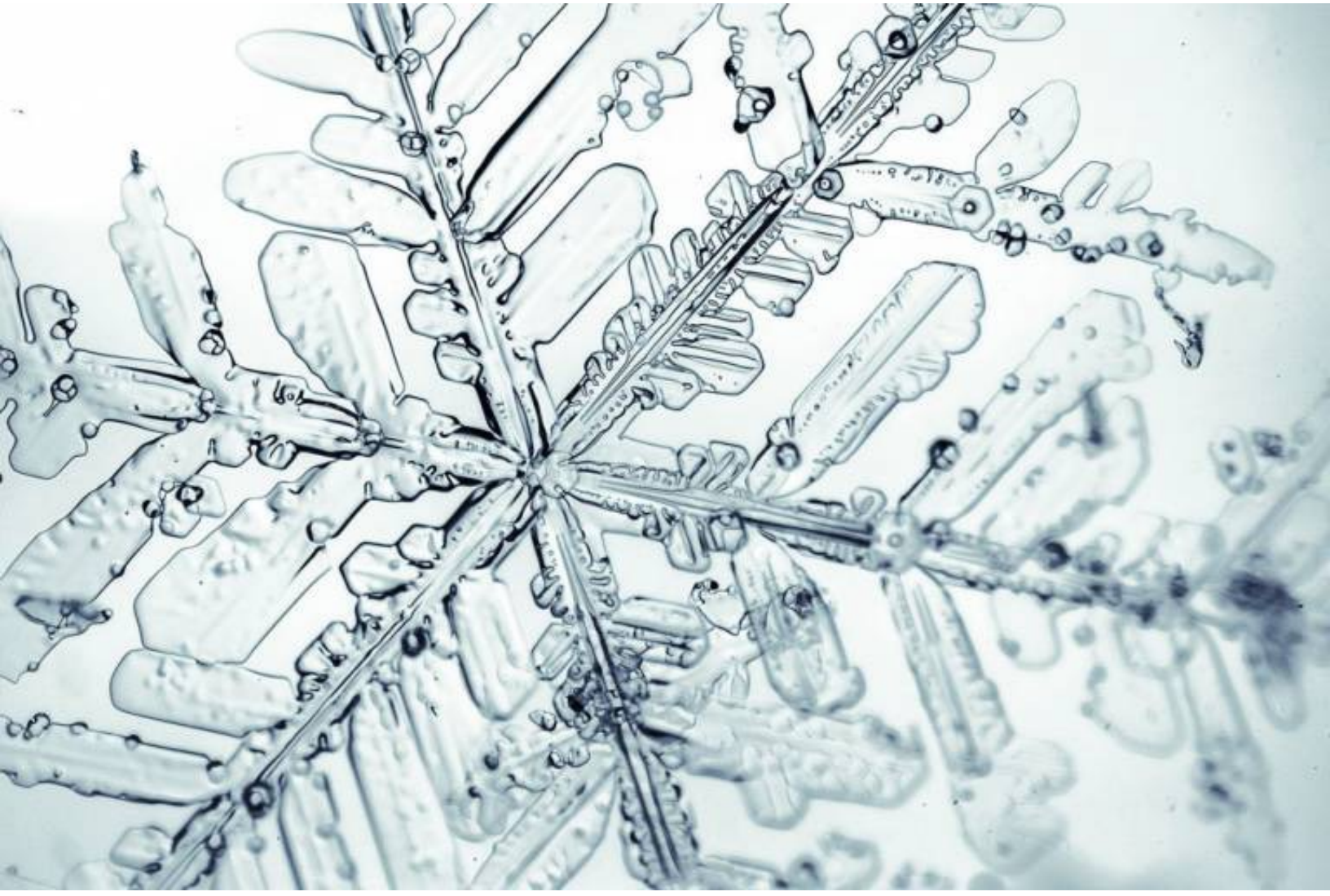
CUNY | Research Scholars Program



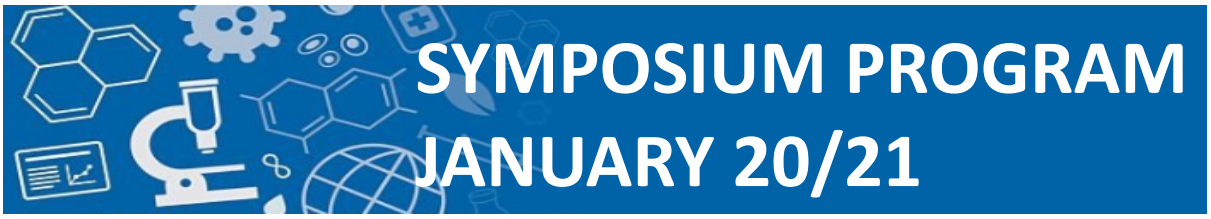
2022 Kingsborough Community College Winter Symposium

January 20/21

Virtual Presentations via Zoom

KINGSBOROUGH COMMUNITY COLLEGE

★ DREAMS BEGIN HERE ★



SYMPOSIUM PROGRAM
JANUARY 20/21

5:00 PM/10:00 AM	Registration/Sign - In
5:05 PM/10:05 AM	Welcoming remarks Dr. Kieren Howard, Director of the KCC CUNY Research Scholars Program
5:10 PM/10:10 AM	Presentation Preview Ms. Frances Samuel, CRSP Assistant
5:15 PM/10:15 AM	Student Presentations
6:15 PM/11:15 AM	Student Feedback and Open Review
6:30 PM/11:30 AM	CUNY-wide Winter Mini- Symposium
	Closing Remarks

Welcome to the annual winter symposium of the CUNY Research Scholars Program (CRSP) at Kingsborough Community College (KCC). The mission of CRSP is to encourage undergraduate participation in authentic scientific research and to increase persistence in STEM disciplines. This symposium show-cases works in progress across a spectrum of STEM: Biology, Physics, Earth and Planetary Science, Linguistics, & Psychology are all represented. You will notice that this year our cohort also includes scholars and mentors from the disciplines of Nursing and Social Sciences. Spanning from cell biology to social movements, CRSP facilitates student research experiences at KCC every day.

CRSP would not be possible without the continued support of many people. We thank Provost Russell and her office at KCC, as well as Ron Nerio, Rhimi Dhar and Vengely Galvan from CUNY Central. We also acknowledge the tireless work of our mentors - thank you, for all that you do. To our scholars, good luck with your presentations and your ongoing research - we are excited to see your work emerge.

Frances Samuel and Kieren Howard

Student Name	Project Title	Mentor
Munira Ali	Groundwater Contamination by Boron-bearing Minerals, New Jersey (Newark Basin)	Larbi Rddad
Ani Arakelyan	TBD	Jameelah Hegazy
Andrew Fleming	In silico Comparison of the α and β Tubulin 1 Gene Sequences in Hevea brasiliensis	Farshad Tamari
Malky Gestetner	Comparison of the NPC1 Genes using two Mammalian Species' DNA Sequences	Farshad Tamari
Lev Gilinskiy	Bangladesh Sediment Geological Survey	Robert Schneck
Dimitra Gkioula	Staphylococcus aureus genome annotation using MRSA USA300 reference strain	Dmitry Brogun
Brandon Guasaquillo	Grain Sizes in Surma Basin Sediments	Robert Schneck

Lala Hamidli	Language and violent behavior: You already know how to live and speak peacefully! Don't we?	Jason Leggett
Andrew Huang	SARS-CoV-2 Drug Discovery: The Search to End the Pandemic	Dmitry Brogun
Azim Husman	Surma Basin (Bangladesh) sediment grain sizes.	Robert Schneck
Vladyslava Kaplan	Does time matter? Identifying levels of student engagement based on length of instructor-created videos in online classes	Patrice Morgan
Amanda Kirshner	How Does Instructor Made Content Benefit Virtual Learners?	Patrice Morgan
Quintarra Lee	Support Faculty Professional Needs: Improve Job Performance and Satisfaction.	Jameelah Hegazy
Jonathan Legros	Identification of possible targets to develop potential new treatments for COVID-19 by analyzing genetic profiles and innate immunity responses in infected SARS-CoV2 individuals	Roberto Mariani
Daniel Lopez	TBD	Tanzina Ahmed
Celeste Mckenzie	Do monolinguals and bilinguals exhibit different levels of mental effort during arithmetic tasks? A pupil dilation study.	Laura Spinu
Omar Mehmood	SARS-CoV-2 Drug Discovery	Dmitry Brogun
Youssef Mohamed	The Social and Political Activism of the Religious Left	Tracy Steffy
Shawana Profitt-Alexander	Support Faculty Professional Needs: Improve Job Performance and Satisfaction.	Jameelah Hegazy
Samir Samadov	Staphylococcus aureus Genome annotation using MRSA USA300 Reference Strain	Dmitry Brogun
Kate S	Do monolinguals and bilinguals exhibit different levels of mental effort while learning a novel accent of English? A pupil dilation study.	Laura Spinu

Julia Wallace	The Link between Serial Memory, Language Proficiency, and Novel Accent Learning Ability in Bilinguals.	Spinu

THURSDAY 1/20 PRESENTATION ORDER				
order #	Time	First Name	Last Name	Mentor
1	5:15 PM	Julia	Wallace*	Spinu
2	5:20 PM	Celeste	Mckenzie*	Spinu
3	5:25 PM	Malky	Gestetner	Tamari
4	5:30 PM	Amanda	Kirshner	Morgan
5	5:35 PM	Brandon	Guasaquillo	Schenck
6	5:40 PM	Samir	Samadov	Brogun
7	5:45 PM	Dimitra	Gkioula	Brogun
8	5:50 PM	Omar	Mehmood	Brogun
9	5:55 PM	Kate	S	Spinu
10	6:00 PM	Vladyslava	Kaplan	Morgan
11	6:05 PM	Lala	Hamidli	Leggett
12	6:10 PM	Ani	Arakelyan	Hegazy
13	6:15 PM	Quintarra	Lee	Hegazy
14	6:20 PM	Shawana	Profitt-Alexander	Hegazy
15	6:25 PM	Munira	Ali	Rddad
16	6:30 PM	Azim	Husman*	Schenck
18	6:40 PM	Youssef	Mohamed*	Steffy

FRIDAY 1/21 PRESENTATION ORDER				
order #	Time	First Name	Last Name	Mentor
1	10:15 AM	Celeste	Mckenzie***	Spinu
2	10:20 AM	Lev	Gilinskiy	Schenck
3	10:25 AM	Andrew	Fleming	Tamari
4	10:30 AM	Andrew	Huang	Brogun
5	10:35 AM	Azim	Husman*	Schenck
6	10:40 AM	Youssef	Mohamed*	Steffy

*****Subject to Change**

The Link between Serial Memory, Language Proficiency, and Novel Accent Learning Ability in Bilinguals.

Julia Wallace

Mentor: Laura Spinu

Kingsborough Community College

Bilingualism has been linked with improved function regarding certain aspects of linguistic processing [3, 7, 11]. A study in which subjects learned vocabularies that differentiated words using foreign phonetic contrasts [2] reports that bilinguals possess an advantage over monolinguals in phonetic learning. Other experimental work with non-native contrasts suggests that multilinguals and bilinguals have enhanced speech perception abilities compared to monolinguals [15]. Lastly, Spinu et al. [11] and Spinu et al. [12] have found enhanced phonetic learning in bilinguals as compared to monolinguals using a novel accent task. In this study we aim to (1) replicate earlier laboratory findings using the online medium, (2) investigate whether phonetic learning ability correlates with auditory sensory memory (ASM), as recent reports suggest bilinguals outperform monolinguals in ASM tasks [13], and (3) determine whether ASM and phonetic learning ability are also correlated with a bilingual's proficiency level in their weaker (non-dominant) language, since much of the recent literature has suggested this may be the case [5, 10].

We conducted an online experiment consisting of two tasks: (1) a running digit span task with suffix effect in order to measure ASM, and (2) a novel accent training task consisting of training the participants on an artificial accent of English through listening and imitation of a limited number of sentences. The artificial accent was constructed following Spinu et al. [12] and differs from standard North American English in two ways: diphthongization of mid front lax vowels, e.g. *bed* → *bee-ed*, and intervocalic tapping, e.g. *color* → *cuh-der*. In addition, the bilingual participants completed a short language proficiency test to determine their level in their non-dominant language. 30 monolinguals and bilinguals completed the experiment under 1-on-1 supervision by a member of the research team via Zoom.

Preliminary findings reveal that, similarly to previous studies, bilingual speakers outperformed monolinguals in the digit span task and the accent learning task, suggesting enhanced auditory sensory memory and phonetic learning skills in this population. The analysis of the proficiency data and the correlational analyses are underway. While our results are preliminary, our findings will ultimately shed more light on the connection between cognitive and sensory functions in speakers of diverse linguistic backgrounds. As we have already

observed a bilingual advantage in ASM and phonetic learning, our research also adds to the body of work on the cognitive benefits of bilingualism.

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Do monolinguals and bilinguals exhibit different levels of mental effort during arithmetic tasks? A pupil dilation study.

Celeste Mckenzie, Kate S
Mentor: Laura Spinu
Kingsborough Community College

Numerous studies suggest the bilingual brain has cognitive advantages over the monolingual one [1,2,3,4], though these findings are still controversial [5,6,7]. Among others, bilinguals have exhibited a greater ability to memorize [8], focus, and multitask [9]. The goal of this experiment is to determine whether there are differences in cognitive effort in monolinguals versus bilinguals when completing arithmetic tasks. We will be using pupil dilation as the main measure of cognitive effort between the groups, similar to older studies which have attempted to use pupil dilation as a measure of cognitive effort [10], along with reaction times and accuracy. In our pilot experiment, participants will complete an arithmetic task in which they will either be asked to memorize or add a sequence of numbers. The task itself will be administered online using Pavlovia software and each participant will be supervised remotely via Zoom teleconferencing. Reaction time data will be analyzed with the assistance of Praat software, and pupil dilation will be measured against a control image in Procreate editor application. This research will add to the existing body of work concerning the cognitive bilingual advantage. However, the idea of measuring pupil dilation remotely is novel.

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Comparison of the *NPC1* Genes using two Mammalian Species' DNA Sequences.

Malky Gestetner
Mentor: Farshad Tamari, Ph.D.
Kingsborough Community College

Niemann Pick Type C (NPC) is a hereditary metabolic disease. NPC occurs in approximately one of every 120,000 births [1,2]. The disorder is caused by mutations in both alleles of the corresponding *NPC* gene. Two alternative forms of the disease are possible. Mutations occurring in the *NPC1* gene account for 95% of the cases. The remaining cases occur due to mutations in *NPC2* gene [1,2]. Both mutations result in the production of a defective transport protein responsible for carrying lipids and cholesterol throughout the blood, resulting in detrimental clogging and accumulation of unesterified cholesterol in the endosomal/ lysosomal pathway (National Organization for Rare Disorders, 2019). This accumulation can occur in many different tissues and can have a wide range of consequences. In different cases, NPC manifests at different times and presents a range of symptoms, but broadly the condition encompasses separate systemic and neurological aspects. It involves the liver, spleen (collectively known as hepatosplenomegaly), and occasionally the lungs, but most severely, it affects the nervous system, causing a range of progressively worsening problems due to central nervous system deterioration [1,2]. Ultimately, Niemann pick disease is usually fatal [2]. Recent studies have shown a cellular alleviation of lipid transport inhibition due to overexpression of a small GTPase called *RAB9* [3,4].

Studies focusing on NPC generally use the mouse (*Mus musculus*) as a model organism. This project aims to compare the *NPC1* gene of the mouse to that of the human, to identify similarities and/or differences. To achieve this, the complete cDNA for both species were obtained from *NCBI-PubMed*. Subsequently, FASTA files were prepared prior to their input into

appropriate bioinformatics software. Preliminary *in-silico* comparative analysis indicates greater dissimilarity in the 5' and 3' regions of the gene. This investigation is currently ongoing. We hypothesize that overall, results will show a high degree of similarity between the human and mouse *NCP1* genes, given that they are both from mammalian species.

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How Does Instructor Made Content Benefit Virtual Learners?

Amanda Kirshner

Vlada Kaplan

Mentor: Dr. Patrice Morgan

Kingsborough Community College

Online learning has become ever more prominent in education. Online learning is done either synchronously or asynchronously. Synchronous learning style includes scheduled meetings where teachers and students come together for class. Asynchronous is different in that students do not have scheduled meets with their teachers and peers. Rather the teacher posts videos, assignments, and articles for students to do independently. Whether in a synchronous or asynchronous format, online learning has become ever more prominent throughout all levels of education. There is no discernible data stating whether synchronous or asynchronous learning is more effective for college students.

The purpose of this present study is to identify if there is a preference in modality among students currently enrolled at Kingsborough Community College. Students registered in Behavioral Science classes are being asked to participate in a 30-question survey. Students were asked what engagement means to them, whether their class was synchronous or asynchronous, and polled on more specific questions to find what seemed to engage them.

Minimal literature was found on the effectiveness of online learning. The majority of research indicates that students being able to see their professors and peers and the ability to interact seemed to lead to a feeling of cohesion and less feelings of isolation, leading to more productivity and engagement.

This study is exploring if there is a more active online presence to increase engagement based on synchronous or asynchronous offerings. These results will add to literature helping educators and students alike find the best ways to learn and teach more effectively and be better able to engage in online academics and help close the gap in resources available.

Grain Sizes in Surma Basin Sediments.

Brandon Guasaquillo
Mentor: Robert Schenck
Kingsborough Community College

Sediments and grains can give insight into the geological history of a region. The Surma Basin is located in Bangladesh, south-east Asia. It is surrounded by the Himalayas region, India, and Myanmar. The Surma Basin records changes in geological processes through the sediments that fill it.

The sediments in the basin have been recovered through a drilling core. The material comprises many minerals, including clay minerals, quartz, feldspar, and rock fragments. The sediments can come into the basin from a different source type. I will first do a grain size analysis to sort the grains into mud and sand portions. I will then count using microscope images the ratio of quartz, feldspar, and lithic fragments in samples in the core and analyze them on a geological ternary diagram. These ratios and grain sizes can give clues to the origins of these rocks. The ratios and grain sizes may also give insight into how the region will evolve in the years to come.

Staphylococcus aureus Genome Annotation using MRSA USA300 reference strain.

Samir Samadov
Mentor: Dr. Dmitry Y. Brogun
Affiliation: Kingsborough Community College

Staphylococcus aureus or “staph” is the leading cause of skin and soft tissue infections, such as abscesses, boils, furuncles, and cellulitis. It can also cause more serious infections, such as pneumonia, bloodstream infections, endocarditis, and bone and joint infections. *S. aureus* is spread by touching infected blood or body fluids, most often by contaminated hands. *Staph* bacteria are very adaptable, and many strains have become resistant to one or more antibiotics. The rise of antibiotic-resistant strains of staph bacteria- often described as methicillin-resistant *S. aureus* (MRSA) strain. In this research, we have annotated the ABD20460.1 ABC transporter, ATP-binding protein [Staphylococcus aureus subsp. aureus USA300_FPR3757] query vs CCJ27464.1 Oligopeptide transporter putative ATPase domain [Staphylococcus aureus subsp.

aureus ST228] subject sequences. From the alignment, there were a lot of miss matches present that causes the mutation. From the nucleotide blast alignment, there were frameshifts that occurred from range 1 to range 9. In other words, the frame shifts from nucleotide base pair may give the beneficial trait for the bacteria which could be harmful to *Homo sapiens*. Researchers are running against time trying to find new antibiotic treatments for *Staphylococcal* infections. Annotating the Methicillin-*Resistant Staphylococcus aureus* (MRSA) metagenomes will aid in developing a new MRSA treatment. In this project, we analyzed 161 S*taphylococcus aureus* metagenomes and manually annotated and identified orthologous genes in *Methicillin-Resistant Staphylococcus aureus* species, using the *Staphylococcus aureus USA30*0 strain as our reference. Our project is paving the first step in developing new treatments against Staphylococcal infections.

Keywords: *(MRSA) Methicillin-Resistant Staphylococcus aureus*.

Staphylococcus aureus genome annotation using MRSA USA300 reference strain.

Dimitra Gkioula
Mentor: Dr. Brogun
Kingsborough Community College

Staphylococcus aureus is a very flexible bacteria meaning it can survive in aerobic and anaerobic environments. It is a gram-positive, spherical, or round-shaped, pathogenic bacterium that grows in the form of a cluster. A causative agent of a wide range of infectious diseases such as skin infections, bacteremia, endocarditis, pneumonia, and food poisoning. *Staphylococcus aureus* is well known to be resistant to beta-lactam antibiotics which are: *Methicillin, Amoxicillin, Penicillin, Oxacillin,* and others in this family. Moreover, the IDSA also known as the Infectious Diseases Society of America suggested that *Staphylococcus aureu*s infections have been significantly increased in patients with *HIV-d1 disease (human immunodeficiency virus)*, as well as the ones who been diagnosed with *COVID-19* (*SARS - CoV-2*). These two diseases are easily spread by human fluids and hard to appear with symptoms which are tremendously threatening and deadly. The importance of this study is to identify genes that can be targeted via novel antibiotics due to its dangerous harmful causes that this bacterium creates in our world. *Staphylococcus aureus* can be spread in a matter of seconds from being engaged from accidents such as skin cuts, skin to skin interaction and abrasions. According to Healthcare-Associated Infections (HAIs), more than two hundred thousand people have been affected, and twenty thousand of the population lost their lives in the United States by 2017 due to its harmful spread. In the research we annotated the 161 Staph genomes in the *NCBI (The National Center for Biotechnology Information*) library of medicine, protein *BLAST* the query ABD20473.1 an amino acid protein, derived from methicillin-resistant clonal population *[Staphylococcus aureus subsp. aureus USA300_FPR3757]* verses the subject sequence which is CBI48453.1 also known as *[Staphylococcus aureus subsp. aureus TW20].* As a result of being the

worst match throughout the gene annotation. We will go in more depth throughout this research to provide assistance to scientists and researchers to accumulate and prevent this asymptomatic bacteria from growing by annotating 161 Staph genomes and discovering orthologous genes. Whatsoever these genes can be potentially used as targets for the development of future medications.

Keywords: COVID-19, *Staphylococcus aureus, HIV (human immunodeficiency virus)*, *Methicillin, Amoxicillin, Penicillin, Oxacillin, NCBI, BLAST protein.*

SARS-CoV-2 Drug Discovery.

Omar Mehmood
Mentor: Dmitry Brogun
Kingsborough Community College

For two years not only the United States but globally has everyone felt the effects of SARS-CoV-2 (Covid 19). For example, people not believing that the vaccines are a viable solution to SARS-CoV-2. A better solution? Finding a drug to combat the virus effectively, almost like taking a drug for the common cold like antihistamine. People are less scared of medicine compared to vaccines and are more willing to take it if it's readily available. Our goal is if we can find a way to use machine learning and AI to aid not just with SARS-CoV-2 but overall drug discovery and development. For this experiment we will be using but not limited to Jupyter Notebook that will allow us to search through large amounts of data from the Chembl database. We will be searching over 2 million compound data also known as Big Data, and in order to sort the 2 million compound data visually we will be using a Jupyter notebook. Jupyter notebook uses Python, one of the many programming languages in Computer Science. We will also use Pandas which is a library used for data analysis and will help with the visualization of data. All of this will be done through NSF's grants from Dr. Brogun. We will be utilizing the cloud computing resources using VM on the XSEDE servers.

Do monolinguals and bilinguals exhibit different levels of mental effort while learning a novel accent of English? A pupil dilation study.

Kate S.
Mentor: Laura Spinu
College: Kingsborough Community College

Monolinguals and bilinguals were reported to exhibit differences in their performance on certain cognitive (including linguistic) tasks [1,2], with the general trend being to identify superior performance in the bilingual group. The features presumed to be enhanced as a result of bilingual experience include memorization, multitasking, auditory discrimination, and

phonetic learning [3,4], though this has been highly debated [5,6]. Given the controversy surrounding these findings, the question arises whether cognitive differences between these two groups might better be captured not in terms of performance success, but in terms of mental effort expended during such tasks. The purpose of our research is to establish whether bilinguals and monolinguals display different levels of cognitive effort while completing an experimental task requiring the participants to acquire a novel accent of English differing from standard English in two specific ways, following [7]. The experiment will be conducted online via Zoom teleconferencing, and the experimental tasks will be presented to each participant in a 1-on-1 setting using the Pavlovia website for experiment management. The experimental blocks include a baseline task, in which participants will be reading sentences in their own English accent, a training task, in which they will be listening to and imitating sentences in the novel accent, and a testing task, during which they will be prompted to read new sentences in the accent they have just been trained on, in the absence of any prompts. The data collected will include pupil dilation, reaction times, and performance success (reflected in the participants' ability to reproduce the two novel features of the artificial accent). Pupil dilation has already been used as a measurement of cognitive effort in earlier studies [8]. Reaction time data will be analyzed with the assistance of Praat software, and pupil dilation will be measured against a control image in Procreate editor application. Pupil dilation, reaction times and accuracy of responses will be analyzed in the baseline and testing phase. Pupil dilation and accuracy will be measured manually, while reaction times will be automatically recorded by the software. Based on previous findings, our expectation is that bilinguals will exhibit shorter reaction times, more successful performance, and less pupil dilation compared to monolinguals. Through its focus on these aspects of cognition, our research study adds to the existing body of work concerning the posited advantages of bilingualism.

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[5] Marian, V., & Hayakawa, S. (2021). Measuring bilingualism: The quest for a "bilingualism quotient". *Applied psycholinguistics*, 42(2), 527-548.

[6] Marzecová, A. (2015). Bilingual advantages in executive control – A Loch Ness Monster case or an instance of neural plasticity. *Cortex*, 73, 364-366.

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Does time matter? Identifying levels of student engagement based on length of instructor-created videos in online classes.

Vladyslava Kaplan
Mentor: Patrice Morgan
Kingsborough Community College

With the rising popularity of online classes in higher education, keeping students engaged and developing effective methods of delivering content has become more challenging. One of the most used teaching and learning tools in online education is instructor-created videos. Various studies show that the majority of students favorably view the integration of instructor-created video content in online courses. But there is still a lot of speculation about how to effectively design video lessons to maximize their efficiency and increase the level of student engagement and overall academic performance.

The current study examines students' perceptions of instructor-created videos, with an emphasis on the preferred length of the videos. Google survey forms were created and distributed among students who are enrolled in Behavioral science courses. Students were asked to identify academic engagement in their own words and share their personal experience with online classes as well as answer more specific questions such as if instructor-created videos were used in the course, how long they were, and if the length of the videos determined whether students watched them or not. Findings indicated that while most videos were on the shorter side (under 15 minutes), students would watch longer video lectures as long as they were required for the grade.

While studies show that students consider the instructor-made content an important aspect of their overall engagement, further experimental research is needed to determine whether instructor-created videos actually help improve academic performance and increase student motivation.

Language and violent behavior: You already know how to live and speak peacefully! Don't we?

Lala Hamidli
Mentor: Jason Leggett
Kingsborough Community College

Our purpose is to examine the relationship between gossip and violent behavior. For example, January 6th insurrectionists exhibited violent behavior; did they use violent language before the insurrection? We will collect documents from the Republican and Democratic parties and from social media specific to the group Oath Keepers in order to conduct a word-frequency analysis. We hypothesize that the use of violent words (rhetoric) is more likely to lead to violent behavior; in other words, violent actors will use and be exposed to more violent language. Then we will move on to other data including social media, news media, and other texts in order to show the relationship between violent behavior and language.

Support Faculty Professional Needs: Improve Job Performance and Satisfaction.

Quintarra Lee, Shawana Profitt-Alexander & Ani Arakelyan
Mentor: Jameelah Hegazy, PhD.
Kingsborough Community College

The purpose of this qualitative research study was to gain further insight into faculty perspectives of job factors that promote quality performance in teaching and student learning. The research question is as follows: What was the teaching experience like for fulltime tenure-track and tenured teaching faculty who taught the virtual classroom during the Coronavirus disease 19 (COVID-19) pandemic in an associate degree college in a large metropolitan area in the United States? The study sample comprised of five full-time faculty in each discipline department who not only meet the criteria for tenured and tenure-track faculty, but also experienced job satisfaction needs, after purposeful sampling and simple randomized assignment respectively of each academic discipline. The literature review revealed that job satisfaction needs in higher education were classroom autonomy, recognition and support from administration and colleagues, time for family, and reasonable fair salary. Adapting to virtual teaching because of the COVID-19 pandemic resurfaced faculty concerns and brought attention to difficulties communicating information with the use of digital technology.

Proposal to conduct the research was submitted and is pending IRB approval. However, the literature review led to the researchers' assumption that tenured faculty concerns could be very different from those for tenure-track faculty. The decision to interview tenure-track and tenured full-time faculty stemmed from the researcher's casual conversations with colleagues and a quantitative full-time faculty opinion survey, which revealed faculty dissatisfaction. The

methodology used was a simple qualitative study through a semi-structured interview question, a criteria survey for purposeful sampling, and a randomized selection of a sample size of 5 full-time faculty from each disciplinary department, who met the requisite criteria. The remaining participants were assigned to focus groups respective of their discipline to support confirmation of the interview responses. The conceptual framework used, to design the research and interview questions, to guide the selection, analysis, and interpretation of relevant data, and to propose explanations of the underlying influences, were Herzberg's motivation-hygiene theory (two-factor theory) and Weiner's attribution theory. Herzberg's two-factor theory would identify job factors that give rise to job satisfaction and factors that prevent job dissatisfaction, while Weiner's attribution theory would relate participants' perceived causes of job satisfaction and dissatisfaction. The researchers would then propose recommendations to address the professional needs of faculty in accordance with the research findings.

Support Faculty Professional Needs: Improve Job Performance and Satisfaction.

Shawana Profitt- Alexander, Ani Arakelyan & Quintarra Lee
Mentor: Jameelah Hegazy, PhD.
Kingsborough Community College

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Groundwater Contamination by Boron-bearing Minerals, New Jersey, (Newark Basin).

Munira Ali
Mentor: Larbi Rddad
Kingsborough Community College

The groundwater in the Newark basin has a higher-than-normal concentration of boron; reaching up more than 2000 microgram per liter, which exceeds that recommended by the U.S Environmental Protection Agency. In some areas, Boron content of groundwater reaches up to 18,000 micrograms per liter. Such high concentrations of boron in groundwater pose major health risks for the residents who used it for domestic purposes. Boron is known to have an adverse effect on the male reproductive system and affects the development of the fetus (teratogenicity). Therefore, it is imperative to determine the contaminant source of boron in this area. [1] reported that sulfides that are associated with the diabase rocks are not the source of boron. The aim of this study is to determine for potential rocks/minerals that can be the possible source of boron.

Previous studies show a clustering pattern of elevated boron concentrations in groundwater samples [1,2]. This leads to the general hypothesis that diabase intrusion can be the possible source and/or contributor to the ground water contamination with boron. To validate this hypothesis, rock samples (diabase) from quarries in New Jersey were collected and will be observed under a binocular microscope and analyzed by Scanning Electronic Microscope (SEM) to determine if these rocks are potential source of Boron that contaminates of the ground water.

References:

[1] Spayd, S. 2019. Elevated Boron Associated with Lithium, Sodium, Sulfate, and Arsenic in Newark Basin private wells, GSA
[2] Zuna, J., 2019. Hornfels and sulfide ore associated with diabase as possible sources of boron that contaminates groundwater in the Newark basin, eastern USA. KCC and CUNY annual symposiums.

Surma Basin (Bangladesh) sediment grain sizes.

Azim Husman
Mentor: Robert Schenck
Kingsborough Community College

The Bengal Basin is a heavily populated and important region of Bangladesh and South East Asia. It is strongly influenced by the ongoing collision of the Indian and Asian tectonic plates, which is causing the building up of the Himalaya mountains.

The purpose of this project is to conduct a geological analysis of the Bengal Basin region. I will be exploring shifts in grain size of the sediments from the Surma Basin. The sediments in the basin have been recovered through a drilling core. The material comprises many minerals, including clay minerals, quartz, feldspar, and rock fragments. The sediments can come into the basin from a different source type. I will first do a grain size analysis to sort the grains into mud and sand portions. I will then count using microscope images the ratio of quartz, feldspar, and lithic fragments in samples in the core and analyze them on a geological ternary diagram.

These ratios and grain sizes can give clues to the origins of these rocks. The ratios and grain sizes may also give insight into how the region will evolve in the years to come and the changes in grain size will correlate with past tectonic activity of the Bengal Basin. Having a record of past changes should provide insight into the range of possible future changes for the basin and the people that live within it.

The Social and Political Activism of the Religious Left.

Youssef Mohamed
Mentor: Tracy Steffy
Kingsborough Community College

For almost fifty years the political activism of conservative Christians, referred to as the Christian Right, has effectively advocated for an agenda that has not only shaped political discourse but affected policies at the local, state and federal levels. Since the late 70's evangelical and other conservative Christian voters have increasingly found a home for their priorities in the Republican Party. This agenda includes banning abortion, opposition to LGBTQI rights, opposition to equal rights for women (the ERA), and education reform efforts focused on prayer in schools, and school "choice," among others. Research and media attention focused on the Christian Right, identify this group as "values voters" and the group has often proclaimed itself the "moral majority." However, surveys show these extreme conservative Christian values are largely out of step not only with the values of most Americans, but also with majorities of voters of faith from a variety of denominations and religious traditions. This research examines the organizing and advocacy work of a broadly defined religious left including Christian, Interfaith and other groups and seeks to understand how and why their diverse values and

differing views are so often obscured by a focus on the politically powerful evangelical Christian minority.

Bangladesh Sediment Geological Survey.

Lev Gilinskiy
Mentor: Robert Schenck
Kingsborough Community College

The standard and flood phases of a river play an important role in the deposition of sediments. During normal phases, sediments of a specific size, roundness, and sorting will be deposited onto the riverbed. During flood phases, the changes in river flow conditions will deposit sediments of a different size (often larger), roundness (often less round), and sorting (often less well-sorted) onto the riverbed and surrounding terrain. Identifying the distinct patterns of deposition for each phase will help establish local geological conditions and help describe the geological history of the region.

This project will pursue an investigative, descriptive analysis of as much general geological data as can be extracted from the cores and correlated into useful conclusions. This will include, as allows by time, data, and equipment, estimates of geological age of layers within the cores, estimates of sources for sediments, estimates of travel time and/or energetic intensity of travel for the sediment, observations of layer and grain size patterns to establish geological history for the core site (flooding, wandering rivers contributing temporary sediment sources, and similar), layer ratios (mud to sand, mudstone to sandstone, etc.), and similar data.

Grain sizes, roundness, and sorting is often an indicator of the distance a sediment has travelled, the energy intensity of the journey, or both. A stack of sieves will be used to sort sediments based on grain size along the sediment core. If any sharp changes of layering (for example, layers of fine sand with coarser mud between them) are discovered, this data, alongside an analysis of the degree of roundness and sorting of the grains above and below the sharp transitions, will be used to correlate potential patterns for flooding of the river source(s).

The expected outcomes are data sets able to distinguish between near and far sources of the sediments with strong indications that either near or far provenance sediments dominated deposition in the core at different times, data sets able to distinguish between normal and flood phases of the river source(s), and general data sets with observational data regarding the core samples.

This study provides a general geological history in the vicinity of core sample sites. Further study, including meta-analysis of other studies in conjunction with this document, will be needed to firmly establish the geological history of the Surma Basin region.

In silico Comparison of the *α* and *β Tubulin 1* Gene Sequences in *Hevea brasiliensis.*

Andrew Fleming
Mentor: Dr. Farshad Tamari
Kingsborough Community College

The purpose of this investigation is to compare the gene sequences of *α* and *β Tubulin 1* genes in *Hevea brasiliensis*. The *α* and *β Tubulin 1* genes code for proteins that are the basic units of the microtubule, resulting in the production of a protofilament, which in turn results in the final structure of the microtubules [1]. Microtubules are fibers that make up part of the cell's cytoskeleton performing crucial roles in mitosis, structural support, cellular motility and intracellular transport [2] to name a few.

A comparison of the *α* and *β Tubulin 1* gene using *H. brasiliensis* has never been done to the best of our knowledge. As a part of this study, we will download gene sequences of the *α* and *β Tubulin 1* genes for this species to find potential similarities and differences. Analyses will be performed *in silico* using bioinformatics software called Unipro UGENE and possibly DNAStar. An analysis of various *Tubulin* gene sequences has shown that there exists significant sequence variability among members of the gene. However, given the important functions of both genes, and their evolutionary relationships, while we hypothesize that differences found between the two sequences will be significant and over 50% dissimilarity, we also hypothesize that the translated proteins will show less dissimilarity.

References:

[1] McKean, P. G., Vaughan, S., & Gull, K. (2001). The extended tubulin superfamily. *Journal of Cell Science, 114*(15), 2723-2733. Accessed on October 15th, 2021, from http://doi.org/10.1242/jcs.114.15.2723
[2] Hyams, J. S. & Lloyd, C. W. (1993). *Microtubules*. New York: Wiley-Liss.

SARS-CoV-2 Drug Discovery: The Search to End the Pandemic.

Andrew Huang
Mentor: Dmitry Brogun
Kingsborough Community College

For over the past two years, our lives have been continuously ravaged by the novel disease Coronavirus disease 2019 (COVID-19), which is caused by the severe acute respiratory syndrome coronavirus (SARS-CoV-2) virus. Global efforts of drug discovery to find a drug to treat the disease is still underway. Through the means of machine learning, AI and critical thinking, we hope to further advance the search for a way to treat COVID-19 and to end the pandemic. If we are able to identify and analyze inhibitory molecules that would disrupt key proteins found in the biological processes of the SARS-CoV-2 virus through the means of algorithms in a

machine learning AI, then we would be able to identify/formulate drug(s) that can be used as an effective treatment for COVID-19. As a starting point, we would have to find a possible target protein of the SARS-CoV-2 virus to inhibit it from undergoing its biological processes and harming our body. This is done through our machine learning model in Jupyter Notebook, where it searches the ChemBL database. The target protein we are looking for has a low IC50 value, which is the standard used to measure the effectiveness of a drug based on the concentration, in nanometers (nM), needed to inhibit a certain biological process by 50%. Bioactivity data is also extracted from the ChemBL database using the machine learning model. This data will undergo EDA, or exploratory data analysis, a type of data analysis that is done through a variety of tools like box plots and scatter plots. Once the data is analyzed, molecular descriptors would have to be done in order to calculate chemical properties.

About CRSP

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"Historically, pandemics have forced humans to break with the past and imagine their world anew. This one is no different. It is a portal, a gateway between one world and the next. We can choose to walk through it, dragging the carcasses of our prejudice and hatred, our avarice, our data banks and dead ideas, our dead rivers and smoky skies behind us. Or we can walk through lightly, with little luggage, ready to imagine another world. And ready to fight for it."

-- Arundhati Roy