11.21.2019
12:30-4:00 pm

New Academic Complex
Lobby

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

17th ANNUAL

POSTER SESSION

BIOLOGY AND HEALTH SCIENCES	BUSINESS	CHEMISTRY
COMPUTER ENGINEERING AND INFORMATION SYSTEM TECHNOLOGY	EDUCATION	ENGINEERING AND ARCHITECTURAL TECHNOLOGY
HUMANITIES, SOCIAL SCIENCES AND ENGLISH	INTERDISCIPLINARY	LAW AND PARALEGAL
LIBRARY	MATHEMATICS	PHYSICS

WELCOME AND GREETINGS
NEW ACADEMIC COMPLEX. ROOM A105

1:00 pm–1:10 pm

Dr. Russell Hotzler
President

Dr. Bonne August
Provost

1:10 pm–1:35 pm

Selected 1 Minute Poster Presentation by Faculty

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.

SELECTED 1 MINUTE POSTER PRESENTATION BY FACULTY

1 **Subhendra Sarkar**, **Anthony DeVito**, **Faisal Khosa** and **Evans Lespinasse**. A Quantitative Trend Analysis of Emergency Service Usage in USA – Age, Geographic Region, Race and Gender Considerations.

2 **Alyssa Daana Adomaitis** and **Diana Saiki**. Sexuality and Brand Personalities in Luxury Fashion Advertisements.

3 **Rachel Raskin**, **Joseph Foy**, and **Frimette Kass-Shraibman**. The Daily Deal Sales Tax Trap: What Practitioners Need to Know to Guide Clients.

4 **Anita Giraldo**, Democracy Spoken Here: Message, Typography and Politics.

5 **Ivana Radivojevic Jovanovic**, **Colleen M.B. Gallagher**, **Benjamin P. Burton-Pye**, **Donna McGregor**, **Wayne W. Lukens, Jr.**, **Lynn C. Francesconi**. Strategies for the Photoreduction of Tc-99 Pertechnate to Low Valent Tc by Keggin Polyoxometalates.

6 **Jorge Rojas**, **Terence Cox**, **Christian Cheel** and **Aparicio Carranza**. Data Science Applications in Cardiovascular Field of Medicine.

7 **Mary Tedeschi**. Patterns for Ethical Decision Making in Information System Security.

8 **M. Genevieve Hitchings**. Exploring the Role of Information Design in Visualizing Science.

9 **Fangyang Shen**, **Janine Roccosalvo**, **Andrew Douglas**, **William Roberts**, **Nadia Kennedy**, and **Kendra Guo**. E-NEST: STEM Teacher Education Program.

10 **Karen Goodlad**, **Anna Matthews**, **Jason Montgomery**. Building an Institutional Culture of General Education: A Multidisciplinary Blueprint.

11 **Melanie Villatoro**, **Mery Diaz**, **Ruth Garcia**, and **Benito Mendoza**. What Does It Mean To Be a Hispanic Serving Institution at City Tech?

12 **Euisuk Sung**. Developing Spatial Analysis Tool to Examine Student-Teacher Interactions in Making.

13 **Diana Samaroo**, **Mai Zahran**, **Andrew Wills**, **Johnny Guevara** and **Alexandra Tatonetti**. Experimental and Computational Studies of Glycosylated Photosensitizers with Albumins.

14 **Marissa J. Moran**. The Promise & Challenges of Artificial Intelligence as Applied to Law.

15 **Nandi Prince**. Examining Student Learning Encounters: Teaching Information Literacy and Cultivating a Culturally Responsive Classroom.

16 **Nora Almeida**, **Junior Tidal**, and **Kimberly Abrams**. Get With The Go-Pro(Gram): How Esol Students Explore a Library.

17 **Nadia Benakli**, **Ezra Halleck**, **Sandra Kingan**. k-Neighborhood Degrees of a Graph.

18 **Patrick Serafin** and **German V. Kolmakov**. Polariton Optical Transistor Based on a Transition Metal Dichalcogenide Heterostructure Embedded in an Optical Microcavity at Room Temperature.

19 **Paolo Aime**, **Marco Gajeri**, **Roman Ya. Kezerashvili** and **Giancarlo Genta**. Design Interstellar Trajectories Using Direct Fusion Drive.

20 **Ariyeh H. Maller** and **IQ Collaboratory**. The Influence of Neutral Gas on the Star-forming Sequence.

POSTER SESSION

12:30 pm-4:00 pm
New Academic Complex
Lobby

Table Number/Presentation

BIOLOGY AND HEALTH SCIENCES

1 Liana Tsenova, Stephanie Cabrera and Eugenia Pierre. What is Celiac Disease and How Is It Affected by Gluten Free Diet?

2 Bridget Maley. Academic Misconduct In AD Nursing Students.

3 Mercer R. Brugler, Michael Tessler, John A. Burns, Nina R. Sinatra, Daniel M. Vogt, Anand Varma, Madelyne Xiao, Robert J. Wood, and David F. Gruber. The impact of an Ultra-gentle Soft Robot on Jellyfish Transcriptomic Response During Handling.

4 Susan Davide. Course Coordination Liaison - What's That All About?

5 Subhendra Sarkar, Anthony DeVito, Faisal Khosa and Evans Lespinasse. A Quantitative Trend Analysis of Emergency Service Usage in USA – Age, Geographic Region, Race and Gender Considerations.

6 Subhendra Sarkar, XiangFu (Richie) Zhang and Mary A. Browne. Modeling Injuries to Midbrain Structures to Explain Brain Tissue Abnormality and Other Health Effects after Mild Traumatic Brain Injury.

BUSINESS

7 Robert L. Woods. Those Who Quit: A Study of Student Retention at Two-Year Community and for-Profit Colleges.

8 Alyssa Daana Adomaitis and Diana Saiki. Sexuality and Brand Personalities in Luxury Fashion Advertisements.

9 Nazanin Hedayat Munroe. Haft-Rang : Color Symbolism in Nizami's Haft Paykar (Seven Beauties) as Inspiration for Safavid Textiles.

10 Rachel Raskin, Joseph Foy, and Frimette Kass-Shraibman. The Daily Deal Sales Tax Trap: What Practitioners Need to Know to Guide Clients.

11 Anita Giraldo, Democracy Spoken Here: Message, Typography and Politics.

12 Devon M. Jackson, Alyssa Dana Adomaitis. Redefining Gender with the Influence of New Fashion Collections.

CHEMISTRY

13 Ivana Radivojevic Jovanovic, Colleen M.B. Gallagher, Benjamin P. Burton-Pye, Donna McGregor, Wayne W. Lukens, Jr., Lynn C. Francesconi.. Strategies for the Photoreduction of Tc-99 Pertechnetate to Low Valent Tc by Keggin Polyoxometalates.

14 Alberto Martínez, and Gabriel Ortiz. Interaction of Multi-Target Compounds with Human Serum Albumin.

COMPUTER ENGINEERING AND INFORMATION SYSTEM TECHNOLOGY

15 Palo Nikci and Aparicio Carranza. A New Outlook to Virtual Realm of Computing via Virtualization.

16 Cristhian Urgiles, Rabia Arif, Piankhi Wade and Aparicio Carranza. Data-Based Empowered Website.

17 David Oppong, Yehia Sadek, Rolando Barredo, Reynaldo Cabral and Aparicio Carranza. Javascript nn Web Development for Social Platform.

18 Housney Ahmed and Aparicio Carranza. Probing of File Sharing via Point-to-Site Azure Vpn.

19 Rolando Barredo and Aparicio Carranza. Routing and Networking with Microsoft Azure.

20 Alvin Li, Mohammad Rahaman, Kevin Chin and Aparicio Carranza. IoT GPS Tracker for Bike Users.

21 Jorge Rojas, Terence Cox, Christian Cheel and Aparicio Carranza Data Science Applications in Cardiovascular Field of Medicine.

ABSTRACTS OF PRESENTATIONS

BIOLOGY AND HEALTH SCIENCES

What Is Celiac Disease and How Is it Affected by Gluten Free Diet?

Liana Tsenova, Stephanie Cabrera and Eugenia Pierre / Biological Sciences Department

Celiac disease (CD) is one of the most common diseases, resulting from both environmental (gluten) and genetic factors. One in 100 people worldwide is affected by CD and 30% of these individuals still have symptoms even being on a Gluten Free Diet (GFD). The current study was accomplished through extensive literature search with the aim to fully understand the effect of GFD. Celiac Disease is an autoimmune condition in which gluten damages the mucous membrane of the small intestine. Gliadins and glutenins are the two main component of the gluten fraction of the wheat seed. An overview on CD is provided describing the pathogenesis, symptoms and treatment of the disease. The study focuses on the effects of GFD on the immune system and the intestinal flora in individuals with CD.

Academic Misconduct In Ad Nursing Students

Bridget Maley PhD,RN / Nursing Department

Academic misconduct is a growing national and global concern. There is a paucity of literature on academic misconduct in nursing. Among the research studies that have been conducted, all but one were quantitative. The purpose of this study is to gain a deeper understanding of AD nursing students' experiences with academic misconduct during their nursing education. This study utilizing the qualitative method of narrative inquiry was utilized to address the research question: What are the stories of Associate Degree nursing students with academic misconduct experiences during their nursing education? This sample included five volunteer research participants who were current associate degree nursing students, focusing on their experiences of academic misconduct. Four themes emerged in the analysis: Theme #1: Rules: Perception of rules unfulfilled, Theme #2 Fear of failing greater than fear of getting caught, Theme #3 Solidarity: treat others as I want to be treated, and Theme #4: Success or failure: Cheating throughout the program; you may only be cheating yourself. The study gave voice to students' stories of academic misconduct. Participants in the study revealed intimate stories of their experience with academic misconduct. The stories contribute to a deeper understanding of associate degree nursing students' experience with academic misconduct. The findings of the study has implications for future research, nursing education, and practice which may lead to further research.

The Impact of an Ultra-Gentle Soft Robot on Jellyfish Transcriptomic Response During Handling

Mercer R. Brugler [1,2,§], Michael Tessler [1,§], John A. Burns [1,3], Nina R. Sinatra [4,5], Daniel M. Vogt [4,5], Anand Varma [6], Madelyne Xiao [1], Robert J. Wood [4,5], and David F. Gruber [1,7,8]

[1] Department of Invertebrate Zoology, American Museum of Natural History, [2] Biological Sciences Department, NYC College of Technology, [3] Bigelow Laboratory for Ocean Sciences, East Boothbay, Maine [4] Wyss Institute for Biologically Inspired Engineering, Harvard University, [5] Harvard John A. Paulson School of Engineering and Applied Sciences, Harvard University, [6] National Geographic Society, Washington, D.C., [7] Baruch College, City University of New York, Department of Natural Sciences, [8] The Graduate Center, PhD Program in Biology, City University of New York, [§] Co-first authors

To better study fragile and long-lived deep-sea marine species, engineers recently developed biologically-inspired soft robotics and other "delicate" handling devices. Soft robotic grippers are presumed to better maintain physiological homeostasis and lower stress compared to traditional rigid robotic devices. Herein we test whether novel, ultra-gentle soft robotic fingers induce less transcriptomic change to a jellyfish compared to handling with a rigid gripper. We report differences in gene expression among treatments after only one minute, a time chosen to reflect a realistic collection time in the abyss. Relative to the control, differentially expressed transcripts (DETs) in the rigid claw-grab (28↑; 27↓) and high-stress (92↑; 29↓) treatments were more abundant than the soft robotic fingers (11↑; 15↓). While DET counts are comparatively low, the treatment time was substantially shorter than most DET studies. An example of a notable early induced DET from the claw-grab and high-stress treatments (but not the soft robotic fingers) was a death domain-containing adapter protein (triggers apoptosis). This is the first study to quantify the transcriptomic response in a jellyfish in relation to handling methods. As these ultra-gentle soft robotic fingers produced fewer DETs during handling, these actuators may also be relevant to other sensitive applications (medical micromanipulation).

Course Coordination Liaison - What's that All About?

Susan Davide, RDH, MS, MSEd. / Department of Dental Hygiene

The purpose of a Course Coordinator Liaison (CCL) is leading course-level improvement of student learning and the student experience in the respective area of study. Working with course instructors, other members of the department, fellow liaisons, deans, members of the Gen Ed and Assessment Committees and others to evaluate course content, course materials and pedagogical

practices, and implement, reassess, and share effective course coordination practices. Since the inception of an evening program, the department has experienced a significant growth in faculty, particularly part-time/adjunct instructors. On-site workshops have limitations and/or nonattendance by adjuncts, so an alternative means was to offer specific topic workshops designed and available to all faculty using the college's Blackboard digital platform. The CCL coordinated with a full-time faculty member to present a topic subject in a PowerPoint Presentation accompanied with a pre- and post-survey quiz to determine background knowledge. During the Spring 2017 semester, the first workshop was developed and launched, allowing all faculty members to complete it on their own time and off-campus. More than half of faculty participated and were pleased to have the ability to complete this workshop on their own time and in the comfort of their home. This alternative format facilitates faculty calibration and has been implemented on an annual basis with a continued increase in faculty participation rates and currently offered during fall and spring semesters. Offering alternative approaches to disseminate new topics and updates to faculty proves to be effective and well received from post-workshop survey questionnaires. Coordination and use of your institutions digital platform may be an innovative consideration for dental programs to provide professional development that is accessible for all members in effort to have knowledge in current education theory and concepts, relative to subjects taught and applied throughout clinical care in effort to maximize cohesive student instruction.

A Quantitative Trend Analysis of Emergency Service Usage in USA – Age, Geographic Region, Race and Gender Considerations.

Subhendra Sarkar[1], Anthony DeVito[1], Faisal Khosa [2] and Evans Lespinasse[1]
[1] Department of Radiologic Technology & Medical Imaging, NYC College of Technology
[2] Department of Radiology, University of British Columbia, Canada

Emergency Department (ED) services are utilized by more than 100 million Americans every year and therefore ED usage trends are important determinants of healthcare quality, patient outcomes and current healthcare costs. A meta-analysis of Federal and State statistics and 12 publications from 2010-2018 on ED utilization from 2010-2016 was performed in this work; some of the original findings are as follows: Regional ED usage is primarily similar across US except in Mid-west where ED use exceeded significantly. ED usage depended on patient age; children and elderly follow different patterns than the young adults and middle aged. Usage difference between black and white Americans and between male and female were also significant. These findings can serve to improve policy ED and resource allocation.

Modeling Injuries to Midbrain Structures to Explain Brain Tissue Abnormality and Other Health Effects after Mild Traumatic Brain Injury

Subhendra Sarkar, XiangFu (Richie) Zhang and Mary A. Browne / Department of Radiologic Technology & Medical Imaging, NYC College of Technology

Traumatic brain injury (TBI), particularly mild concussion/TBI is quite prevalent in the United States. Sleep disorder and often depression, memory loss, and other cognitive deficits are known to be associated with mild TBI. Yet, the cause and consequence of most of these disorders are unknown. The objective of this project is to gather findings from multiple neurobiology and imaging literature to construct suitable theoretical models to relate imaging findings in the temporal lobe, particularly in the thalamus. We hypothesized that injury or functional deficits of thalamic structures controlling sleep may be most logical for such research since those are concentrated in thalamus while structures for memory, depression and cognition are believed to be distributed in the whole brain. We also find that after mild head trauma there is little or no detectable damage to physical structures of brain tissue and one may look into physiological or metabolic deficiencies and correlate with severity. Our model argues that the linear and rotational inertial forces may affect microscopic vasculatures and thus reduce the perfusion in the thalamus without being detected by macroscopic imaging, for example, by CT or MRI that are sensitive to significant cell loss or structural deficits. Our model takes a global connectivity approach and differs from models of abnormal isotope distribution as in PET or SPECT due to local damage to cell membranes.

BUSINESS

Those Who Quit: A Study of Student Retention at Two-Year Community and for-Profit Colleges

Robert L. Woods / Department of Business

Much of the existing retention literature on post-secondary education has centered around traditional four-year institutions. This study provides insight into how to help two-year college officials better understand their students, their mission, and persistence measures at their colleges. Tinto's Longitudinal Model of academic and social integration was systematically combined with Bean and Metzner's retention model on non-traditional students to guide this study. A two-stage procedure consisting of descriptive analysis, and regression analysis was performed on all factors to determine their significance in predicting successful retention at the end of the first college year. Students attending two-year institutions are different from traditional students in four-year institutions, thus the results of the study are vital for improving the retention efforts and systems at two-year institutions.

Little is known about the degree to which previously established variables such as age, gender, race, education of parents; socio-economic status, enrollment as a full or part-time student, GPA, or college majors impact non-traditional students' intent to persist in both academic institutions. This study adds to the literature by creating a student persistence model utilizing data surrounding the variables particular to underrepresented populations of students who attend two-year colleges. By investigating the overall influences of these students' demographic background, grade point averages, and financial situations, meaningful dialogue can then be initiated that will enhance the persistence rates at two-year Community and for-profit colleges.

Sexuality and Brand Personalities in Luxury Fashion Adverstiements

Alyssa Daana Adomaitis & Diana Saiki / Department of Business

According to Shields and Heinecken (2002, p. 34) "images of ideal bodies, most often female bodies, are some of the most dominant and consistent images produced by advertisers." Playing on individuals' emotions when they view advertisements will affect their hedonic or pleasure attitudes. Retailers produce hedonic advertisements to appeal to the consumers' emotions, in order for the consumer to purchase their products (e.g., Wiedmann, Hennigs, & Siebels, 2007). Luxury brands are known to produce such advertisements to market their companies. These name brands are already synonymous with prestige and high quality, but also sex and pleasure (Thomas, 2007). Whatever the behavioral response, the individual will react to the advertisement causing them to make a decision about the brand. Reactions to sexuality in advertisements are important to understand to determine its impact on consumers.

Brand identity, refers to how the company presents its brand to consumers (Keller, 2008). The identity of the brand, which includes reflection on consumer image and self-image or how the consumer feels, is depicted to a receiver within the context of a culture. Researchers have noted that consumers place human personality characteristics on brands (Fournier, 1998) such as the "Big Five" dimensions that include emotionality, openness and intellect, culture, rebelliousness, and unconventionality (e.g. John & Srivastava, 1999). Differences in responses to advertisements have been found among males and females.

Haft-Rangī: Color Symbolism in Nizami's Haft Paykar (Seven Beauties) as Inspiration for Safavid Textiles

Nazanin Hedayat Munroe
Business Department/Business & Technology of Fashion

The poetry of Nizami Ganjavi (d. 1209) inspired a prolific response in the visual arts of the Early Modern period in Iran. Color symbolism in textiles, particularly luxury wovens used for apparel, reflect the familiarity of artists and patrons with Nizami's mystical color interpretation in his eloquent treatise, *Haft Paykar*, a frame story in his quintet, the *Khamsa*. In *Haft Paykar*, Nizami narrates the story of a Sasanian king who visits seven princesses in their respective pavilions identified by color, material, and the astrological significance of the seven days of the week. As the princesses relate their own tales, the king learns the significance of each color. The *Khamsa* was reproduced in several illustrated manuscripts during the Safavid period (1501-1722) and was well known among royal and elite patrons. This study explores the connection between Nizami's color symbolism, luxury textile production, and the underlying relationship of artists and patrons to his Sufi treatise.

The Daily Deal Sales Tax Trap: What Practitioners Need to Know to Guide Clients

Rachel Raskin / Department of Business, Joseph Foy / The CUNY School of Professional Studies, Frimette Kass-Shraibman / Brooklyn College

The daily deal industry is a $6 billion dollar industry (IBISWorld, 2019) and Groupon, the most prominent daily deal firm, has over 47 million customers that have purchased over 1.5 billion deals thereby infusing more than $20 billion into local businesses as of 2019. The Groupon mobile device application is one of the top three most visited retail applications (Groupon 2019). Despite the popularity, business owners may face complexity and uncertainty when it comes to assessing and collecting tax on these deals. Anecdotal evidence suggests an inherent flaw exists with communication between merchants and the daily deal business with respect to the actual price paid by the consumer for daily deals. Thus, merchants may be unwittingly and systematically overcharging sales tax to many consumers which may result in litigation, compliance issues, and reputational damage to the merchant and the merchant's accountant. Practitioners must be knowledgeable of the daily deal mechanics and the sales tax complexities surfacing from the sale and redemption of such vouchers to be able to appropriately advise their clients.

DEMOCRACY SPOKEN HERE: Message, Typography and Politics

Anita Giraldo, / Communication Design Department

"DEMOCRACY SPOKEN HERE: Message, Typography and Politics" is a typographic art piece, funded by the CUNY Research Foundation. Since the research started for this project was exhibited at the 14th Poster Session, a number of art works have been completed, which are planned for exhibition in this year's session.

The Poster Session will show original works, along with the print methods that produced them—an amalgam of digital and analog design, production and print methods.

Redefining Gender with the Influence of New Fashion Collections

Devon M. Jackson, Alyssa Dana Adomaitis / Business and Technology of Fashion

Arguably, the outward expression of individuality has begun with the way one dresses. In recent times, the parallel between the new gender identities and the latest fashion collections has propelled cultural change as non-traditional ready-to-wear classifications are integrated into men and womenswear collections. One of these cultural changes influenced by fashion is identity and its relation to gender. As the relationship between fashion and identity evolves, the perception of identity and gender are examined. What is gender? How is gender defined? How is gender communicated? How has gender and identity been portrayed in fashion media through advertisements, celebrity/influencer, and in runway presentations?

CHEMISTRY

Strategies for the Photoreduction of Tc-99 Pertechnetate to Low Valent Tc by Keggin Polyoxometalates

Ivana Radivojevic Jovanovic[1], Colleen M.B. Gallagher[2], Benjamin P. Burton-Pye[3], Donna McGregor[2], Wayne W. Lukens[4], Jr., 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.

Technetium-99 (^{99}Tc) is a radioactive contaminant with a half-life of 2.1×10^5 years and is a weak beta emitter with a β_{max} energy of 0.29 MeV. When exposed to air, ^{99}Tc is most prevalent in its oxidized (Tc(VII)) form, which exists predominantly as pertechnetate (TcO_4^-). The immobilization of ^{99}Tc in the environment has usually been achieved via reduction of the prevalent TcO_4^- anion to relatively insoluble TcO_2 species. We have been studying the use of small metal-oxide clusters called Keggin polyoxometalates (POMs) ($XM_{12}O_{40}^{n-}$) (X= P, Si, Al, n=3, 4, 5) to act as both reducing agent and stabilizing agent of reduced species of ^{99}Tc upon UV irradiation. The work described herein is a fundamental study designed to understand the reduction of TcO_4^- to lower valent Tc species by photocatalytic means. The examination of Keggin POMs to photocatalytically reduce TcO_4^- will lead to investigation of solid-state materials for photocatalytic reduction of TcO_4^-.

Interaction of Multi-Target Compounds with Human Serum Albumin

Alberto Martínez, Gabriel Ortiz / Department of Chemistry, NYC College of Technology

The distribution, excretion, activity and toxicity of a drug are determined, at least in part, by its interactions with serum proteins. Human serum albumin (HSA), the most abundant blood plasma protein, reversibly binds pharmaceuticals, mainly at the hydrophobic cavities of subdomains IIA and IIIA. In previous work, a family of multi-target compounds have been synthesized and studied for their potential in fighting against important aspects of Alzheimer's disease. As part of our ongoing investigations on the biological activity of these potential drugs, we are now exploring possible transport mechanisms, in comparison with resveratrol, a polyphenol that has completed phase II clinical trials in Alzheimer's disease. We have studied the interaction of these multi-target compounds with HSA through fluorimetric titrations and circular dichroism (CD). Analysis of results suggests static quenching and protein-compound adduct formation displaying binding affinities in the range 10^4 to 10^6 M^{-1}. CD experiments show slight or no modifications on the secondary structure of the protein. Overall, our results seem to indicate that there is a compound-protein interaction which could have a potential impact on transporting properties of the multi-target compounds.

COMPUTER ENGINEERING AND INFORMATION SYSTEM TECHNOLOGY

A New Outlook to Virtual Realm of Computing via Virtualization

Palo Nikci and Aparicio Carranza / Computer Engineering Technology

We have entered into a new technological era in computing, where computers have not only outperformed their predecessors, but have made computing infrastructure obsolete. It is called virtualization, which is the umbrella term for all things encompassing cloud computing, virtual machines, and IoT. In layman terms, virtualization is the process by which any IT professional, usually in Enterprise environments, uses a very powerful supercomputer, often called a server, to minimize and more efficiently utilize the resources of the physical computing infrastructure, by leveraging their highly-capable servers. We have focused our effort on High Availability (HA), a technology that allows a server to replicate itself in real time. Technologies such as VMware's ESXi platform, Red Hat's Virtualization platform, and Amazon's Web Services (AWS) have been used to bring to the audience about the possibilities available with virtualization, specifically when it pertains to Enterprise level applications as seen in the corporate world.

Data-Based Empowered Website

Cristhian Urgiles, Rabia Arif, Piankhi Wade, Aparicio Carranza / Computer Engineering Technology

Servers have been used as innovative technology to develop programs and data-based websites. These servers are namely the Apache HTTP Server, MySQL Database server and PHP Engine. Apache is fast, reliable, and secure. It can be highly customized to meet the needs of many different environments by using extensions and modules. PHP is a scripting language that is especially suited to server-side web development; and generally runs on a web server. Web servers are mostly developed by examining databases and contribute to MySQL servers. Our goal is to create a data-based website by connecting MySQL database to the web using Apache Webserver and PHP Engine. Our integrated-module will handle PHP scripts from our website and have MySQL collect data and save into the server database.

Javascript In Web Development for Social Platform

David Oppong, Yehia Sadek, Rolando Barredo, Reynaldo Cabral, Aparicio Carranza / Computer Engineering Technology

Social media has been the biggest achievement from the late 1990s until now since blogging websites were developed in order to network with a niche audience. Facebook, Twitter, Instagram, and other social media platforms are examples with individual markets of their own. We develop a social media web application that will inspire gamers to upload game reviews, create meetups, and a safe way for gamers to buy, sell, and trade games. The front-end will use React.js and Bootstrap to create the structure of the web page to implement a login/sign-up page, profile page, and a news feed that consists of posting reviews/pictures, create an online shop to buy, sell, and trade games, and also create meetups. We create a database with MongoDB to store the account credentials of usernames and passwords with Node.js as our backend.

Probing of File Sharing via Point-to-Site Azure Vpn

Housney Ahmed and Aparicio Carranza / Computer Engineering Technology

Cloud networking can be seen as a virtual online infrastructure, in which the number of hardware components can be minimized, resulting in cost-effective projects. Cloud Virtual Private Network (CVPN), a form of cloud networking, offers a virtual connection between private networks using a public network such as the Internet. VPN uses tunneling, secure protocols, encryption, and authorization for data transfer. We have implemented a Point-to-Site Cloud VPN using Microsoft Azure to share, access, and control remote resources such as cloud storage. The cloud storage is accessed by Cloud Virtual Machines, where clients access using RDP (Remote Desktop Protocol). In order to connect a client computer to the VPN gateway, the client and root certificates need to be created to establish VPN authentication. We have also explored the network protocols and the security level as used in VPNs.

Routing and Networking with Microsoft Azure

Rolando Barredo and Aparicio Carranza / Computer Engineering Technology

Cloud computing is the concept of using offsite resources like computer systems, storage, servers and networks to provide services. Cloud computing concept has been knwon since the 1960s, and the physical platforms for cloud computing have been available since the early 2000's. We can use the cloud to provide Applications, Platforms and Infrastructure as a Service (AaaS, PaaS, IaaS). Cloud Service Providers (CSP) include Microsoft Azure, Amazon Web Services (AWS), Google Cloud Platform (GCP) and others. We have used Microsoft Azure to implement a networking

solution in the cloud. The use of the cloud for routing and networking falls under the category of an Infrastructure as a Service. Cloud versus local implementation of networking and routing have been compared and contrasted.

IoT GPS Tracker for Bike Users

Alvin Li, Mohammad Rahaman, Kevin Chin and Aparicio Carranza / Computer Engineering Technology

Internet of things (IoT) are computing devices that can be used in everyday objects. These could be cellphones, coffee makers, washing machines, headphones, lamps, cars, etc. With the improvements of WiFi and the limitless amount of Internet bandwidth, any kind of household item can be used from a user's phone and/or computing systems. Sherlock, a startup in Italy, connects GPS to the IoT network and allows the user to track their bicycle if it is ever stolen or lost. The advanced tracing can benefit bicycle owners protect their bikes from theft and any changes made to the bicycle will immediately alert the owner. We have developed/implemented a tracker system with a GPS and IoT devices that provide solution when connected to the IoT cloud services which helps locate and track all over a given area for a bike owner.

Data Science Applications in Cardiovascular Field of Medicine

Jorge Rojas, Terence Cox, Christian Cheel and Aparicio Carranza / Computer Engineering Technology

The medical field has always been an integral part of humanity's survival. The extensive amount of research and development in medical technology has furthered the life expectancy of many individuals. Although many advancements have been made, the medical field still faces many challenges today. Every year in the U.S alone there have been over 610,000 cases of cardiovascular diseases reported to medical personnel. Most reported cases are first time occurrences, unbeknownst to the individuals themselves. Our effort is to record data about blood pressure in various individuals, since this data can reveal the trends in heart-related issues and conditions that may arise in some people. We will use a microcontroller, a pulse oximeter/Heart-Rate sensor, and a data collection site (i.e. Thing-speak) to collect the Pulse Transit Time (PTT) from multiple individuals. From the recorded PTT, we approximate the blood pressure conditions in people incorporating various methods used in Data Science.

Data Science in Action

Jorge Rojas, Dillen Pantua, Bryan Taylor, Ruposri Bhowmic and Aparicio Carranza / Computer Engineering Technology

Data Science is used in various areas of concentration that implements scientific methods and algorithms to come up with solutions to real world problems. These components utilize strategies drawn from numerous fields inside the setting of arithmetic, clustering, probability and classification

to show the significance of data. Several programming languages are readily available to be used in Data Science analysis nowadays; the three most popular languages used are Python, R and SQL, also Microsoft Excel and KINME are good computer applications for Data Science. We will perform analysis on data collected and obtained from the New York City Police Department, available as Excel files that will be read into MySQL format for subsequent manipulation, determination and interpretation using D3.js -topojson to render a map that represents the crime rate of New York City. Furthermore, our effort is aiming to recommend where more police presence is needed.

Facial Recognition Software Implementation Into Home Security

Ricky Basantes and Aparicio Carranza / Computer Engineering Technology

Today's technology has made great impact on humans worldwide. Smart phones and personal computers have become very sophisticated that are able to incorporate Artificial Intelligence (AI) and Machine Learning (ML) into these devices. Dependence on these technologies has grown greatly because oversimplifies people's lives. To prevent the locked out from homes due to losing a key, we will implement a facial recognition lock giving the user peace of mind when leaves home in a rush or simply misplaced the keys. To implement the facial recognition software we will be using the Microsoft Face API, a facial recognition service used to detect and compare human faces and organize them based on similarities and a Raspberry Pi to control the mechanism to unlock the door when the correct face is detected.

Algorithmic Trading Using Python and Quantconnect

Arooba Sohail, Hamza Hamed, Yiyi Luo and Aparicio Carranza / Computer Engineering Technology

Financial markets have been a corner stone of humanity. In the ever-present postmodern era, these markets have evolved, shifted and became heavily robust in the amount of information given and opportunities for individuals (traders) as well as the ease and simplicity with which one can maneuver around these markets. Algorithmic trading is one such way where traders and institutional investors dominate the pricing models and capitalize on market fluctuations. Using various technical and fundamental indicators and strategies, traders can capitalize on history and price action to predict future movements as well as help them increase the chance of their trades working. Algorithmic traders use large amounts of data and can manipulate that data using a coding language to help automate their trading process. We highlight key principles and strategies of modern trading such as moving average crossovers and price breakouts to determine if the trade is justifiable, we also showcase the algorithmic trading using python and QuantConnect, a multifaceted algorithmic trading platform used to back test and manipulate data.

A 'Look' at Blockchain Technology

M. Pinto / Computer Systems Technology Department

Blockchain technology is being used in business transactions, in management of personal identity in the digital world, in automated governance, in management of stock markets, etc. In blockchain technology the data is being disclosed differently, secured differently and recorded differently. Blockchain technology creates a viable, decentralized record of transactions – the distributed ledger – which allows the substitution of a single master database. It keeps an immutable record of all transactions, back to the originating point of a transaction. This poster presents an application of such a technology as a foundation for further investigation of the properties of this revolutionary technology.

Patterns for Ethical Decision Making in Information System Security

Mary Tedeschi / Computer Systems Technology Department

According to Ralph Johnson, "Patterns are supposed to describe reality, not invent new ones". Identifying patterns in information security ethics has the potential to create better Internet security. The Internet is not an ethically secure place and has no known ethical security patterns associated with it. Ethical decision making helps improve cyber security. Patterns are primarily about solutions, but understanding the problem is vital. In this paper, we demonstrate how we created several ethical patterns based on teaching an introductory course in computer security.

The Privacy Preserving Framework with Virtual Ring and Identity-Based Cryptography for Smart Grid

Yu-Wen Chen and Leonard Sutanto / Computer Systems Technology Department

One of the main challenges in the smart grid is how to efficiently manage the high-volume data from smart meters and sensors and preserve the privacy from the consumption data to avoid potential attacks (e.g., identity theft) for the involved prosumers, retail electricity providers and other clusters of distributed energy resources. This poster proposes a two-layer framework with the cloud computing infrastructure. The virtual ring and identity-based cryptography are utilized in each layer to preserve privacy efficiently. The methods of the virtual ring and identity-based cryptography are introduced. The purposes and needs are also discussed at the end of this poster.

Video Game Designing and Hack Prevention

Steven Gangaram, Emmanuel Boateng, Jigmey Dorjee and Aparicio Carranza / Computer Engineering Technology

As technology advances and becomes widely available, more people are capable of accessing Internet based games. These games are free to play, competitive, player versus player online based games. Throughout these games with monetary rewards, many players seek hacking and exploiting as a way of gaining an unfair advantage over fair players. In order to overcome this, game designers try to implement anti-hack techniques for trying to prevent hacking all together such as preventing the game from loading if any malicious mods are detected or placing permanent blocks on player profiles preventing them from playing the game altogether. We have designed our video game to test for exploits and potential points of hacking. Our solution has the following components: Android based game app using java, a hack prevention tool for the game, and countermeasures to detect weak points of the Application (App).

Exploring the Role of Information Design in Visualizing Science

M. Genevieve Hitchings / Communication Design

Science is full of captivating and complex ideas that are puzzling to non-expert audiences. What is familiar and intuitive to scientists with specialized knowledge is often unintelligible to the average person. Ineffective communication of consequential scientific discovery risks perpetuating society's inability to take meaningful action to address issues such as climate change and the depletion of finite natural resources. Visualizing science through information design can play an important role in facilitating comprehension thus fostering public awareness. At its best, information design becomes a story driven experience that educates and makes scientific progress visible and usable.

This poster aims to encourage collaboration at City Tech between Science and Information Design courses, whose students could benefit equally from effective communication of scientific endeavors. This natural partnership prepares design students to analyze real data and synthesize complex information so that they more effectively tell a meaningful story and inform an audience. For science majors, such collaboration reinforces the skills needed to present and speak about their work to broader audiences.

Developing Spatial Analysis Tool to Examine Student-Teacher Interactions in Making

Euisuk Sung / Career and Technology Teacher Education

Recent educational reforms in the United States have attempted to transform the traditional classroom instruction to student-centered learning approaches such as inquiry, design, hands-on, collaborative problem-solving. The cognitive, behavioral, and social merits of the student-centered learning should not be overlooked, but little is investigated. The primary goal of this study is to develop a computerized tool to examine how students and teachers interact in the context of making, as a type of student-centered instructions. The research tool was developed using C# .NET framework and the OpenCV graphic library. As a pilot study, this study utilized a data set captured from one-week maker camp for students in ages 8-12. The preliminary study confirmed that this research tool successfully captured positions and movements of students and teachers in the student-centered making classes. This poster session presents various motion graphs of student-teacher interactions to unpack the mechanism of student-centered learning in making. The intellectual merits and pedagogical implications of this study will be discussed in the poster presentation.

E-NEST: STEM Teacher Education Program

Fangyang Shen, Janine Roccosalvo, Andrew Douglas, William Roberts, Nadia Kennedy, Kendra Guo

The CUNY Noyce project from 2014-2019 involving STEM Education scholarships was awarded to City Tech from the National Science Foundation. City Tech and BMCC have collaborated to recruit and retain Science, Technology, Engineering and Mathematics students to become prospective K-12 STEM teachers in New York City. In total, we have trained 20 STEM teachers. This project also gave over 600 CUNY students opportunities to participate in Noyce internships, scholarships and summer workshops.

Roebling, Before the Bridge

Paul C King / Architectural Technology

Roebling before the bridge focuses on the early work of John Roebling which came before his most famous work the East River (Brooklyn) Bridge. A review of my current book manuscript the presentation covers the evolution of all of Roebling's built works starting with his first two bridges both built in Pittsburgh, first the Aqueduct over the Allegheny River for the Pennsylvania Main Line Canal (1844) and his second a bridge across the Monongahela River (1845), his four suspension aqueducts for the Delaware and Hudson Canal (1846-51), the first suspension railway bridge across the Niagara Gorge (1855) connecting to Canada and acting as the final link to freedom for the underground railroad, his third bridge in Pittsburgh at St. Clair Street (1859), the Cincinnati-Covington bridge (1866), his first with large masonry towers connected by an arch, and finally his posthumous work completed by his son Washington the East River (Brooklyn) Bridge in 1883. Along the way Roebling refined techniques in the manufacture of wire rope, conducted experiments in materials science and patented bridge building methods that changed how bridges were built.

Living in Brooklyn: Housing Along the Waterfront

[1]Richard Hanley, [2]Jason Montgomery, [1]Celia Castellan, [1]Arielle Lawson / [1]Brooklyn Waterfront Research Center, [2]Architectural Technology Department

The Waterfront annual conference of the Brooklyn Research Center (BWRC) (April 2019)

The phrase, "housing along the Brooklyn waterfront," can conjure condos in Brooklyn Bridge Park, public housing units in Red Hook, bungalows in Sheepshead Bay, or two-family brick homes in Canarsie; the housing could be a high-rise apartment in Schaeffer Landing, a studio apartment in DUMBO, a brownstone along the Promenade in Brooklyn Heights, a row house in Sunset Park, or an apartment overlooking Brighton Beach. In short, Brooklyn's waterfront housing comprises an extraordinary number of building typologies, population classes, and demographic categories.

In an April 2019 conference, BWRC gathered speakers who explored issues related to housing along the Brooklyn waterfront in all its diversity, complexity, and ever changing nature. After setting the context with a history of the evolution of Brooklyn's waterfront housing, the conference focused on the rich stew of issues facing those whose professions, businesses, or needs include providing, or living in, housing along the Brooklyn waterfront. Those discussions inevitably led to discussions of the two greatest challenges facing housing along the waterfront today: gentrification and climate change.

Living in Brooklyn gathered leading advocates and city officials to debate two pressing questions: What bold policies are needed to increase real affordability? Should our city continue to develop waterfront housing in the face of climate change and sea-level rise?

Modifying Hydraulic Conductivity without Compromising Load Restrictions in Urban Roof Farms

Ivan L. Guzman and Sandra Torres / Construction Management and Civil Engineering Technology Department

Rooftop farming systems deliver the benefits of rural agriculture to an urban setting by taking advantage of seldom-used roof real estate. One of the challenges that prevent the industry from reaching a wider audience is the existing roofs ability to withstand additional structural loads imposed by soil, vegetation, retained water and increased activity. To help minimize added structural loads designers have used lightweight green roof media to mimic the characteristics of natural soil. However, lightweight green roof media has poor water retention properties, which lead to heavy irrigation schedules, and rapid loss of nutrients, which imposes an economic deterrent to the wider use of this green technology. Through laboratory experiments, the authors have found preliminary results that indicate that the addition of reclaimed textile fibers has the effect of modifying storm water retention characteristics of green roof media without significantly compromising its weight.

Building the Hurricane-Proof House: The Labor Day Hurricane and the Emergence of the Hurricane House as a Floridian Vernacular Dwelling

Anne Marie Sowder /Construction Management and Civil Engineering

In response to the Labor Day Hurricane of 1935, 29 single family dwellings were built in the upper Florida Keys. The cast-in-place concrete Hurricane Houses were a joint venture of the American Red Cross and FERA. Hurricane Houses were built with unsophisticated labor according to local tastes. Although their design was a significant departure from neighboring dwellings, their modest, climate-responsive style reflected a growing new consensus about the home's ability to do more than provide seasonal comfort, instead to weather even the most violent storms. Hurricane House design and construction were meant to withstand worst-case weather scenarios, a change from other Florida vernacular structures, specifically the timber-framed houses commonly found in the Florida Keys, built for comfort under average conditions. This paper builds upon the work of Matthew Hyland, who, in exploring the rebuild of private homes destroyed by the Labor Day Hurricane, introduces the Hurricane House as a vernacular architecture that would influence later storm-proof design and construction techniques. This paper expands on the practical, political, and aesthetic influences leading up to the Hurricane Houses within the context of the manmade disaster of inadequate shelters and failure to evacuate.

The Environmental Consequences of Energy Choice in a Growing Economy

Unurjargal Nyambuu / Social Science Department

Discovery and extraction rates of fossil fuel define energy reserves that could last hundreds of years. The historical evolution of CO_2 emissions (greenhouse gases) from the combustion of coal, oil, and natural gas are presented. As is well-known, due to their out-sized carbon emissions, carbon-intensive fuels, coal in particular, generate substantial negative externalities. There is a limited amount of carbon that the atmosphere of the earth can absorb (carbon budget) without producing further dangerous trends in global warming. This research emphasizes the importance of growing output using renewable energy in addition to non-renewable energy. In line with empirical facts, this study suggests that a large fraction of coal reserves should remain underground and that renewable energy should be phased in to meet the carbon budget, consistent with the Paris 2015 agreement, while still allowing for economic prosperity.

Academic Lineage as a Research Methodology

Julian Thomas Costa / Department of Humanities

The practice of genealogical research sheds much insight into where we come from. That being said, must the "we" be limited to family bloodlines? This study examines how genealogical research methods can be used to discover one's academic lineage, or, where we "come from" in

terms of our scholarly training. This poster explains the resources one can use to trace their own lineage, discusses existing scholarship, and also provides an example of a lineage extending back to 1597.

Rákosi Era: A Period of Rebuilding, Anxiety, and Fear

Lisa Pope Fischer / Social Science Department

This poster presents the second 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. Following World War II in Budapest Hungary, people faced new challenges posed by the harsh Rákosi regime. Based on a series of life histories, this presentation focuses primarily on Leila's story shedding light on rebuilding the country after the destruction of the war. My informants characterized this era as one of restrictions, surveillance and fear that impacted their daily lives economically, politically, academically, and culturally. What strikes me about this period is that these people at a very young age experienced a rapid change in society, particularly one that consisted of an oppressive government. In later periods this experience of society change is one they have learned to deal with, and whereas some have learned to distrust unfair systems that may appear oppressive, others seem to be falling for a similar wave of autocratic leadership grasping to the appeal of conservative right wing populist trends.

INTERDISCIPLINARY

Building an Institutional Culture of General Education: A Multidisciplinary Blueprint

Karen Goodlad[1], Anna Matthews[2], Jason Montgomery[3]

[1]Hospitality Management, [2]Dental Hygiene, [3]Architectural Technology

Encompassing high impact educational practices, place-based learning, open pedagogy and enhanced assessment of learning outcomes, the Living Lab Model of Pedagogy was developed and successfully implemented at City Tech. It is designed to engage students in the general education curricula tailored to and integrated into their degree-specific coursework. Full-time and adjunct faculty from various disciplines work together in an annual Living Lab General Education Seminar. They develop their teaching methodology through innovative techniques and reflection, incorporating general education in a multidisciplinary manner. This approach breaks down institutional barriers to faculty interaction and collaboration, encouraging professional growth as both educators and scholars.

Medical Dental Device: Biogeneric Implant Prototype

Authors: Aneeza Hussain, Ibeth Erazo, Itchak Mor, Mutayab Chaudhry, Christian Rioschambi, Marjola Paloka, Erika Ramirez, Jamie Rubin, Agostinho Fragoso, Giovanni Campos, Kerolos Hanna, Liza Chiu, Patrick Fung, Olesea Galusca

Mentors: Prof. Renata Budny, Restorative Dentistry

Prof. Gaffar Gailani, Mechanical Engineering

NSF ATE Restorative Dentistry & Business Team

Teeth are lost due to tooth decay, injury, disease, or other causes. Today, dental implants extend the range of care to a variety of patients undergoing necessary prosthodontic rehabilitation. If the benefits of such treatments are to be maximized, then implants must be selected on logical basis and placed within the context of the full range of treatment modalities. However, modern dental implant systems are based on multiple components often leading to micro-movements which cause stress on the bone or bacterial infections, both of which compromise the success of osseointegration and consequently jeopardize the whole implant adaptation. Thus, a new idea of one-component immediate loading implant emerged to reduce the micro-movement, shorten healing time and number of visits, and contribute to lesser implant failures. The prototypes of the seven-fin trabecular structure implant will be customized using the design software and 3D printing. Next steps will focus on osseointegration, specifically on the best materials and techniques to induce bone formation at the osteotomy site, and on creating the printed implant. prototype designed with specifications, measurements, and proportions in accordance with the morphology and function of the natural teeth.

What Does It Mean To Be a Hispanic Serving Institution at City Tech?

Melanie Villatoro / Construction Management and Civil Engineering Technology
Mery Diaz / Human Services Department, Ruth Garcia / English Department, Benito Mendoza / Computer Engineering Technology Department

"What does it mean to be a Hispanic Serving Institution?" By definition, a Hispanic Serving Institution (HSI) is a not-for-profit degree-granting accredited institution of higher education whose enrollment of Hispanic students exceeds 25% of its total full-time undergraduate enrollment. City Tech has been a federally designated HSI since 1997 and currently, 34% of students identify as Hispanic or Latinx. In the fall of 2018, Hispanic/ Latinx faculty organized the first annual HSI forum at City Tech for the purpose of increasing awareness of the college's designation and to seek a better understanding of how we support the HSI mission. At the forum, we asked participants to reflect on what it means to be a Hispanic Serving Institution. This poster presentation will share a summary of the discussion from the forum and subsequent white paper put together by the organizing faculty. The summary includes City Tech demographic trends and national trends, existing initiatives that support the mission of HSIs on campus, and future recommendations and goals. We aim to spark dialogue and a call to action for building on City Tech's current culture and policies to ensure an atmosphere of inclusion and equity and meets the needs of Hispanic/Latinx students.

Experimental and Computational Studies of Glycosylated Photosensitizers with Albumins

Diana Samaroo[1], Mai Zahran[2], Andrew Wills[1], Johnny Guevara[2] and Alexandra Tatonetti[1]

Departments of [1]Chemistry and [2]Biological Sciences

Three glycosylated photosensitizers (porphyrin, chlorin, and isobacteriochlorin) were evaluated in the presence of bovine and human serum albumin using ultraviolet-visible (UV-vis) absorption and fluorescence spectroscopies. Analyses of the experimental data, determined that there was a concentration dependent fluorescence quenching of the Trp residue in the albumins. Furthermore, the average binding constant and number of binding sites on the protein were determined. To support the experimental studies, computational molecular docking/dynamics simulations were used to identify the binding sites and binding poses of the each of the glycosylated photosensitizers onto BSA and HSA. The three compounds are binding to the Hemin site located in the subdomain IB of BSA forming strong interactions with Trp134, while they are binding to the subdomain IIA of HSA close to the Sudlow's site I, and interacting with Trp214.

Contestable Kinship: User Experience and Engagement on DTC Genetic Testing Sites

Katherine Gregory / Department of Health Sciences

Direct-to-consumer genetic testing products and their participatory social media outlets provide users with new ways to understand ancestral identity, build community around shared results, and conceptualize the role of genetic determinism in their lives. Based on my published results in *New Genetics and Society* (2019), this project explores the role of user-generated information constructed with results from direct-to-consumer genetic scanning services such as 23andme, GEDMatch, AncestryDNA, MyHeritage. In particular, I consider how social capital is accumulated and disseminated utilizing these participatory tools in the communication practices of users. Through the sharing of genealogical knowledge, historical expertise, communication technology skills, access to genealogical services, selective behaviors such as cooperation, trust building, and a reliable presence on these social networking sites are examined. Thus, the aim of this research is to examine consumer contact practices and information sharing of social capital in the form of familial origin narratives, genetic ancestry estimations, and how this communication shapes user interpretation of genetic results.

LAW AND PARALEGAL

The Promise & Challenges of Artificial Intelligence as Applied to Law

Marissa J. Moran / Law and Paralegal Studies Department

Artificial Intelligence/AI invisibly navigates and informs our lives today and may also be used to determine a client's legal fate. Through executive order, statements by a U.S. Supreme Court justice and a Congressional Commission on AI, all three branches of the United States government have addressed the use of AI to resolve societal and legal matters. Pursuant to the *American Bar Association Model Rules of Professional Conduct and New York Rules of Professional Conduct* (NYRPC), *the legal profession recognizes the need for competency in technology which requires both substantive knowledge of law and competent use of technology for lawyers in the practice of law*. Comment 8 of the NYRPC states, "To maintain the requisite knowledge and skill, a lawyer should … (ii) keep abreast of the benefits and risks associated with technology the lawyer uses to provide services to clients." This duty implies that in leveraging the potential of AI, legal professionals must also be cognizant of the challenges and limitations presented by its use in law. For it is the nuances of law, non-binary in nature, and the many and varied characteristics involved with judicial decision-making which "*make it especially interesting and challenging for AI.*"

Get with the Go-Pro(Gram): How Esol Students Explore a Library

Nora Almeida, Junior Tidal, and Kimberly Abrams / Library

This poster will focus on a first-person perspective wayfinding study that was conducted with support from a PSC Research Grant. The aim of this study was to learn how ESOL (English for speakers of other languages) students navigate physical and digital library spaces with the goal of minimizing communication obstacles and spatial challenges. Our multifaceted research strategy incorporated GoPro camera video, webscreen capture, and traditional user-experience research methods. Using a visual mapping analysis, we identified common challenges students encountered while completing information seeking tasks. These study findings shed light on potential strategies to reorganize the library's digital and physical spaces, change signage design and placement, and modify the workflow of service areas and staff training. Our methodology can be adapted in other contexts, highlighting obstacles students encounter navigating different campus environments, such as enrollment and registration processes.

Examining Student Learning Encounters: Teaching Information Literacy and Cultivating a Culturally Responsive Classroom

Nandi Prince / Library

Instruction Librarians at the New York City College of Technology teach information literacy classes to students participating in the City of New York Language Immersion Program (CLIP); students in the CLIP program seek to improve their language skills before qualifying to enroll in a degree program. The students take several content-based courses, English being one of them. They visit the library once as part of their English class to obtain help with their research, as do students enrolled in regular sections of an academic level English class. CLIP students receive the same instructional model as academically prepared students. My research project seeks to explore the information literacy instruction practices and delivery to these students, and the impact and development of the research strategies these students receive in the present model of a one-time instructional class.

The James Baldwin Residence

Wanett Clyde / Library

The NYC LGBT Historic Sites Project strives to make invisible history visible by documenting sites, historic and cultural, which are associated LGBT history. This poster highlights the historical significance portion of the application to the National Park Service to list James Baldwin's former home, a row house at 137 West 71st Street, on the National Register of Historic Places. Using archival documentation, biographies and articles, and the works of the author himself, James Baldwin's significance and that of his home as a historic site have been established. This site went on to be designated a New York City landmark by the Landmarks Preservation Committee.

Using Dialogical Video Analysis as a Tool for Improvement During Student Teaching

Nadia Stoyanova Kennedy / Mathematics Department

This is a research study on the use of dialogical video analysis as a tool for enhancing preservice teachers' noticing and interpreting of aspects of classroom interactions and for improving of their own organization and facilitation of classroom interactions. It focuses on preservice-teachers' observations and analysis of digital video recordings of "exemplary" classroom interactions and on their own teaching practice over the course of their student teaching semester. The study is designed in order to register: a) changes in preservice teachers' noticing and interpretaion of the key aspects of mathematics classrooms interactions, and b) whether the preservice teachers are able to improve their own organization and facilitation of classroom interactions, and if so, how. It also examines to what extent regularly re-viewing recordings of one's own teaching supports continuing growth towards attainment of teaching competence and expertise in organizing and enacting the dimensions of a "powerful mathematics classrooms, " of which classroom interactions represent one dimension. (Schoenfeld, 2014).

A Diophantine Encoding of Networks

Hans Schoutens / Mathematics

To a network (aka graph), we associate in an algorithmic way, a subfield of the reals, in such a way that we can test whether two nodes in the network are connected by solving a certain Diophantine equation over that field. This answers a problem in computable model-theory whether fields can encode graphs. As a corollary one obtains that the Turing complexity of fields is as complicated as that of graphs.

Subgroups of $SL_2 (Z)$ Characterized by Certain Continued Fraction Representations

Sandie Han, Ariane Masuda, Satyanand Singh, and Johann Thiel / Mathematics

For positive integers u and v, let $L_u = \begin{pmatrix} 1 & 0 \\ u & 1 \end{pmatrix}$ and $R_v = \begin{pmatrix} 1 & v \\ 0 & 1 \end{pmatrix}$. Let $S_{u,v}$ be the monoid generated by L_u and R_v, and $G_{u,v}$ be the group generated by L_u and R_v. In this work we show an extension of a characterization of matrices $M = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ in $S_{k,k}$ and $G_{k,k}$ when $k \geq 2$ given by Esbelin and Gutan to $S_{u,v}$ when $u,v \geq 2$ and $G_{u,v}$ when $u,v \geq 3$. We present a simple algorithmic way of determining if M is in $G_{u,v}$ using a recursive function and the short continued fraction representation of b/d

Modular Properties of Characters of Principal Subspaces

Corina Calinescu / Mathematics

The general question of when a q-hypergeometric series is modular continues to be an actively researched area. In this presentation we discuss modular properties of the characters (which are q-hypergeometric series) of the principal subspaces of standard modules for the untwisted affine Lie algebra associated to A_n.

k-Neighborhood Degrees of a Graph

Nadia Benakli[1], Ezra Halleck[1], Sandra Kingan[2]

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The k-neighborhood degree list of a vertex v in a graph G, denoted by $N_kDL(v)$, is the list of degrees of vertices at distance k from v, where $1 \leq k \leq diam(G)$. We will denote by $N_kDL(G)$ the lists of k-neighborhood degrees of every vertex of G. An N_kDL-unique graph is a labeled graph that is uniquely realizable by its $N_tDL(G)$ for $1 \leq t \leq k$. It is a generalization of NDL-unique graphs by Barrus and Donavan (Discrete Mathematics 341(2018)) and Bassler et al (New J. Phys. 17(2015)). We will present applications of $N_kDL(G)$ to the problem of determining the similarity of vertices in large graphs and some theoretical results

relating NkDL to diameter. A 2-switch operation that preserves degrees is the replacement of a pair of edges $v_1 v_2$ and $w_1 w_2$ such that $deg(v_1) = deg(w_1)$ and $deg(v_2) = deg(w_2)$ by the edges $v_1 w_2$ and $v_2 w_1$, given that $v_1 w_2$ and $v_2 w_1$ did not appear in the graph originally. We will prove that within the class of diameter 2 graphs, a 2-switch operation that preserves degrees also preserves $N_2DL(G)$.

Polariton Optical Transistor Based on a Transition Metal Dichalcogenide Heterostructure Embedded in an Optical Microcavity at Room Temperature

Patrick Serafin and German V. Kolmakov / Physics

Exciton polaritons in an optical microcavity were shown to be a platform for the design of working elements for optical transfer and processing circuits such as optical transistors and switches. In this report, we considered a three-way superposition of cavity photons, direct excitons and indirect excitons in a bilayer semiconducting system; that is, exciton dipolaritons. Using the forced diffusion equation, we studied the room-temperature dynamics of dipolaritons in a transition-metal dichalcogenide (TMD) heterogeneous bilayer embedded in an optical microcavity. Specifically, we considered a $MoSe_2$-WS_2 heterostructure, which encompasses Y and Ψ-shaped channels guiding the dipolariton propagation. We demonstrated that optical signals propagating in the channels can be effectively redistributed between the branches of the channels by applying the driving voltage ~2V/mm to one of the TMD layers. Our findings open the route to the design of an efficient room-temperature polariton based optical transistor.

On Various Parametrizations of Feynman Integrals

Giovanni Ossola, Ray D. Sameshima / Physics Department

Scattering amplitudes in quantum field theories allow us to compare the phenomenological prediction of theoretical models with the measurement data at collider experiments. Feynman diagrams and the related Feynman rules allow us to write scattering amplitudes in terms of a class of Integrals over momentum space, known as Feynman Integrals.

In our poster, we discuss two different parametrizations of Feynman Integrals, namely Lee-Pomeransky and Baikov parametrization. By going to different parametrizations, we do not simply choose different variables to represent the same multidimensional integral, the gain is much higher: some properties of Feynman integrals, and more in general, scattering amplitudes, become particularly transparent when we use the appropriate parametrization.

Indeed, the Lee-Pomeransky parametrizations clarifies some graph-theoretical properties which Feynman graphs intrinsically have, and Baikov parametrization gives us geometrical interpretations of Feynman integrals through Gram-determinants. We also show that, in these parametrizations, the famous Cauchy's integral formula can provide a recipe to handle negative exponents in the denominators of Feynman integrals; the price we have to pay for this procedure is simply a dimensional shift.

Magnitoexcitons in Monolayer Transition Metal Dichalcogenides

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[2]Physics Program, The Graduate Center of CUNY

Monolayer transition-metal dichalcogenides (TMDC) such as MoS_2, $MoSe_2$, WS_2 and Se_2 host a series of exciton Rydberg states denoted by the principal quantum number n = 1, 2, 3, etc. We study the 1s–2s exciton Rydberg states in TMDC monolayers encapsulated by hexagonal boron nitride (hBN) under the action of a magnetic field. The exciton Rydberg states exhibit similar Zeeman shifts but distinct diamagnetic shifts from each other. Excitons in the magnetic field are described in the framework of the potential model. We have used the Keldysh potential to calculate the energies of exciton Rydberg states in hBN-encapsulated monolayers of MoS_2, $MoSe_2$, WS_2, and WSe_2 under varying magnetic field. Our calculations use as inputs the effective masses of electron and hole obtained in the framework of the density functional theory. The binding energies of exciton are calculated using the first-order perturbation theory, which gives good approximation only in the low magnetic field. These binding energies are comparable to experimental measurements. Our results are consistent with the other theoretical predictions.

Electron-Hole Superfluidity Controlled by a Periodic Potential in Double Layers of Two-Dimensional Material

Oleg L. Berman[1] Roman Ya. Kezerashvili[1], Yurii E. Lozovik[2], and Klaus G. Ziegler[3]
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We propose to control of electron-hole superfluidity in semiconductor coupled quantum wells and double layers of 2D material by an external periodic potential [1]. The latter can either be created by periodic gates attached to quantum wells or the double layers of 2D material or by the Moiré pattern of two twisted layers. Treating the electron-hole pairing within the mean-field approach, we apply the tight-binding approximation of the single electron spectrum and study the effect of the additional periodic potential on the electron-hole plasma-superfluid transition. The electron-hole pairing order parameter as a function of the temperature, the charge carrier density, and the gate parameters are obtained by minimization of the mean-field free energy. The second order phase transition between superfluid and electron-hole plasma, controlled by the external periodic potential, is studied for various parameters.

Design Interstellar Trajectories Using Direct Fusion Drive

Paolo Aime[1], Marco Gajeri[1], Roman Ya. Kezerashvili[2], Giancarlo Genta[1]
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In order to achieve deep space exploration, new propulsion system has to be developed, and they need to be both light and extremely powerful. One of the most promising concepts is the nuclear fusion based Direct Fusion Drive (DFD), under study and development at the Princeton Plasma Physics Laboratory. This innovative concept is based on the Princeton Reversed Field Configuration, a plasma configuration which will enable the construction of a compact, powerful and aneutronic propulsion system suitable for deep-space exploration. The DFD will achieve a thrust of about 5 N, a specific impulse around 10^4 s, by producing about 1 MW of power from D-3He fusion reaction. The potentialities of this reactor are far beyond what is the state of the art for space propulsion, and for this reason there have been many studies for missions for both outer planets and the interstellar space. One of the most attractive destination is the Kuiper Belt, its inner and outer edges, and all its asteroids and its dwarf planets, such as Makemake, Eris, Haumea and Pluto itself. The objective of this 6 months study is to fully understand and exploit the capabilities of DFD, by evaluating and computing unprecedented trajectories to those far space regions with the help of different methodologies, with particular attention to all possible mission scenarios.

Design of Trajectories within Solar System with the Direct Fusion Drive

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The Direct Fusion Drive (DFD) is a D-^{3}He fueled, aneutronic, thermonuclear fusion propulsion system, related to the ongoing fusion research at Princeton Plasma Physics Laboratory (PPPL), funded by NASA, where a new RF heating method, the so called odd-parity heating rotating magnetic field (RMF_O), is under development. This revolutionary fusion propulsion concept will exploit nuclear fusion energy, heating a magnetically confined Field reversed configuration plasma, in order to produce both thrust and electrical energy, supplying power consumption to all onboard subsystems. The most critical aspects primarily concern the challenging achievement of energy gain from the fusion process, which is necessary to heat the propellant and exhaust it through a magnetic nozzle. Secondly, FRC physics and engineering research and development problems involving plasma stability.

The DFD overcomes physics limitations which have electrical and chemical propulsion systems (EP and CP), by providing higher thrust compared to EP with larger availability of power and lower masses than CP. The main purposes of this work are to perform analysis of realistic new trajectories to Saturn's largest moon - Titan and to estimate and modelling D-3He FRC fusion radioactivity generation in order to evaluate radiation shielding issue. The trajectories calculations are obtained based on the estimated characteristic provided to us by the PPPL. In particular we are considering *1-MW-class* single DFD module, 5-10 *N* of continuous thrust and a specific impulse of ≈10^4 s have been obtained.

Ultra-long Reach 4x100Gb/s Unrepeatered Transmissions with Real-time Signal Processing Using Large Aeff Ultra-Low Loss Fiber

B. Zhu, P. I. Borel, T. Geisler, L. Leng, R. Jensen, M. Stegmaier, B. Pálsdóttir, D. W. Peckham, A. H. McCurdy, R. L. Lingle Jr., D. S. Vaidya, M. F. Yan, P. W. Wisk, and D. J. DiGiovanni / Physics Department

There is an increasing interest in ultra-long unrepeatered transmission submarine cable systems due to the tremendous growth of global data traffic, especially for emerging subsea networks in recent years. Unrepeatered transmission systems are cost-effective solutions for communication via optical fibers when the access to intermediate points are difficult. Typical applications are submarine links connecting islands to the mainland or island hopping, and the communication links to offshore oil and gas platforms. There are also use cases in terrestrial networks such as in desert, mountain, and forest areas. Usually, elaborate amplifiers and pumping lasers are installed at the transmitter and receiver terminals to allow data transmission without in-line active elements in the fiber cable links. This work describes the enabling fiber and amplifier technologies for ultra-long reach unrepeatered transmission systems. The key enabling technologies include the large-area ultra-low attenuation fibers, high-efficient Remote Optically Pumped Amplifier (ROPA), and 2nd order pumped distributed Raman amplification. The benefits of the technologies are illustrated, and their physical limiting factors for unrepeatered transmission are discussed. We then present the design and experimental demonstrations of ultra-long reach total capacity of 400 Gb/s (4x100 Gb/s) unrepeatered transmission links with real-time signal processing.

Effects Of Structural Disorder on the Cavity Polariton Dynamics In Transition Metal Dichalcogenides

Shaina Raklyar[1], Yamuna Paudel[1], Yuri Lvov[2], David W Snoke[3], German V Kolmakov[1]
[1]Physics, NYC College of Technology , [2]Mathematical Sciences, Rensselaer Polytechnic Institute, [3]Physics and Astronomy, University of Pittsburgh.

Two-dimensional transition-metal dichalcogenide (TMD) atomically thin layers are characterized by record strong light-matter interactions and provide a platform for optoelectronic applications at room temperatures. By considering the coupled dynamics of cavity photons and TMD excitons, we numerically studied exciton-polariton formation and propagation in an optical microcavity with an embedded TMD layer. Specifically, we studied the case where the TMD excitons are affected by a short-scale (10-100 nm) random potential due to the interactions with the environment inside the cavity. To characterize the stability of the polaritonic states in the system, we numerically calculated the energy of eigen modes in a cavity as a function of the wave number, E(k). In our poster, we present our findings and, in particular, we discuss the crossover from the polaritonic modes formed at weak disorder to strongly broadened photonic and excitonic modes at strong disorder. We also discuss the polariton formation and propagation in a cavity where the TMD layer is non-uniform and consists of a set of separate, topologically disconnected microflakes.

Analytic Two-Loop Corrections to Top-Quark Pair Production

Andrea Ferroglia / Physics

The production of top-quark pairs is a process of primary importance in the Large Hadron Collider physics program. In fact, the top quark, as the heaviest elementary particle in the Standard Model of particle physics, plays a key role in the study of the electroweak symmetry breaking and in the

study of the Higgs boson. This motivated a multi-year effort to calculate the two-loop QCD corrections to top quark pair production. Recently, my collaborators and I completed the analytic calculation of the Master Integrals for the two-loop, non-planar topologies that enter the calculation of the amplitude for top-quark pair hadroproduction in the quark-annihilation channel. Using the method of differential equations, we expanded the integrals in powers of the dimensional regulator and determine the expansion coefficients in terms of generalized harmonic polylogarithms of two dimensionless variables through to weight four.

The Influence of Neutral Gas on the Star-forming Sequence

Ariyeh H. Maller and IQ Collaboratory / Physics

One of the main goals of galaxy formation is to understand the star formation rates in galaxies. In this project we study the connection between star formation rate and the gas content for a wide range of cosmological simulations. We find that the star formation rate closely follows the molecular hydrogen mass of a galaxy with a small amount of scatter. The star formation rate also tracks the atomic hydrogen content of a galaxy, but with significantly more scatter. This is also true in all of the simulations we study but with differing slopes and scatter. Making simulations match the observations will give insight into the nature of star formation.

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Mai Zahran

First row l to r:
Roman Kezerashvili,
Candido Cabo,
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Second row l to r:
Andrea Ferroglia,
George Kiezik

Third row l to r:
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