riskier transactions and investments that can likely result in a momentary inflation of company and stock valuation (or at least that's what lobbyist representing lucrative corporations argue). In the poster presentation titled "Market vs. Government Failure" we will be exploring the pros and cons of government failure to determine which approach is the best approach to maximize market success.