NEW YORK CITY COLLEGE OF TECHNOLOGY · CUNY

20th ANNUAL POSTER SESSION

11.17.2022
12:30-4:00 pm

New Academic Complex Lobby

A Showcase of City Tech Faculty and Students' Research and Publications

BIOLOGY AND
HEALTH SCIENCES

BUSINESS

CHEMISTRY

COMPUTER
ENGINEERING AND
INFORMATION
SYSTEM TECHNOLOGY

ELECTRICAL,
MECHANICAL AND
CIVIL ENGINEERING

HOSPITALITY
MANAGEMENT

HUMANITIES,
SOCIAL SCIENCES
AND ENGLISH

INTERDISCIPLINARY

MATHEMATICS

PHYSICS

20th Poster Session, 2022
12:30 pm – 4:00 pm

WELCOME AND GREETINGS
1:00 pm –1:15 pm

Dr. Russell Hotzler
President

Dr. Pamela Brown
Provost

Dr. Reginald Blake
Associate Provost and Dean of Curriculum and Research

Dr. Justin Vazquez-Poritz
Dean of the School of Arts & Sciences

Dr. Gerarda Shields
Dean of the School of Technology & Design

Dr. Maureen Archer
Interim Dean of the School of Professional Studies

AWARDING CEREMONY
1:15 pm –1:30 pm

One-minute Faculty Poster Presentation
1:30 pm –2:00 pm

Informal Q&A in the lobby with refreshments.
Refreshments will be served.

The program is organized by topics rather than by departments. Frequently the presentations are cross-disciplinary or difficult to assign to the discipline represented by the department with which the presenter is affiliated.

AWARDING CEREMONY

The organizing committees of the 18th and the 19th Annual Faculty and Student Research Poster Sessions have selected for special recognition the following awardees from among over 50 excellent posters presented each year. The names of presenters of the awarded posters are given in bold and identified with an asterisk*.

18th POSTER SESSION AWARDEES, 2020

***Alberto Martinez**, Mai Zahran, Miguel Gomez, Johnny Guevara and Rosemary Pichardo-Bueno. *Blood-Brain Barrier Permeability and AChE Inhibition of Ionophoric Polyphenols*.

***Denise H. Sutton**. *From Feed Sacks to Dresses: Upcycling Consumer Goods Packaging During the Depression in the United States*.

***Anastasia Spiridonova** and Roman Ya. Kezerashvili. *Rydberg Excitons in Novel Two-dimensional Materials: TMDCs and Xenes*.

19th POSTER SESSION AWARDEES, 2021

***Alyssa D. Adomaitis** and Diana Saiki. *Attitudes towards Wearing Masks among Young Adults*.

***Viviana Vladutescu**. *Dynamic Alignment of Transmission Telescope*.

Sandie Han, Ariane M. Masuda, Satyanand Singh and ***Johann Thiel**. *Solving the Membership Problem for Certain Subgroups of SL2 (Z)*.

POSTER SESSION

BIOLOGY AND HEALTH SCIENCES

1 Karen Shirley-James and Heather Gibson. *Reflections on My Experience as a New Nurse Faculty Member in a Large Urban Publicly Funded Associate Degree Nursing Program.*

2 Juan Rivera-Correa, Ana Rodriguez and Maria F. Yasnot-Acosta. *Why Do We Get Sick from Infection? Assessing Immune Factors Involved in Infection-Induced Pathologies.*

3 Pegah Khosravi, Maria Lysandrou, Mahmoud Eljalby, Qianzi Li, Ehsan Kazemi, Pantelis Zisimopoulos, Alexandros Sigaras, Matthew Brendel, Josue Barnes, Camir Ricketts, Dmitry Meleshko, Andy Yat, Timothy D. McClure, Brian D. Robinson, Andrea Sboner, Olivier Elemento, Bilal Chughtai and Iman Hajirasouliha. *A Deep Learning Approach to Diagnostic Classification of Prostate Cancer Using Pathology–Radiology Fusion.*

4 Sitaji Gurung, Karen MacDonell, K. Marie Sizemore, Richard Zhao, Rafael Dilones, Marvin E. Belzer and Sylvie Naar. *An Examination of Perceptions and Usage of Dried Blood Spot Biosampling Technology for HIV Viral Load Collection Among Youth Living with HIV.*

5 Audra Haynes and Isis Marsh. *Oral Health Effects of Fetal Alcohol Spectrum Disorder.*

6 Khrystyna Vyprynyuk. *Effectiveness of Manual Periodontal Instrumentation in the Management of Periodontal Disease.*

7 Iudra E Haynes. *Dental Healthcare Professionals and Monkeypox Virus.*

8 Subhendra Sarkar, Evans Lespinasse, Eric Lobel, Zoya Vinokur, Somdat Kisoon, Analia Basilicata, Aaliyah Salmon, Joanna Sysca, Guito Charles, Katie Tam, Angela Rodriguez, Aravis Mcbroom, Anam Riaz, Daler Djuraev, Robert O'Brien, Nino Jvarishvili and Jodi-Ann Douglas. *Soft X-Ray and Susceptibility MRI to Detect Distribution and Function of Minerals: Initial Results on Changing Roles of Iron and Bound Water During Climate Change and Industrial Pollution in Biological Tissues.*

9 Mai Zahran, Andreas Mardt, Rene F. Gorriz, Federica Ferraro, Philip Ulrich and Petra Imhof. *Effect of a U:G Mispair on the Water around DNA.*

10 Dora-Ann Oddo and Christopher W. Bowers. *Systemic and Oral Health Manifestations of Kidney Disease.*

BUSINESS

11 Alyssa Dana Adomaitis and Diana Saiki. *Lookism: A Framework to Understand Discrimination.*

12 Nazanin Hedayat Munroe. *The Digitization of Fashion.*

CHEMISTRY

13 Ivana Radivojevic Jovanovic, Colleen M.B. Gallagher, Ramsey Salcedo, Wayne W. Lukens Jr., Jacopo Samson, Charles M. Drain, Donna McGregor, Benjamin P. Burton-Pye and Lynn C. Francesconi. *Reduction of Pertechnetate by Chemical and Photochemical Approaches and Incorporation of Tc(IV) into Titanium Dioxide.*

14 *Alberto Martinez. Synthesis of Caffeic Acid Derivatives and Preliminary Results of Molecular Docking with AChE and BACE 1 Enzymes.*

COMPUTER ENGINEERING AND INFORMATION SYSTEM TECHNOLOGY

15 Brygettee Al-Shawkani, Majd Alnuman, Arleni Mendez and Aparicio Carranza. *Penetration Testing with Wireshark, John The Ripper and Social Engineering Toolkit (Set).*

16 Jose Cruz Jr. and Aparicio Carranza. *Remote Iot Doorbell Using Cloud Computing.*

17 Frank Garcia, Bryant Perez, Yves Kabore, Jaylen McDonald and Aparicio Carranza. *American Sign Language to Text.*

18 Diego Portoviejo and Aparicio Carranza. *IoT Doorbell Using Raspberry PI.*

19 Edwin Tito, Yuan Yao, Christopher Berry and Paul Ogo and Aparicio Carranza. *IoT and Cloud Computing to Minimize Drunk Driving Accidents.*

20 Angelo Huertero, Aleem Ahmed, Almi Imraz, MD Karim and Aparicio Carranza. *Preventing Hackers by Means of Encryption.*

21 Paa Conduah, Michael Lewis, Andrew Jaquez, Dariel Mella and Aparicio Carranza. *The Use of Cryptographic Algorithms.*

22 Abdelhameed Nasr, Angel Velazquez, Hansel Serra, Aseed Yacoub and Aparicio Carranza. *Analysis of Software Defined Networking.*

23 Aparicio Carranza. *Penetration Testing in a Virtual Testbed Environment.*

ONE-MINUTE FACULTY POSTER PRESENTATION

12 **Charlotte Welker, J. Madhani, Y. Dubois, C. Pichon, and S. Kassin**. Planes of Dwarf Satellites around the Milky And its Neighbors: A Challenge to Cosmology or an Interaction with Cosmic Filaments?

1 **Juan Rivera-Correa, Ana Rodriguez, and Maria F. Yasnot-Acosta**. Why Do We Get Sick from Infection? Assessing Immune Factors Involved in Infection-Induced Pathologies.

2 **Pegah Khosravi, Maria Lysandrou, Mahmoud Eljalby, Qianzi Li, Ehsan Kazemi, Pantelis Zisimopoulos, Alexandros Sigaras, Matthew Brendel, Josue Barnes, Camir Ricketts, Dmitry Meleshko, Andy Yat, Timothy D. McClure, Brian D. Robinson, Andrea Sboner, Olivier Elemento, Bilal Chughtai, and Iman Hajirasouliha**. A Deep Learning Approach to Diagnostic Classification of Prostate Cancer Using Pathology–Radiology Fusion.

3 **Audra E Haynes**. Dental Healthcare Professionals and Monkeypox Virus.

4 **Nazanin Hedayat Munroe**. The Digitization of Fashion.

5 **Ivana Radivojevic Jovanovic, Colleen M.B. Gallagher, Ramsey Salcedo, Wayne W. Lukens Jr., Jacopo Samson, Charles M. Drain, Donna McGregor, Benjamin P. Burton-Pye, and Lynn C. Francesconi**. Reduction of Pertechnetate by Chemical and Photochemical Approaches and Incorporation of Tc(IV) into Titanium Dioxide.

6 **Angelo Huertero, Aleem Ahmed, Almi Imraz, MD Karim, and Aparicio Carranza**. Preventing Hackers by Means of Encryption.

7 **Li Geng**. Distance Estimation in Tag-to-Tag Communication Systems.

8 **Hamid Norouzi, Reginald Blake, Abdou Bah, Cynthia Rosenzweig, Satya Prakash, Naved Khan, Matthew Bilik, Lucy Piacentini, Carolien Mossel, Anais Teyton, and Mary Anne Woody**. Studying Urban Heat Island and Climate Change Using Satellite Remote Sensing and Ground Measurements.

9 **Mark J. Noonan and Matthew Joseph**. City of Print: New York and the Periodical Press Digital Website.

10 **Diana Samaroo, Liana Tsenova, Sandie Han, and Urmi Ghosh-Dastidar**. Promoting STEM Learning Through a Multidisciplinary SENCER Framework at a Minority-Serving Institution.

11 **Boyan Kostadinov and Satyanand Singh**. Discovering Kepler's Third Law from Planetary Data.

ABSTRACTS OF PRESENTATIONS

Reflections on My Experience as a New Nurse Faculty Member in a Large Urban Publicly Funded Associate Degree Nursing Program

Karen Shirley-James and Heather Gibson / Department of Nursing

Summary

The transition to the full-time faculty member role is challenging. I was thrilled when I was appointed to a full-time lecture line in Spring 2022 after serving as a clinical adjunct faculty member. My assignment was to teach three theory sections with a total of 86 students in psychiatric nursing course. Complicating my debut in academia was the rocky start of the semester due to the Covid-19 pandemic. Clinical partners cancelled 25% of the school's clinical placements three weeks before the beginning of the semester. The semester started one week late after the Nursing Department Chair had to arrange replacement placements. As a new teacher I was surprised by the student's anxiety, depression and incivility which focused primarily on testing. Students were relentless in asking "what is on the test?" One researcher found that City University of New York (CUNY) students were disproportionately affected by the COVID-19 pandemic finding a high prevalence and severity of depression and anxiety symptoms (Rudenstine et al, 2020). This poster describes my reflections to my first semester teaching in the classroom and exposure to student's reaction to testing during the Covid-19 pandemic.

Limitations and Conclusions

Little is known about students' reaction to testing despite its importance to nursing education. Even less is known about the impact of the Covid-19 pandemic on nursing education. One limitation of this poster is that it is a description of my experience, so it is limited to one person and one school. No research tool was used to measure my experience. I was lucky to have two mentors who were of great assistance. I was able to manage the student's anxiety, depression and incivility in the classroom setting by using strategies to lower the temperature in the classroom. The evaluation strategy was able to correlate with NCLEX predictive high stakes testing.

The sequala of the COVID-19 pandemic hastened the appearance of a long-anticipated nursing and nursing faculty shortage. Estimates of the nursing shortage worldwide were grim before the pandemic. According to the American Association of Colleges of Nursing (AACN), faculty shortages at nursing schools across the country are limiting student capacity at a time when the demand for professional registered nurses continues to rise. Factors such as budget constraints, an aging faculty and increasing job competition from clinical sites have contributed to this crisis (AACN, 2021). New faculty need support to thrive in the new role.

Why Do We Get Sick from Infection? Assessing Immune Factors Involved in Infection-Induced Pathologies

Juan Rivera-Correa [1]*, Ana Rodriguez,[2]* and Maria F. Yasnot-Acosta [3]*

[1] Department of Biological Sciences, NYC College of Technology
[2] Department of Microbiology, NYU School of Medicine
[3] GIMBIC, Universidad de Córdoba, Montería, Córdoba, Colombia

Most human infections are accompanied by disease affecting the health of the host. Even though pathogen-induced damage contributes partly for the disease burden, a significant amount of the pathologies during infection are due to inadequate immune responses. Two examples of exuberant immune responses include the creation of autoantibodies (antibodies targeting your cells and tissues) and the over production of inflammatory cytokines (proteins that can cause fever). Using a cohort of severe malaria patients (a parasitic disease and one of top 4 global killer infections), we dissected the role of autoantibodies and cytokines in correlating with severe manifestations of the disease. Across different cohorts around the world, we found that high levels of autoimmune antibodies targeting different cell components, such as membrane lipid phosphatidylserine (PS), correlated with severe disease in malaria. Furthermore, a second study suggests that cytokines IL-4, IL-10, CCL2 and TGF-β might be developed as biomarkers for severity in a malaria Colombian cohort. This work is summarized in a recently published review in *Frontiers in Immunology* and a *PLoS Neglected Tropical Diseases* research article respectively. Altogether these works highlight the importance of studying the immune response during infection suggesting it as major mediator of disease.

*All are senior authors that contributed equally (collaborative work)

A Deep Learning Approach to Diagnostic Classification of Prostate Cancer Using Pathology–Radiology Fusion

Pegah Khosravi, Maria Lysandrou, Mahmoud Eljalby, Qianzi Li, Ehsan Kazemi, Pantelis Zisimopoulos, Alexandros Sigaras, Matthew Brendel, Josue Barnes, Camir Ricketts, Dmitry Meleshko, Andy Yat, Timothy D. McClure, Brian D. Robinson, Andrea Sboner, Olivier Elemento, Bilal Chughtai and Iman Hajirasouliha / Department of Biological Sciences

Prostate cancer is the most commonly diagnosed cancer in adult men. Distinguishing patients with high-risk and low-risk forms of prostate cancer is important because early detection of high-risk prostate cancer improves survival rate and accurate diagnosis prevents overtreatment.

The aim of this study is to combines magnetic resonance imaging (MRI) data with pathology assessment from 400 patients with suspected prostate cancer to develop an artificial intelligence (AI)-based model (named AI-biopsy) for the early diagnosis of prostate cancer. The MR images were labeled with prostate biopsy and reviewed by two radiologists and one pathologist. Deep learning models were developed to distinguish 1) benign from cancerous tumor and 2) high-risk tumor from low-risk tumor.

Our computational method achieved AUCs of 0.89 (95% CI: [0.86–0.92]) and 0.78 (95% CI: [0.74–0.82]) to classify cancer vs. benign and high- vs. low-risk of prostate disease, respectively.

AI-biopsy provided a data-driven and reproducible way to assess cancer risk from MR images and a personalized strategy to potentially reduce the number of unnecessary biopsies. It is a fully automatic method with a drag-and-drop web interface that allows radiologists to review AI-assessed MR images in real time.

An Examination of Perceptions and Usage of Dried Blood Spot Biosampling Technology for HIV Viral Load Collection Among Youth Living with HIV

Sitaji Gurung[1,2], Karen MacDonell[3], K. Marie Sizemore[4], Richard Zhao[2], Rafael Dilones[2], Marvin E. Belzer[5] and Sylvie Naar[3]

[1] Department of Health Sciences, NYC College of Technology
[2] Department of Psychology, Hunter College
[3] College of Medicine, Florida State University
[4] Department of Psychiatry, Institute for Health, Health Care Policy and Aging Research Robert Wood Johnson Medical School, The State University of New Jersey
[5] Children's Hospital Los Angeles

Background: The use of dried blood spot (DBS) biosampling technology holds promise for expanding routine viral load (VL) monitoring services to adolescents, especially those at highest risk for HIV medication non-adherence.

Methods: We enrolled 34 YLH aged 15-24 years old from April 2020 to December 2021 to collect pilot data. Participants received a survey with an instructional video along with the HemaSpotTM-HF blood sampling kit.

Results: Survey data was collected for 34 participants (M = 22.18, SD = 1.69). Descriptive analyses revealed a positive relationship between perceived suitability and feasibility (r = .673, p < .000), as well as acceptability (r = .547, p = .001). We observed a significant negative association between perceived suitability and age (r = -.34, p = .049). Examining mean differences on these measures by demographics revealed a significant difference in perceptions of feasibility, based on health insurance coverage. Those covered by a parents insurance reported greater feasibility (M = 4.65, SD = .39) compared to those with their own insurance (M = 4.11, SD = .58); t(30) = -2.66, p = .012. Potential barriers to DBS include participants' living situation, DBS kit cost and mailing issues. Clinic and medical provider involvement and data about the innovation of DBS, having medical insurance and larger scale mailing and expedited product shipments were considered facilitators.

Conclusions: Our findings indicate the integration of DBS into adolescent culture via clinic and healthcare provider promotion as a suitable, feasible and acceptable method for obtaining VL among YLH. The collection of pilot data to inform virtual health services provide novel and urgent information on how to respond and cater to the health needs of youth in the digital age.

Oral Health Effects of Fetal Alcohol Spectrum Disorder

Audra Haynes and Isis Marsh / Department of Dental Hygiene

Fetal alcohol spectrum disorder (FASD) is a medically diagnostic term used to describe a complex neurodevelopmental disorder resulting in permanent and sometimes progressive disabilities caused by prenatal alcohol consumption. FASD is as common as autism spectrum disorder but remains underdiagnosed in North America, emphasizing the need for increased awareness, diagnosis and treatments. The diagnosis of FASD by healthcare professionals remains low due to the impreciseness of self-reported maternal drinking, lack of sensitive biomarkers, social stigma, the complexity of the diagnosis, inadequate recognition of dysmorphic facial characteristics and an overlap with differential diagnoses such as attention-deficit/hyperactivity disorder. Persons with developmental and intellectual disabilities are at increased risk for oral health issues and many of the identifying characteristics are within the purview of the oral health professional. This review evaluates the latest research on FASD to increase awareness and medical referrals, educate oral health professionals on the defining features of the disorder and provide guidance for improving the oral health of this vulnerable population.

Effectiveness of Manual Periodontal Instrumentation in the Management of Periodontal Disease

Khrystyna Vyprynyuk / Department of Dental Hygiene

Periodontal disease is one of the most prevalent chronic diseases affecting the adult population worldwide (Tonetti et al., 2017). One of the most effective methods to arrest periodontal disease is periodontal debridement, which refers to the mechanical removal of bacterial biofilm, calculus and toxins (Puglisi et al., 2022). This may be achieved using either hand instruments, power instruments, or a combination of both. Research has shown that using hand instruments alone can be as effective in removing toxins and deposits from tooth surfaces as using power instruments. However, the success of periodontal therapy using hand instruments depends on how sharp the instrument used by a clinician is. This work presents the importance of maintaining the sharp cutting edge of manual periodontal instruments for increased effectiveness in the treatment of periodontal disease (Vyprynyuk & Chitlall, 2022).

References

Puglisi, R., Santos, A., Pujol, A., Ferrari, M., Nart, J., & Pascual, A. (2022). Clinical comparison of instrumentation systems for periodontal debridement: A randomized clinical trial. International Journal of Dental Hygiene, 20(2), 328-338.

Tonetti, M. S., Jepsen, S., Jin, L., & Otomo-Corgel, J. (2017). Impact of the global burden of periodontal diseases on health, nutrition and wellbeing of mankind: A call for global action. Journal of clinical periodontology, 44(5), 456-462.

Vyprynyuk, K., & Chitlall, A. (2021). Efficacy of Hand Instrumentation vs Power Instrumentation. Dimensions of Dental Hygiene, 19(5), 18-22. https://dimensionsofdentalhygiene.com/article/efficacy-hand-instrumentation-power-instrumentation/

Vyprynyuk, K., & Chitlall, A. (2022). Maintain the Sharp Cutting Edge of Periodontal Instruments. Dimensions of Dental Hygiene, 20(2), 16-21. https://dimensionsofdentalhygiene.com/article/maintain-the-sharp-cutting-edge-of-periodontal-instruments/

Dental Healthcare Professionals and Monkeypox Virus

Audra E Haynes / Department of Dental Hygiene

Monkeypox, a viral transmissible disease caused by the monkeypox virus, is commonly found in Central and Western Africa, has caused a recent outbreak in the United States. It is important for dental healthcare professionals to be knowledgeable about the pathogenesis and transmission of the disease and how to better protect themselves and the public from further spread, as well as educating patients about the disease.

This review examines the etiology of monkeypox, transmission, signs and symptoms and preventive measures to reduce occurrence of the disease with an emphasis on who has largely been affected by the disease and the vaccines available for immunization, as well as guidance on infection control and best practices in the workplace.

Haynes, A., Davide, S., Lam, A. (2022). Update on Monkeypox. Understanding the origins of this viral disease and how it spreads, will help oral health professionals advise their patients and prevent its transmission.

The Journal of Professional Excellence, Dimensions of Dental Hygiene.

Soft X-Ray and Susceptibility MRI to Detect Distribution and Function of Minerals: Initial Results on Changing Roles of Iron and Bound Water During Climate Change and Industrial Pollution in Biological Tissues

Subhendra Sarkar [1], Evans Lespinasse [1], Eric Lobel [1], Zoya Vinokur [1], Somdat Kisoon [1], Analia Basilicata [1], Aaliyah Salmon [1], Joanna Sysca [1], Guito Charles [1], Katie Tam [1], Angela Rodriguez [1], Aravis Mcbroom [1], Anam Riaz [2], Daler Djuraev [3], Robert O'Brien [1], Nino Jvarishvili [1] and Jodi-Ann Douglas [1].

[1] Department of Radiologic Technology & Medical Imaging
[2] Department of Chemistry
[3] Department of Biological Sciences

Radiology departments have contributed significantly to greenhouse gases including release of toxic imaging contrast media to environment. However, Radiology also has several imaging tools to monitor and support environmental goals. Our current research is one of the firsts to pursue this direction by non-invasive imaging of biometals that are less abundant in biological tissues but play key roles as co-factors in tissue structure and function while conventional spectroscopies and microscopies are too invasive to characterize the native states. We work with porous organic matrix of metal-rich fruits and animal tissues in the 20-40 keV range, that is at low end of clinical X-Ray and detect alkali, alkaline earth, and transition as well as confirm microscopic dynamics including quantum effects by magnetic resonance imagers (MRI). The results are applicable to food science, environmental effect on food chain due to industrial pollution and climate change as well as various metal-controlled biochemical processes in human brain and neurological disorders.

Effect of a U:G Mispair on the Water Around DNA

Mai Zahrana [1], Andreas Mardt [2], Rene F. Gorriz [2], Federica Ferraro [2], Philip Ulrich [2] and Petra Imhof [2,3]

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[2] Department of Physics, Freie Universität Berlin
[3] Department for Chemistry and Pharmacy, Computer Chemistry Center, Friedrich-Alexander University (FAU) Erlangen Nürnberg

DNA repair proteins are able to discriminate DNA lesions among an abundance of intact DNA with high selectivity. To investigate detectable characteristics of one specific lesion, we compare statistical results from molecular dynamics simulations of two different DNA in water, one with an intact C:G pair and one that contains a U:G mispair, and perform a comparative analysis of the water dynamics around the two. Our data show that in addition to the local DNA conformation, also the surrounding water shell exhibits significant differences that may help mispair discrimination. The chemical groups which account for a U:G mispair to exhibit a wobble conformation instead of the 'proper' Watson-Crick pairing of a C:G pair, that is an oxygen atom (in uracil) instead of an amino group (in cytosine), also order the water molecules around the bases such that they act predominantly as hydrogen-bond donor or acceptor to the uracil or cytosine base, respectively. These changes in water conformation stretch into the second solvation shell, which may be exploited by repair enzymes to achieve lesion detection with high efficiency.

Systemic and Oral Health Manifestations of Kidney Disease

Dora-Ann Oddo and Christopher W. Bowers / Department of Dental Hygiene

Chronic kidney disease (CKD) is the progressive loss of kidney function due to cumulative damage[1]. In the United States, approximately 37 million adults, or one in seven, have CKD, with nearly 90% of those cases remaining undiagnosed.[2] Socioeconomic status, race and ethnicity, lifestyle choices and other systemic diseases all impact the incidence of CKD and end stage renal disease (ESRD).

Studies show that individuals of lower socioeconomic status have a high incidence of CKD[3]. Moreover, Black individuals are four times more likely to develop CKD than white individuals. Black Americans also have a higher prevalence of diabetes, and hypertension, which both lead to CKD[2]. Lifestyle choices can influence the probability of CKD or ESRD. An unhealthy diet and physical inactivity are among the key modifiable risk factors for chronic conditions. Diabetes and high blood pressure are the most common causes of CKD in the United States.[4]

Intra oral changes may occur in patients with CKD, such as uremic stomatitis, xerostomia, taste alternations, mucosal petechiae, ecchymosis, renal osteodystrophy and periodontal disease.[5,6] During routine dental visits, oral health professionals may note signs of undiagnosed CKD, such as uremic stomatitis, which is typically associated with untreated chronic renal failure. A painful lesion caused by elevated levels of urea nitrogen in the blood, uremic stomatitis may manifest in four forms: ulcerative, hemorrhagic, non-ulcerative and hyperkeratotic. It may present with red mucosal ulcers or thick gray exudate covering the oral mucosa. Non ulcerative and hyperkeratotic types appear as white lesions. Hyperkeratotic lesions are more often found around the tongue and floor of the mouth. The pain associated with uremic stomatitis may be managed by using mildly acidic mouth rinse (Such as diluted hydrogen peroxide) sucking on ice chips or applying topical anesthetic.[5]

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[2] Brown JS. Addressing the issue: health disparities and social determinants of health among Blacks/African Americans in comparison to non-minorities with chronic kidney disease. Nephrol Nurs J. 2021;48:489. 3. U.S. Centers for Disease Control and Prevention. Chronic Kidney Disease Basics. Available at: https://www.cdc.gov/ kidneydisease/basics.html. Accessed October 4, 2022.

[3] Brown JS, Elliott RW. Social determinants of health: understanding the basics and their impact on chronic kidney disease. Nephrol Nurs J. 2021;48:131.

[4] Proctor R, Kumar N, Stein A, Moles D, Porter S. Oral and dental aspects of chronic renal failure. J Dent Res. 2005;84:199–208.

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Lookism: A Framework to Understand Discrimination

Alyssa Dana Adomaitis and Diana Saiki / Department of Business

Discrimination based on sex, nationality, religious beliefs and race has been discussed frequently. Yet, there is another layer to discrimination, which tends to fall under the radar and has been coined as "lookism." Lookism can be described as the *"preferential treatment of those considered to be attractive and discrimination against those deemed less physically desirable"* (Sims, 2021). Increased awareness of this issue has caught the attention of some scholars and psychologists. Saiki and Adomaitis (2017) found that there has been an increase in research on lookism since 2010. However, the focus of scholarly research tends to be generic or focused on the effects of this phenomenon in the workplace. Literature on the topic has revealed that physically attractive individuals tend to receive better job opportunities, attention and care.

It has been observed that conventionally attractive people had better professional and social lives (e.g., Rhodes, 2010). Taking this into consideration, the following research aims to examine the issue further as found in recent scholarly literature. The aim is not to be exhaustive but instead exploratory, by investigating how biases regarding physical appearance affect different minority groups. It will be vital to shed light on additional invisible barriers these groups have to face.

Scholars in the apparel and textile field are positioned to contribute to defining and examining lookism. Therefore, the purpose of this research was to examine the literature on lookism as it relates to minority groups.

The Digitization of Fashion

Nazanin Hedayat Munroe / Department of Business, Business & Technology of Fashion

The Fashion industry is incorporating new technologies and ideologies moving the field into the digital arena. Smart textiles increase the viability of garments functioning in tandem with wireless technology, offering a new future for fashion as more than a visual and sensory phenomenon. As physical clothing is going online, its virtual counterparts are also finding new modes of expression through digital fittings, adopting mixed and augmented realities and photo-realistic digital twins to model consumer-specific clothing. Through their partnerships with the gaming industry, luxury labels are offering skins for avatars that make them affordable for all socio-economic classes—perhaps fulfilling the industry's 20th century quest for "the democratization of fashion." In an ultimate shift, virtual couture has made digital-only clothing which is meant to be "worn" and experienced online.

This research is included in the final chapter of my new book: *A Cultural History of Western Fashion: From Haute Couture to Virtual Couture*. (Bloomsbury Publishing, 2022).

Reduction of Pertechnetate by Chemical and Photochemical Approaches and Incorporation of Tc(IV) into Titanium Dioxide

Ivana Radivojevic Jovanovica [1], Colleen M.B. Gallagher [2], Ramsey Salcedo [2], Wayne W. Lukens Jr. [4], Jacopo Samson [2], Charles M. Drain [1], Donna McGregor [3], Benjamin P. Burton-Pye [3] and Lynn C. Francesconi [2]

[1] Department of Chemistry, NYC College of Technology
[2] Department of Chemistry, Hunter College
[3] Department of Chemistry, Lehman College
[4] Chemical Sciences Division, Lawrence Berkeley National Laboratory, Berkeley

Technetium-99 (^{99}Tc) is a fission product present in relatively large amounts in nuclear waste sites. The long half-life (211,000 yr) and environmental mobility of pertechnetate (TcO_4^-), the most stable form in aerobic environments, render Tc particularly challenging to isolate and stabilize during nuclear waste disposal. One strategy is to immobilize Tc in a waste form sufficiently durable to prevent release of Tc until an acceptable fraction has decayed. We present the preparation of Tc(IV) doped TiO_2 via two synthetic approaches that may promote development of potential Tc $TiO_2$2 wasteforms. The first approach is the low temperature chemical synthesis of TiO_2 nanoparticles. Approach 2 utilizes TiO_2 to photocatalytically reduce TcO_4^- to Tc(IV). The materials formed by either approach may be consolidated into a dense waste form by Hot Isostatic Pressing (HIPing).

Synthesis of Caffeic Acid Derivatives and Preliminary Results of Molecular Docking with AChE and BACE 1 Enzymes

Alberto Martinez / Department of Chemistry

Alzheimer's disease (AD) is the most common form of dementia that affects more than 6 million Americans and more than 40 million people around the world. The incidence is expected to rapidly increase due to the lack of any effective treatment. Several enzymes have been related to the progression of the disease, especially acetylcholinesterase (AChE) and b-secretase (BACE 1). Phenolic acids have shown to possess anti-AD properties. Caffeic acid and chlorogenic acid are two abundant phenolic acids widely distributed in plant tissues that occur in foods such as fruits, spices, vegetables, wine, olive oil and coffee. Their antitumor, anti-inflammatory, and anti-AD properties have been described. In addition, quinoline-based compounds have also shown promising potential as anti-AD agents. In this work we report the synthesis and preliminary molecular docking studies to AChE and BACE 1 of two novel caffeic acid derivatives, AM67 and AM68. Results were compared to parent compound caffeic acid, as well as clinically used enzymatic inhibitors. Both new compounds displayed high binding affinity to the active site of both enzymes, especially AM68, which is a hybrid multi-target caffeic acid-quinoline compound. In conclusion, these compounds represent a promising strategy in the development of new anti-AD agents.

Penetration Testing with Wireshark, John the Ripper and Social Engineering Toolkit (SET)

Brygettee Al-Shawkani, Majd Alnuman, Arleni Mendez and Aparicio Carranza /
Department of Computer Engineering Technology

Penetration testing, also known as ethical hacking is a cyber-attack that is simulated against a computer to check for vulnerabilities that may potentially be exploited. As technology advances and more businesses rely on web applications to keep their organizations running, there is an increased risk for sensitive information to be compromised by hackers. Private businesses as well as governmental organizations have put forth an effort to stop these attacks using readily available and accessible open source tools such as those included in Kali Linux. We report results of our experimentation performed with Wireshark, an application that captures packets from a network connection, John the Ripper, a tool that gauges password strength and Social Engineering Toolkit, an open-source penetration testing framework designed for social engineering.

Remote IoT Doorbell Using Cloud Computing

Jose Cruz Jr. and Aparicio Carranza /
Department of Computer Engineering Technology

Remote IoT doorbell controlled via Cloud Computing technology is becoming popular nowadays. Remote IoT doorbell is an embedded network connection solution that enables us to link to systems, devices and sensors. Cloud Computing is a methodology where remote systems are accommodated on the Internet to store, operate and process data. Raspberry Pi is a small computer used for performing peripheral computation and networking. The Integration of Raspberry Pi and Cloud Computing result is reported for our remote IoT doorbell implementation.

American Sign Language to Text

Frank Garcia, Bryant Perez, Yves Kabore, Jaylen McDonald and Aparicio Carranza /
Department of Computer Engineering Technology

In our world people have always communicated in various ways. It is easier for some than for others to communicate and have mutual understanding. Besides verbal, there are other means of communication, one of this method is sign language. This method can be used by anyone and everyone, but is of prime importance for individuals with speech impairments. According to the World Federation of the Deaf (WFD), there are more than 70 million deaf people worldwide. We have designed, developed and implemented an American Sign Language-to-Text device translator. Our implementation makes use of a Webcam, the Python programming language, TensorFlow object detection API, the Deep Neural Network SSD Mobilenet and a regular Laptop.

IoT Doorbell Using Raspberry PI

Diego Portoviejo and Aparicio Carranza /
Department of Computer Engineering Technology

IoT doorbell is basically a smart doorbell, which takes a photo of whoever rings the bell, and it directly emails the picture taken to the configured email address and archives these pictures to a specific set location. While many efforts are currently being made to standardize this model, our effort focuses on the aspects of the Raspberry Pi IoT Doorbell. We report the implementation, device programming steps and performance details of our system. Furthermore, we show how the data (photos) is stored in a specific location.

IoT and Cloud Computing to Minimize Drunk Driving Accidents

Edwin Tito, Yuan Yao, Christopher Berry, Paul Ogoo and Aparicio Carranza /
Department of Computer Engineering Technology

Current studies demonstrate that there are more than 17,000 deaths annually due to drunk drivers in the United States, and in New York State it is estimated that around 30% of fatal crashes are due to alcohol intoxication. We have implemented an IoT embedded system with sensors that measure the blood alcohol level of the driver with a breath detecting system which uses a beam of infrared light to perform a calculation of the alcohol level present in the driver's blood. The hardware and software components have been programmed to control the behaviour of the engine upon the data collected from the alcohol sensor. The IoT generated data is transmitted through a communication network using the IBM cloud to send alerts to the public authorities and relatives of the intoxicated individual to take appropriate actions.

Preventing Hackers by Means of Encryption

Angelo Huertero, Aleem Ahmed, Almi Imraz, MD Karim and Aparicio Carranza /
Department of Computer Engineering Technology

Nowadays, security has become a big issue for everyone, especially when it comes to our private data. According to the Aite-Novarica Group, 47 percent of Americans experienced financial identity theft in 2020. The Identity Theft Research Center (ITRC) reported a record number of data compromises in the United States in 2021, amounting to a 68 percent increase over 2020. To prevent hackers from stealing data one must implement a secure environment for the devices as well as Internet browsing. One solution for data protection is encryption which transforms plaintext data into ciphertext using selected algorithms. We report the implementation and performance results of well known encryption algorithms such as the Advanced Encryption Standard (AES), Data Encryption Standard (DES), Supply-Chain Network Optimization Workbench (SNOW) and Rivest-Shamir-Adleman (RSA).

The Use of Cryptographic Algorithms

Paa Conduah, Michael Lewis, Andrew Jaquez, Dariel Mella and Aparicio Carranza / Department of Computer Engineering Technology

Security is exponentially compromised when a predator gains access to a computer system or the Internet. One way to enact protection of such systems is to use encryption. Encryption algorithms are used to encrypt data which provides one additional layer of defense in the protection of data and enhances confidentiality. We discuss various cryptographic algorithms such as Hash functions, Public Key Infrastructure (PKI), etc., and how they are used to secure a system. Hashing is often a component of many cryptographic algorithms and schemes and is used to provide data integrity. PKI uses pair of keys, in which each pair consists of a public key and private key. The generation of such key pairs depends on cryptographic algorithms.

Analysis of Software Defined Networking

Abdelhameed Nasr, Angel Velazquez, Hansel Serra, Aseed Yacoub and Aparicio Carranza / Department of Computer Engineering Technology

The concept of programmable networks has gained considerable momentum and attention such as Software Defined Networking (SDN) that promises simplification of network management and research innovation. SDN is recognized by its two distinguished features: the data plane and the control plane which provides programmability for network application development. SDN provides more efficient configuration, better performance and higher flexibility to accommodate innovative network designs. We discuss Software Defined Networking benefits, challenges, the future and how it has transformed Networking Infrastructure. We demonstrate the applicability of SDN for scalability using two controllers: RYU and POX. We have implemented our solution using the Python programming language, mininet and Distributed Internet Traffic Generator (D-ITG).

Penetration Testing in a Virtual Testbed Environment

Aparicio Carranza / Department of Computer Engineering Technology

Wireless Access Points are susceptible to many types of cybersecurity attacks. Among the most common are efforts to compromise encryption keys using de-authentication based attacks. In this tutorial paper, we investigate penetration testing of wireless networks using open source tools such as fern WiFi Cracker with Aircrack-ng backbone to compromise WEP, WPA and WPA-2 encryption. We describe implementation of a virtual testbed environment, and experimental results of this approach.

To Sway Opinions: Sentiment Analysis

Marcos Pinto / Department of Computer Systems Technology

Sentiment analysis is the process of identifying the individual feelings or perceptions towards another person, a commercial product, an art object, or people's opinions in general. It has applications using machine learning and deep learning. In essence, sentiment analysis is the implementation of NLP (Natural Language Processing). Without getting into specific details about this technology, sentiment analysis contrast spoken words and/or written words with a set of words that denote feeling or perception. It works well with 'explicit' feeling words such as "good", "bad", "likable", "naughty", "bad", "unfair", "just", etc. From opinion polls to creative marketing strategy, this platform has completely redefined the way businesses and decision makers operate.

From Classroom to Online Education – An Educators Insights

Mary Tedeschi / Department of Computer Systems Technology

Face to face activities at universities became difficult in the spring of 2020 with the worldwide outbreak of the SARS virus version COVID19. The initial information was that all classes were to be done online for a short period only, and we believed that we would return to the classroom in two weeks. But within a short period, all face-to-face classes were cancelled and replaced with remote lectures utilizing online Learning Management Systems (LMS) and video conferencing. For many colleges, most classes are still conducted this way

in the spring of 2021. The large scale of online education has exposed a number of problems and challenges that although somewhat known have taken on greater significance. This paper describes online teaching models, learning styles, engagement and interaction models to create a foundation for a set of patterns that capture ways of dealing with these problems – solutions that have been developed and applied for online education even before the pandemic hit but are now being more broadly used. The paper was written over the course of 3 semesters, with examples from teaching at 3 different colleges, depicting the transition from face-to-face teaching coming to an abrupt halt and the rapid transition to pure on-line mode. To support remote activities, the universities contracted some sort of software. St John's University contracted Cisco WebEx, which was available to faculty and students. The City University of New York, (CUNY) system has unique software within each College. At The College of Technology, we used Collaborate Ultra, a tool part of the LMS (Blackboard). Baruch College offered this tool and Zoom was offered with a license from the school. During the second semester, zoom licensing was enhanced and offered throughout the CUNY system. Most of the patterns in this paper depend on an LMS system being in place, as they cover practical topics like course design and how to deal with testing and exams, but also move into areas of student engagement and motivation. Definitions of user experience may be vague and conflicting, as each student and school is unique. The motivation of this paper was the pandemic; however, the findings show engagement as being positive, and yet still exploratory. We engage with technology because it allows us to achieve our purposes. This work contributes to the understanding of how we can apply patterns for online education and shows the start of a whole new pattern language that can benefit educators as well as students as we move forward with a new educational model.

Adopting Heterogeneous Computing Modules: Experiences from a ToUCH Summer Workshop

Sridevi Ayloo and Mary Tedeschi / Department of Computer Systems Technology and
David P. Bunde [1], Kishwar Ahmedxii [2], Tisha Brown-Gaines [3], Joel Fuentes [4], Vishwesh Jatala [5], Ruth Kurniawati [6], Is.ıl OÅN z [7], Apan Qasem [8], Philip J. Schielke [9], Thomas Y. Yeh [10]

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We present efforts to encourage the adoption of modules for teaching heterogeneous parallel computing through a faculty development workshop. The workshop was held remotely using a novel format to exploit the advantages of a virtual format and mitigate its disadvantages. Adoption at a wide variety of institutions showed module effectiveness and also gathered feedback leading to several module improvements. We also report on the adoptions themselves, which show the importance of supporting adaptation of the modules for diverse settings.

Cost-Efficient Shuffling and Regrouping-Based Defense for Federated Learning

Yu-Wen Chen / Department of Computer Systems Technology

Federate learning (FL) enables multiple user devices to train a global machine learning (ML) model collaboratively by uploading their local models to the central server for aggregation. However, attackers may upload tampered local models (e.g., label-flipping attacks) to corrupt the global model. Existing defense methods focus on outlier detection, but they are computationally intensive and can be circumvented by advanced model tampering. This work employs a shuffling-based defense model to isolate the attackers from ordinary users. In addition, it introduces a novel notion, (re)grouping, into the defense model to propose a new cost-efficient defense framework termed SAGE. Experiment results manifest that SAGE can effectively mitigate the impact of attacks in FL by efficiently decreasing the ratio of attacker devices to ordinary user devices. Furthermore, SAGE increases the testing accuracy of the targeted class by at most 40%.

CUNY STEM Teacher Development in New York City

Fangyang Shen and Janine Roccosalvo / Department of Computer Systems Technology

Both CUNY institutions, New York City College of Technology (City Tech) and Borough of Manhattan Community College (BMCC) have partnered together to implement a Noyce Teacher Scholarship Phase I program. This scholarship and internship programs seeks to recruit and retain high quality STEM teachers, specifically in Math and Technology. STEM K-12 New York State certified educators will then teach in NYC high-need hools. This poster will present the first two years of results of internships, scholarships and summer program activities.

Remote IoT Temperature and Humidity Sensor Using Arduino

Starlyn Hiraldo and Aparicio Carranza / Department of Computer Engineering Technology

In modern society, we have homes that are taken over with mold and mildew growth which can lead to certain health and environmental issues around us. Temperature and humidity sensors help to solve these problems by providing the user with a website that can allow them to view the levels of humidity in their home in real-time. Our solution allows the user to make the necessary changes to reduce the risk of obtaining mold by lowering the humidity. We have implemented the DHT11 sensor with the Arduino Mega 2560 microcontroller along with the Arduino IDE and the Hyper Text Markup Language Version 5 (HTML5) scripting language that allows the information of the sensor to be sent using the Internet of Things (IoT). The experimental results show the current temperature and humidity of the surrounding area using an LCD screen as well as via the Internet.

Captious Framework Attacks Should Be Everyone's Concern

Justin Vieira, Mei Xin Lin, Kymora Rogers, Dhilan Mann and Aparicio Carranza / Department of Computer Engineering Technology

Cybersecurity threats are nefarious deeds aimed to damage, steal disrupt digital data. Data could be as simple as an email account or as grand as bank account information. In 2021, a record number of people's private data had been compromised, a 68% increase in comparison to the year before. The Federal Bureau of Investigations (FBI) also had a 7% increase in their public cyber-crimes report. Fundamentally, we are "naked" at anything that involves privacy provisioning and personal information protection. We provide practical guidelines for using Virtual Private Networks (VPN) to enhance privacy and online activities. Encryption techniques to protect information by masking personal data is presented in detail. Protection of a device in a network from malware to safeguard sensitive information is primarily a key factor explained here in detail. Lastly, for protecting businesses from growing cybercrime and sophisticated cyberthreats a set of policies are outlined.

ELECTRICAL, MECHANICAL AND CIVIL ENGINEERING

Environmental Conditions Effect on Optical Components Performance and Cleaning Techniques

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Laboratory working conditions and unproperly set experimental designs highly impact the instruments' performance and shortens their life. Several studies have been conducted on the performance of optical components in ultrafast high-power lasers and metrology equipment. The work presented is a study of different types of damages observed on stretcher and compressor diffraction gratings used in an ultrafast high-power laser system. It was found that short term exposure and operation of the systems at relative humidity and temperatures outside the operating range can damage the systems' components irremediably. The effects of different cleaning techniques are presented along with measurements of the diffraction efficiency of the gratings using a monochromator. Among the cleaning techniques, the 5 min, 75% power O_2 plasma cleaning has been found to be the least invasive technique.

Studying Urban Heat Island and Climate Change Using Satellite Remote Sensing and Ground Measurements

Hamid Norouzi [1,2], Reginald Blake [1,2], Abdou Baha [1,2], Cynthia Rosenzweig [3], Satya Prakash [4], Naved Khan [1], Matthew Bilik [5], Lucy Piacentini [6], Carolien Mossel [1,7], Anais Teyton [8] and Mary Anne Woodyg [9]

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With growing number of world's population living in urban areas, the rapid urban expansion has become a major source for local environmental consequences with implications in human health and safety which are exacerbated by climate change. The urban heat island (UHI) with significant energy, health and societal impact is among the major environmental issues in urban regions. This study aims to enhance our understanding of the urban surface energy budget by coupling satellite remote sensing data with ground-based observations. Here, we develop a multi-sensor LST data with 5-min temporal and 30m spatial resolution. Comprehensive ground observations are collected from various land surfaces in Brooklyn, and the impact of urban heat waves on different demographics are studied.

Distance Estimation in Tag-to-Tag Communication Systems

Li Geng / Department of Electrical and Telecommunications Engineering Technology

Unlike traditional Radio Frequency Identification (RFID) systems which consists of tags and bulky readers, a novel reader-free RFID system has been proposed in recent years where tags can communicate with each other directly with the existence of some external RF carrier source or an ambient RF signal. In this work, the log-power difference between the received signals is studied analytically in tag-to-tag communication systems. The distance between tags is estimated using maximum likelihood method. This work also demonstrates an improved estimation performance of a multiphase backscattering approach with computer simulations.

Potential of Remote Sensing via Satellite in Understanding Impact of Climate Change over Adirondack Park

Carolien Mossel [1], Abdou Bah [1], Marzi Azarderakhsh [1], Kevin Rose [2], Pete McIntyre [3], Reginald Blake [1] and Hamidreza Norouzi [1]

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The lakes within the Adirondack Park Boundary have benefited from strict land use laws meant to keep the land wild for over a century. Lake health corresponds to ecoregions and the differences in geography, soils, climate, as well as land use and alterations within its watershed. Despite the protected status, it has been known that climate change and land use can negatively impact lakes within Adirondack Park. In the late 1970s and through the 1980s, extensive field data was taken to better understand the health of the lakes, including water chemistry, fish populations and other metrics. Some lake stations were installed and continue to monitor specific sites. Remote sensing observations from multiple satellites with better spatial coverage can provide data that can be used to monitor lake health over long periods of time, with products such as surface temperature, aquatic reflectance, lake ice, cloud cover and precipitation data. We aim to investigate the capabilities of multiple satellites for their usefulness in understanding the changes in Adirondack lakes. Multi-platform imagery with different spatio-temporal coverage will be employed to analyze land parameters. MODIS provides a regional scale, high temporal information. Landsat series can provide lake scale observations from 1980s to present. Using all these resources, we will quantify the impacts of climate change for the whole park, as well as specific lakes in the Adirondacks, and fill in crucial data gaps from station data to better inform future efforts to preserve lake health within this treasured region.

HOSPITALITY MANAGEMENT

CT101, Preparing Students for the First Year at City Tech: A Success Story

Sarah Paruolo, Karen Goodlad and Lauri Aguirre / Student Success Center, Hospitality Management and First Year Programs

[Before taking a seat in their first college classroom, students need to be prepared for success; City Tech 101 (CT101) is designed to do exactly that. The CT101 Student Success Workshop welcomes new students to college life by sharing tools and practices in a low-stakes setting, enabling students to become more comfortable and confident before day one. The format enhances new students' sense of belonging at the college by encouraging connections with peers and professors. Student responses to surveys and reflective writing prompts indicate that they feel better prepared to start college upon completion of CT101. Their specific knowledge of instructional technologies, college vocabulary, resources and services improves, as does their confidence in their choice of major. The poster will share how, upon completion of the CT101 workshop, students are able to: identify tools and strategies for learning in a virtual and in-person environment; describe resources available at the college and university; distinguish major degree offerings at the college; recognize vocabulary specific to the college community; communicate in diverse settings and groups, using written, oral and visual means. CT101 gives new City Tech students the introduction they need to start their journey to success.

Green Bonds and Inflation: Are Green Bonds Still a Viable Financing Option?

Unurjargal Nyambuu / Department of Social Science

Environmental sustainability demands achievable goals. Thus, proposed investments in climate-related projects must be matched with financial strategies that allow these initiatives to brought to fruition. In addition to the private sector, governmental policies and enforced targets play an especially important role and encourage emission reduction. Now more than ever, major countries are committed to climate protection. Different financing tools are used for renewable energy investments. In this context, my research highlights the importance of green bonds, underscoring their role in financing not only infrastructure, but also for mitigation and adaptation-related measures. According to the Climate Bonds Initiative, green bond issuance has been increasing across the world and reached a cumulative value of almost $1.9 trillion as of the end of June 2022. As is well known, inflation decreases bond prices by forcing investors to demand higher yields. As borrowing costs continue to rise, the viability of existing green bond funds is thrown into question. This puts pressure on the moral component of green investing. My research addresses the challenges confronting green bond issuers and underwriters of other green financing methods, and why these are particularly severe in times of high inflation.

Effects of Copper Overload on Microglial Immunoreactivity in the Aged Mouse

Alba Rossi-George / Department of Social Science

Copper (Cu) is an essential nutrient and is critical for the central nervous system (CNS) development and function. Under physiological conditions, Cu levels are tightly regulated to prevent copper-induced oxidative stress and to provide sufficient supply for necessary enzymatic reactions. Disruption of homeostatic Cu concentrations and/or distribution in the brain has been observed in several neurodegenerative diseases. Microglia are resident supporting cells in the CNS. As immune cells, microglia promptly engage in a series of phenotypic and morphologic changes to restore the normal milieu. Activation is marked by the release of pro-inflammatory products including nitric oxide (NO). NO reacts readily with Cu. Age is one of the main factors associated with chronic microglial activation. The goal of the present study was to assess the effects of Cu overload on microglial activation in the hippocampus, a region important for the formation of episodic memories. Memory deficits are often observed in aging. To study the potential contribution of Cu on microglial activation in the hippocampus, 24-month-old TX^J mice, which spontaneously accumulate Cu, were compared to wild type C3He mice of similar age. Preliminary results reveal that microglial activation was more pronounced in TX^J mice than in controls. Aged TX^J mice, assessed by the object recognition test, spent statistically significantly more time in contact with the novel object compared to controls, suggesting memory impairment. These results show that Cu accumulation in the brain is expressed both at the physiologic and the behavioral level.

City of Print: New York and the Periodical Press Digital Website

Mark J. Noonan and Matthew Joseph / Department of English

In the summer of 2015 and 2020, I directed the "City of Print: New York and the Periodical Press" Institute, sponsored by the National Endowment for the Humanities (NEH). For each grant, I was awarded $150,000.

At the 2015 institute, 25 faculty fellows (chosen from colleges across the nation) participated in discussions led by experts in American periodicals; visited sites important to the rise of New York's periodical press; attended Digital Humanities workshops; and read scholarship on periodical history and pedagogy.

Owing to the pandemic, the 2020 institute was held fully online. While we were unable to access the archives and streets of New York in person, participants considered issues related to space and place, social justice and press freedom with renewed urgency.

With Matthew Joseph, who graduated from City Tech with a major in Graphic Design, I developed a digital companion to this collaborative research project. This site (at cityofprint.com) features taped lectures, virtual walking tours, reading lists and additional resources developed at the institute, aimed at fostering continued discussion and inquiry.

Post-Communist Era: A Way of Life Disappears and A Promise Unfulfilled

Lisa Pope Fischer / Department of Social Science

This poster presents a chapter in my new book *Chorus of Experiences Capturing Moments in Time: From the Siege of Budapest to Goulash Populism* that uses oral histories of senior Hungarian women to explore the past and the present. This chapter looks at 1989 as a period of transition and hope with the end of the Communist era and the beginning of the post socialist era, however Mária's story illustrates the problems that emerged. Coming from a farming culture, her family longed for the return of their land, the land confiscated for collective farming, but their hopes slipped through their fingers like grains of sand. Her story, along with others, show both the promise and hope people believed in if only Communism would end, yet also the disappointment with what actually happened after 1989. The growing feelings of their potential hopes being dashed, the promise of a satisfying society lost, led to an unsatisfying society that feeds into current trends.

The Language of Law Effectively Communicated by References to Literary Works, Music Artistry and Sports Analogies

Marissa J. Moran / Department of Law and Paralegal Studies

Language employed by judges as decision-makers and attorneys as client advocates, is rooted in tradition referring to case, statutory and constitutional law. Legal stakeholders, the jury as fact-finder, the paralegal/legal assistant as researcher, and members of society as law-abiding citizens rely upon law language, *"lingua iuris,"* in performance of their duties and responsibilities. Use of familiar literary works, popular song lyrics and sports vernacular assist in making law language relatable and so, more readily comprehended. For example, in a recent fee petition matter, U.S. District Judge Iain Johnston began his opinion by saying, "If Dante were a judge, he would have placed fee litigation as an inner circle of judicial hell;" in a copyright case regarding lyrics of a Taylor Swift song, U.S. Magistrate Judge Gail Standish noted, "the Court is not saying that [plaintiff] can *never, ever, ever,* get his case back in court…for the moment,

Defendants have *shaken off* this lawsuit;" similarly in another copyright infringement case involving Google and Oracle and the use of code from Java SE, U.S. Supreme Court Justice Clarence Thomas inquired whether taking the best football players of a rival team in effect meant turning over the team's playbook to achieve optimum player performance. When listening to oral arguments, reading court transcripts, and evaluating information communicated by expert/lay witnesses, as in the Johnny Depp vs. Amber Heard and Alex Jones trials, inflection, tone, gesture and non-verbal cues further assist in deciphering and interpreting law language.

Resisting Economies of Prestige with Translingual Soul Language Practices

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By centering anti-racist praxis and liberation literacies including fugitive speech, we hope to relish in finding power in technologies, in what we call "soul languages," uninhibited expression that harnesses ancestral legacies of freedom. We channel this hope into translingual anti-racist action in our classrooms through student derived (or guided) measures to tap into the power of liberation within ourselves, our legacies, and our communities. In doing so, we aim to dismantle the damaging economies of prestige that often undergird language standards and academia.

INTERDISCIPLINARY

Promoting STEM Learning Through a Multidisciplinary SENCER Framework at a Minority-Serving Institution

Diana Samaroo [1], Liana Tsenova [2], Sandie Han [3] and Urmi Ghosh-Dastidar [3]

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[3] Department of Mathematics

The Prospect Park Biodiversity project is a SENCER collaboration project between the Departments of Biological Sciences, Chemistry and Mathematics at the New York City College of Technology. The goal of this project was to enhance students' participation and learning in STEM disciplines through a civically engaged framework. The project utilized the eco-complexity of Prospect Park Lake in Brooklyn, NY for an interdisciplinary study on the water quality. The project involved ten students and four faculty mentors, integrated microbiology, chemistry and mathematics perspectives using active-learning pedagogies which include hands-on exploration and collaborative learning.
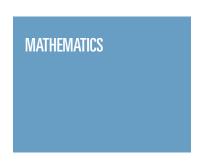
Building Capacity: Improving Undergraduate STEM Education by Enhancing Transfer Success

Pamela Brown [1], Benito Mendoza [2], Elizabeth Milonas [3], Mohammad Razani [4], Diana Samaroo [1], Hon Jie Teo [5] and Melanie Villatoro [6]

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Evidence-based practices were combined to reduce barriers to transfer from associate to baccalaureate programs, and baccalaureate degree completion. The first strategy was creation of the STEM Transfer Collaborative (STC), an adaption of the CUNY Pathways general education articulation initiative. The STC focuses on collaboration by both the sending and receiving college faculty to begin transfer preparation and support before transfer occurs, through articulation agreements, shared professional development to align pedagogy and curriculum, and outreach to potential transfer students. There was also regular feedback to community college faculty on the success of their transfer students. A second strategy employed was Momentum to the Baccalaureate (MB), an adaption of the CUNY Accelerated Study in Associate Programs, ASAP. MB provides support for junior and senior-level transfer students who are either community colleges associate degree graduates (external transfer) or City Tech's associate degree graduates (internal transfer). Components of MB include personalized mentoring, advisement, and monthly stipends to students who maintain full-time enrollment and good academic standing. Students' majors are in high needs STEM areas and include computer engineering technology, computer systems technology, construction management and civil engineering technology, electrical engineering technology, and applied chemistry. Propensity matching was used to evaluate the effectiveness of these strategies. Participating campuses include six community colleges – BMCC, BCC, GCC, HCC, KBCC and LaGCC.

Preliminary results suggest that targeted pre-transfer and post-transfer supports improve transfer student outcomes. Students who transferred from a City Tech associate degree program to a City Tech STEM baccalaureate program and who received MB support had higher GPAs and better retention rates than a matched cohort of students who transferred from a City Tech associate degree program to a City Tech STEM baccalaureate program who did not receive MB support. Students who transferred from a STC community college to City Tech's STEM baccalaureate programs who received MB support had significantly higher GPAs compared with a matched cohort of students who transferred from a STC community college to City Tech's STEM baccalaureate programs but who did not receive MB support.

Using Data Science Tools for Investigating Chat Logs from the Conti Ransomware Group

Boyan Kostadinov / Department of Mathematics

We showcase some results from a comprehensive analysis we did on the cache of chat logs from the notorious ransomware group Conti. We employ a variety of modern data science tools for text mining, natural language processing, network analysis and geospatial analysis to investigate the Conti chat logs so that we can understand the command and control structure of the Conti network and discover any valuable information hidden in the data, such as web, Bitcoin and IP addresses, and any other information that can lead to further insights into the inner workings of the Conti group. This research was conducted at the Criminal Investigations and Network Analysis (CINA) COE at George Mason University, June-August 2022, and under an appointment to the U.S. Department of Homeland Security (DHS) Science & Technology Directorate Office of University Programs.

Discovering Kepler's Third Law from Planetary Data

Boyan Kostadinov and Satyanand Singh / Department of Mathematics

In this data-inspired project, we illustrate how Kepler's Third Law of Planetary Motion can be discovered from fitting a power model to real planetary data obtained from NASA, using regression modeling. The power model can be linearized; thus, we can use linear regression to fit the model parameters to the data, but we also show how a non-linear regression can be implemented, using the R programming language. Our work also illustrates how the linear least squares used for fitting the power model can be implemented in Desmos, which could serve as the computational foundation for this project at a lower course level. This paper is based on our ICTCM 2020 talk with the same title. We included two NASA inspired student projects at the calculus level that were developed with the support of the Opening Gateways grant at New York City College of Technology. https://academicworks. cuny.edu/cgi/viewcontent.cgi?article=1772&context=ny_pubs

Introduction to Data Analysis for Prospective Mathematics Teachers

Nadia Kennedy, Boyan Kostadinov and Ariane Masuda / Department of Mathematics

We report on activities we designed to introduce prospective mathematics teachers to data analysis and visualizations, using the 2021 NYC DOE Middle School Directory. They are part of a research project focused on introducing computational thinking through data analysis and visualizations to our pre-service middle and high school mathematics teachers at City Tech. This effort is part of the CITE CUNY-wide initiative to integrate computing into teacher education and to bring accessible and culturally relevant computing to all K-12 students. We are in the process of developing hands-on coding activities aiming at preparing future educators to leverage computing and data literacies in their learning, teaching and professional lives. We also hope that these activities will inspire our pre-service teachers to pursue certification in Computer Science, which we want to develop in-house.

Universal Categories

Hans Schoutens / Department of Mathematics

When it looks like a duck, swims like a duck and quacks like a duck, then it is probably a duck. But what is the mathematical content of this truism, of this so-called `duck test'? In this poster, I will investigate, using notions from formal logic, when it is that something behaves like objects of a certain category, then it is actually a member of that category. A category with this property, I then call a universal category.

Heuristic Framework for Multi-Scale Testing of the Multi-Manifold Hypothesis on 3D LiDAR Point Clouds

F. Patricia Medina / Department of Mathematics

When analyzing empirical data, we often find that global linear models overestimate the number of parameters required. In such cases, we may ask whether the data lies on or near a manifold or a set of manifolds (a so-called multi-manifold) of lower dimension than the ambient space. This question can be phrased as a (multi-) manifold hypothesis. The identification of such intrinsic multiscale features is a cornerstone of data analysis and representation and has given rise to a large body of work on manifold learning. The workflow is suitable for empirical data analysis as we demonstrate on two use cases, one of them being a 3D LiDAR point cloud of the Golden Gate Bridge. This is joint work Linda Ness (Rutgers), Melanie Weber (Oxford), Karamatou Yacoubou Djima (Amherst College)

Permutation Binomials of the Form $x^r (x^{q-1}+a)$ over F_{q^e}

Ariane Masuda, Ivelisse Rubio and Javier Santiago / Department of Mathematics

The study of permutation polynomials over finite fields dates to the 1800s with the work of Hermite. Since then, many researchers have investigated them, not only because they are interesting on their own, but also due to their applications in areas such as coding theory, cryptography and finite geometry. Permutation monomials can be easily described. In the absence of a general and simple permutation criterion for binomials, permutation binomials have been the focus of many studies. As a matter of fact, most of the results on permutation polynomials concern permutation binomials as they already impose many challenges, despite their simple form. In this work we present several existence and nonexistence results for permutation binomials of the form $x^r (x^{q-1}+a)$ over F_{q^e}, where $e \geq 2$ and $a \in F^*_{q^e}$. As a consequence, we obtain a complete characterization of such permutation binomials over F_{q^2}, F_{q^3}, F_{q^4}, F_{p^5} and F_{p^6}, where p is an odd prime.

Magnetoexcitons in 2D anisotropic monolayers and van der Walls heterostructures

Anastasia Spiridonova and Roman Ya. Kezerashvili / Department of Physics

Direct and indirect excitons in Rydberg states in 2D anisotropic monolayers, bilayers, and van der Waals heterostructures (vdWHs) in an external magnetic field are studied within the framework of the effective mass approximation [1]. We use both the Rytova-Keldysh and Coulomb potentials for charged carriers interaction to analyze the influence of the screening on the studied phenomena. We report the magnetic field energy contribution to the binding energies and diamagnetic coefficients for magnetoexcitons that depend strongly on the effective mass anisotropy of electrons and holes. The comparative study of transition metal dichalcogenide (TMDC), transition metal trichalcogenides (TMTC), and phosphorene is given. In TiS_3, $TiSe_3$ and $ZrSe_3$ the excitonic binding energies and diamagnetic coefficients demonstrate the same kind of anisotropy as in phosphorene. In contrast, ZrS_3 has the opposite anisotropy to phosphorene. The tunability of the binding energy of direct and indirect magnetoexcitons by the external magnetic field and the possibility to control the binding energy of magnetoexcitons in vdW heterostructures by manipulation of numbers of hBN monolayers are demonstrated.

[1] R. Ya. Kezerashvili, A. Spiridonova, Phys. Rev. Res. 4, 033016 (2022)

Spectroscopic Signature of Strain-Induced Quantum Dots

Vitaliy G. Dorogan [1,2], Yu. I. Mazur [2], E. Marega Jr. [2], M. Benamara [2], G. G. Tarasov [2,3] and G. J. Salamo [2]

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Spectroscopic study of self-assembled InAs/GaAs quantum dots (QDs) capped with an $In_xGa_{1-x}As$ quantum well (QW) is carried out under variable excitation intensity and temperature. The QW reduces strain in the QDs. It is demonstrated that the cap layer shifts the transition energy of the QD lower, while maintaining the strong quantization of the QD electronic states. The structure of the QD electronic states reveals itself in photoluminescence as a series of excited state transitions at higher excitation intensity. An additional spectral band is also discovered below the energy of the InGaAs QW exciton, which is unambiguously assigned to the emission of a strain-induced QD layer created by the InAs stressors within the InGaAs QW.

Planes of Dwarf Satellites Around the Milky Way and its Neighbors: A Challenge to Cosmology or an Interaction with Cosmic Filaments?

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In the last decades, observations have confirmed the existence of rotating planes of dwarf galaxies orbiting around more massive hosts like the Milky Way or Andromeda. These peculiar arrangements of dwarf satellites have I ong puzzled astronomers and cosmologists. It has been suggested that they could be the sign of a major flaw in our model of cosmology.

In this poster, I will challenge this claim and show that these planes are more likely the result of the dynamics of gaseous cosmic filaments plunging into these halos. In particular, I will show that modern cosmological simulations are able to recover such planes with a high frequency and shed a new light on how luminous satellite galaxies distribute around their host, beyond the plane/no-plane dichotomy.

The Analytic Solution for the Motion of a Projectile in Presence of Quadratic Air Drag

A. Ferroglia [1] and M. C. Fiolhais [2]

[1] Department of Physics
[2] Department of Science, Borough of Manhattan Community College

Contrary to what one might naively expect, it is possible to find an analytic solution for the motion of a point-like projectile subject to gravity and quadratic air drag. This solution was (re-)discovered and explicitly written out by a high-school student in Germany, Shouryya Ray, a decade ago. In this poster, we show how to obtain an equation for the components of the projectile velocity as infinite series in powers of the time variable. The coefficients of the series can be obtained recursively. The coordinates of the projectile at a given time can then be obtained by numerical integration of the velocity components. The entire procedure can be implemented in a Mathematica code that ultimately plots the projectile trajectory.

On Charge-Dipole and Dipole-Dipole Interactions in Novel Materials

Roman Ya. Kezerashvili and Vladimir Ya. Kezerashvili / Department of Physics

Today the charge-charge interaction in two-dimensional configuration space is well known [1]. We study the influence of the reduction of dimensionality on the charge-dipole and dipole-dipole interactions in two-dimensional configuration space. We demonstrate that the screened nature of Coulomb interaction imposes peculiarities in the two-dimensional charge-dipole and dipole-dipole interactions behavior. The explicit analytical form for the charge-dipole and dipole-dipole interactions in two-dimensional configuration space is derived [2]. We demonstrate that the reduction of dimensionality can alter the charge-dipole and dipole-dipole interactions in two-dimensional case. The asymptotics of these interactions at large distances coincide to the charge-dipole and dipole-dipole interactions in three-dimensional configuration space. This means that at large distances the charge-dipole

interaction in a two-dimensional configuration space is the same as in vacuum in three-dimensional configuration space. The obtained charge-dipole and dipole-dipole interactions will find wide application and contribute to the advancement of research on novel two-dimensional materials.

[1] L. V. Keldysh, JETP Lett. 29, 658 (1979).
[2] R. Ya. Kezerashvili, V. Ya. Kezerashvili, Phys. Rev. B 105, 205416 (2022).

Time Crystals for Exciton Polaritons in a TMDC Nanoribbon Embedded in an Optical Microcavity

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We investigated the dynamics of a Bose-Einstein condensate of exciton-polaritons in a nanoribbon of transition metal dichalcogenides (TMDCs), such as $MoSe_2$, embedded in a microcavity in the presence of an external periodic potential. We have shown that the system exhibits signs of a time crystalline phase. We have demonstrated that this phase prevails even as the width of this ribbon is increased to infinity. This was demonstrated by the fact that the calculated polariton spatial density profile is characterized by self-sustained oscillations over time. This polariton density profile was calculated by solving the quantum Lindblad master equation for the density matrix within the mean field approximation. We also go beyond mean-field and consider the first-order correction due to the addition of quantum noise and show that our results still hold even in this regime. This novel time crystal (TC) has the advantage of being, in principle, achievable even at room-temperature.

First row l to r:
**Roman Kezerashvili,
Hans Schoutens**

Second row l to r:
**Vitaliy Dorogan
Andrea Ferroglia**

Third row l to r:
**Caroline Chamberlin Hellman
Nadia Stoyanova Kennedy**

Fourth row l to r:
**Alexander Rozenblyum
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