



11.15.2018

1:00-4:00 pm

Lobby,  
New Academic Complex

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

16<sup>th</sup> ANNUAL **POSTER SESSION**

**BIOLOGY AND  
HEALTH SCIENCES**

**BUSINESS**

**CHEMISTRY**

**COMPUTER  
ENGINEERING AND  
INFORMATION  
SYSTEM TECHNOLOGY**

**EDUCATION**

**ENGINEERING  
AND ARCHITECTURAL  
TECHNOLOGY**

**HOSPITALITY  
MANAGEMENT**

**HUMANITIES,  
SOCIAL SCIENCES AND  
ENGLISH**

**LAW AND  
PARALEGAL**

**LIBRARY**

**MATHEMATICS**

**PHYSICS**

# WELCOME AND GREETINGS

NEW ACADEMIC COMPLEX. LOBBY

**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'S PRESENTATION BY FACULTY

1:10 pm-1:35 pm

New Academic Complex

- 1 Denise H. Sutton.** Consuming Love: The International Billion Dollar Romance Publishing Industry and the Women Who Drive Its Success.
- 2 Yu-Wen Chen, Janusz Kusyk, Ashwin Satyanarayana.** Design of Cloud Based Robots using Big Data Analytics and Neuromorphic Computing.
- 3 Boyan Kostadinov.** Exploring the Mathematics of the Lights out Game and its Variants.
- 4 Alyssa Dana Adomaitis, Diana Saiki, Eman Saad T. Alshahrani.** Examining Validity: Survey to Assess Collaborative Consumption of Clothing.
- 5 Dionne Bennett.** African American Studies and Black Women's Studies at, before, and beyond Fifty: Intellectual Activism and Emancipatory Inter subjective Humanism.
- 6 Michael Yeh, Palo Nikac, Qazi Abid, Aparicio Carranza.** Implementing Defenses in the Cybersecurity Landscape.
- 7 Hamid Norouzi, Abdou Bah, Cho May Than, Patty Arunyakul, Ronaldo Carhuaricra, Reginald Blake.** Analysis of Driving Factors of Global Lakes Surface Temperature.
- 8 Johanna Goldfeld.** Design of Hidden Symmetries at Stony Brook University at the New York Transit Museum.
- 9 Johnny Guevara, Alberto Martinez, Mai Zahran.** Ensemble docking of BACE-1 inhibitors for Alzheimer's Disease.
- 10 Aida Egues, Gwen-Cohen Brown.** Mentors as Entrepreneurs: Selling the Mouth-Body Connection.
- 11 Marissa J. Moran, Esq.** Judicial Decision Making in the Digital Age: #Attorney-Client Privilege, #Hacking, #Spoliation of Evidence
- 12 Liana Tsenova, Akhila Balachander, Amit Singhal.** Volume (3D) Microscopic Imaging Versus Classic Histology.
- 13 Subhendra Sarkar, Anthony DeVito, Faisal Khosa.** Causes of Treatment Delays in Overcrowded Emergency Departments: Imaging with Too Little Resources.
- 14 Paul C. King.** Roebling: Before the Bridge: The Early Work of John Augustus Roebling.
- 15 Ray D. Sameshima.** Polynomial Representations of Integration-By-Parts relations.
- 16 Matthew N. Brunetti, Oleg L. Berman, Roman Ya. Kezerashvili.** Tunable Optical Absorption by Excitons in Xenon via an External Electric Field.
- 17 Angran Xiao.** An Evaluation of Using Information Driven Product Development Framework in Capstone Design Projects.
- 18 Chen Xu.** Modeling light propagation in the biological medium with tubular structure.
- 19 Elizabeth Milonas.** Content Analysis of the Design Methodologies Used to Present Facets within the Search Result Pages of Nineteen Search Engines.
- 20 Kathleen Falk, Bridget Maley, Esteban Beita Solano, Augustin Maldonado.** Inter-Industrial Collaboration: Nursing and Architectural Technology Visions for Transforming Brownsville.
- 21 Jerry Ortiz, Ariyeh H. Maller.** Heat Conduction in Halo Gas Clouds.
- 22 Corina Calinescu.** Combinatorial Aspects of Vertex Operator Algebras.

# POSTER SESSION

1:00 pm-4:00 pm  
New Academic Complex  
Lobby

Table Number/Presentation

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- 2** Naomi Chery, Katherine Parra, Annie Evankow, David Stein, Daniel Distel, Hannah Appiah-Madson, Rachael Ross, Emmanuelle Sanon, Nadia Alomari, Raven Johnson, Angela Vasovic, Annie Horowitz, Horia (Lee) Popa, Benjamin Short, Daniel Kourehjan, Danny M. Vasquez, Estefania Rodriguez, Dennis M. Opresko, Mercer R. Brugler. Partnering with the Ocean Genome Legacy to Advance Our Understanding of Black Corals (Order Antipatharia).
- 3** Brittany Richards, Shamara Alterno. Saving Our Youth: Let's Take Action Against Meningitis.
- 4** Johnny Guevara, Alberto Martinez, Mai Zahran. Ensemble docking of BACE-1 inhibitors for Alzheimer's Disease.
- 5** Brittany Richards. Let's Dispel a Myth: Mental illness in the African-American Community Does Exist.
- 6** Subhendra Sarkar, Anthony DeVito, Faisal Khosa. Causes of Treatment Delays In Overcrowded Emergency Departments: Imaging with Too Little Resources.
- 7** Merlyn Dorsainvil. Them Too: Examining Violence and Exploitation of Women Globally.

- 8** Evans Lespinasse, Collaborative Consumption of Clothing.
- 14** Nazanin Hedayat Munroe. Wrapped Up: Talismanic Garments in Early Modern Islamic Culture.
- 9** Tatiana Grygoruk, Evans Lespinasse. Radiation in its Origin: Health Risks Resulting from Prolonged Exposure to Radon.
- 15** Rachel Raskin, Frimette Kass-Shraibman. What Skills Do Accounting Firms Want in Entry Level Hires: An Exploratory Study.
- 10** Olivia Martinez, Barbara Tagliaferro, Noemi Rodriguez, Jessica Athens, Courtney Abrams, Brian Elbel. EBT Payment for Online Grocery Orders: A Mixed-Methods Study to Understand Its Uptake among SNAP Recipients and the Barriers to and Motivators for Its Use.
- 16** Denise H. Sutton. Consuming Love: The International Billion Dollar Romance Publishing Industry and the Women Who Drive Its Success.
- 17** Ashley Kim. Persimmon Dye Processing.
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- 19** Ivana Radivojevic Jovanovic, Benjamin P. Burton-Pye, Wayne Lukens Jr., Lynn Francesconi. A New Strategy for Photoreduction of Radioactive <sup>99</sup>Tc Pertechnetate Using TiO<sub>2</sub>.
- ## BUSINESS
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**24** Lili Ma. Cooperative Target Tracking Using UAVS in Flexible Formations.

**25** Elizabeth Milonas. Content Analysis of the Design Methodologies Used to Present Facets within the Search Result Pages of Nineteen Search Engines.

**26** Michael Yeh, Palo Nikac, Qazi Abid, Aparicio Carranza. Implementing Defenses in the Cybersecurity Landscape.

**27** Carlos Delgado, Yovini Deonarine, Kenneth Lima, Aparicio Carranza. Browser Exploitation and Vulnerabilities.

**28** Heesang Kim, Xiao Lin Chen, Aparicio Carranza. Wireless Sensor Networks (WSN) Security Overview.

**29** Zeeshan Bhatti, Patrick Gonzalez, Luis Perez, Amier Metwaly, Aparicio Carranza. The Viability of Virtual Machines.

**30** Syed Ali, Meet Guleria, Aayush Madaan, Aparicio Carranza. The Impact of Cybersecurity in Today's World.

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**32** Michael Fan, Edwin Fung, Saint-Cyr Nafterson, Aparicio Carranza. Comparison of Tools for Web Penetration Testing on Kali Linux.

**33** Yu-Wen Chen, Janusz Kusyk, Ashwin Satyanarayana. Design of Cloud-Based Robots Using Big Data Analytics and Neuromorphic Computing.

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**37** Aida Egues, Gwen-Cohen Brown. Mentors as Entrepreneurs: Selling the Mouth-Body Connection.

**38** Lisette Santisteban, Aida Egues. Efficient Knowledge Sharing and Collaborative Learning: Promoting Mentoring within the Classroom.

**39** Nadia Stoyanova Kennedy. Learning from Re-Viewing Mathematical Practice.

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**47** Freddy A. Ruiz, Daniel Korwan, Kevin Hom. 2018 Toronto World Cities, World Class University Network.

**48** Jihun Kim. Performance Simulation for Precision and Articulation in Architectural Design.

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**50** Johanna Goldfeld. Design of Hidden Symmetries at Stony Brook University at the New York Transit Museum.

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**58** Lisa Pope Fischer. Resilience and Resistance during World War II: Early Experiences of Societal Unrest as a Foundation for Today's Society.

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**65** Boyan Kostadinov. Exploring the Mathematics of the Lights out Game and its Variants.

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## Self-Disclosure, Genetic Illness Narratives and Social Media

Katherine A Gregory / Health Services Administration

Bio-medicalization has permeated everyday life. This indoctrination has integrated advancements in genetic research with commercially accessible DNA technologies. Direct-to-consumer (DTC) genetic kits have made this information about health markers accessible in ways that were previously only within the realm of medical specialists. Consumer genetic data dumping into the software Prometheus has led to instant health marker results but with little or no recourse or professional guidance. Many consumers post their genetic results on social media to engage viewers and to make sense of these discoveries. By posting to social media sites, they treat private information, despite being subject to error and sometimes inconclusive, as part of a public discourse. This project gathers insight from those consumer posts made readily available on *YouTube*.

Data scraping of social media, in smaller sample sizes, can be a valuable tool for qualitative methodologists. Through ethnographic observation and anonymized descriptive accounts of visual posts, called vlogs, this project provides greater understanding of how consumers use social media platforms to craft illness narratives, engage audiences about health risks, and cope with pre-illness prognoses. My analysis will focus on understanding the role of social media in the dissemination of genetic knowledge and the methodological challenges it fosters.

## Partnering with the Ocean Genome Legacy to Advance our Understanding of Black Corals (Order Antipatharia)

Naomi Chery<sup>1</sup>, Katherine Parra<sup>1</sup>, Annie Evankow<sup>2</sup>, David Stein<sup>2</sup>, Daniel Distel<sup>2</sup>, Hannah Appiah-Madson<sup>2</sup>, Rachael Ross<sup>1</sup>, Emmanuelle Sanon<sup>1</sup>, Nadia Alomari<sup>1</sup>, Raven Johnson<sup>1</sup>, Angela Vasovic<sup>3</sup>, Annie Horowitz<sup>4</sup>, Horia (Lee) Popa<sup>5</sup>, Benjamin Short<sup>6</sup>, Daniel Kourehjan<sup>7</sup>, Danny M. Vasquez<sup>8</sup>, Estefania Rodriguez<sup>9</sup>, Dennis M. Opresko<sup>10</sup>, Mercer R. Brugler<sup>1,8,9,10</sup>

<sup>1</sup>New York City College of Technology College of Technology (CUNY), <sup>2</sup>Ocean Genome Legacy, <sup>3</sup>Frank McCourt High School, <sup>4</sup>Irvington High School, <sup>5</sup>Stony Brook University (SUNY), <sup>6</sup>Fairfield College Preparatory High School, <sup>7</sup>Rutgers University, <sup>8</sup>NYU-SPS DAUS, <sup>9</sup>American Museum of Natural History, <sup>10</sup>National Museum of Natural History, Smithsonian Institution

Black corals (Cnidaria: Anthozoa: Hexacorallia: Antipatharia) are largely a deep-water group with 75% of the 247 currently recognized species occurring at

depths >50 meters (deepest: 8,600m). The Smithsonian Institution's National Museum of Natural History houses one of the most extensive collections of black corals in the world. Many specimens in the collection are representatives of species for which a DNA signature remains elusive. Obtaining DNA sequence data is imperative as we have at least two examples of species classified in the wrong family based on misleading morphology. In an effort to obtain genetic signatures from as many black corals in the NMNH collection as possible, we partnered with the Ocean Genome Legacy (OGL), a non-profit, marine research center and genome bank dedicated to exploring and preserving threatened biological diversity of the sea (black corals are listed in Appendix II of the Convention on the International Trade of Endangered Species). OGL sequenced two mitochondrial regions per individual: *cox3-IGR-cox1* and *nad5-IGR-nad1* (IGR: intergenic region). Undergraduates from City Tech are cleaning the raw ABI-3730xL sequence traces and adding taxa to the phylogenetic tree presented in Brugler, Opresko & France (2013) to create a more robust phylogeny of black corals.

## Saving Our Youth: Let's Take Action Against Meningitis

Brittany Richards, Shamara Alterno / Nursing Department

In the United States, a leading cause of Meningococcal Meningitis in adolescents is *N. Meningitidis* (Center for Disease Prevention and Control, 2013). Adolescents are the main source of transmission to persons in other age groups and have the highest rate of carriage of the organism (CDC, 2013). It is a disease with severe complications, at times leading to death. Meningococcal vaccines have been identified as a means of primary prevention. We intend to explain the change in CDC guidelines regarding vaccine administration and identify barriers to compliance. We will also discuss our proposed protocol for improving rates of vaccination as well as other strategies for outreach to decrease the spread of this disease in a vulnerable population.

## Mental Illness in the Black Community

Brittany Richards / Nursing Department

Mental illness in the African-American community is often stigmatized. In the African American community there is pride and value heavily placed on strength. This presentation will explain how mental illness is underreported in the Black community, due to a cultural notion, that having such illness is due to personal weakness. Based on a review of literature this presenter will discuss the stigma associated with mental illness in the African-American community and identify how this perception poses a great risk in the community's awareness of mental illnesses. The concept of mental illness making one inferior generally prevents an individual from seeking help. African-Americans are educated on

prevention for commonly diagnosed physical illnesses within the community, such as diabetes and hypertension. Nevertheless, they do not receive substantial information regarding mental health, because it isn't accepted as a relatable illness. It is imperative that Nursing and other health disciplines are involved in promoting mental health literacy in the community by recognizing and dispelling fallacies associated with mental illness.

## Ensemble Docking of BACE-1 Inhibitors for Alzheimer's Disease.

Johnny Guevara, Alberto Martinez, Mai Zahran / Biological Sciences Department

A wealth of evidence suggests that inhibiting  $\beta$ -secretase 1 (BACE1) can delay or halt the progression of Alzheimer's disease (AD). Studies have shown that small molecules able to interact with the asp dyad and the flap in the active site of BACE1 can promote inhibition. In our previous work, six potential BACE1 inhibitors (**1-6**) were designed, synthesized, and evaluated by pIC50 measures obtained from in vitro FRET inhibition assays. The aim of this work is to implement an in silico molecular docking approach to study the binding mechanism between **1-6** and BACE1. Docking results revealed **3**, **5** and **1** exhibiting the most favorable binding affinities: -8.2, -7.9 and -7.8 kcal/mol, respectively; while retaining binding orientations relative to the catalytic asp dyad sustained by hydrogen bonds, as well as exhibiting stabilizing hydrophobic and pi-pi interactions to flap residues. **2**, **4** and **6** retained binding affinities of -7.7, -7.2, and -6.9 kcal/mol, respectively, but formed stabilizing interactions deemed non-inhibiting. In addition, the Pearson correlation coefficient (R) between binding affinity and pIC50 values,  $R = -0.93$ , showed a strong correlation between experimental and computational results. Overall, our computational results support our experimental results and provide crucial information about the binding mechanism behind our potential BACE1 inhibitors.

## Causes of Treatment Delays In Overcrowded Emergency Departments: Imaging with Too Little Resources

Subhendra Sarkar<sup>1</sup>, Anthony DeVito<sup>1</sup>, Faisal Khosa<sup>2</sup>

<sup>1</sup>Department of Radiologic Technology and Medical Imaging, New York City College of Technology, CUNY, NY, <sup>2</sup>Department of Radiology, Vancouver General Hospital, University of British Columbia, Canada

Emergency Departments (ED) in the USA seem to suffer from inadequate resources and overcrowding. The increasing number of visits to ED is due to a combination of increasing patient population catchment, inadequate number of ED physicians, reduced radiology staff on weekends and evenings and, in the largest US metro areas, other factors, such as radiologic technologist and nursing shortages and inappropriate imaging studies. The ED overcrowding and long wait times are compounded by ED and Radiology budget cuts. The benefits and

shortcomings of free-standing minor emergency centers in certain metro areas are not very clear at this time. However, hospital-based ED's use of digital imaging (CT, MR) and consequent insurance denials amplify the revenue loss in ED.

For trauma-related emergencies, there is still a growing trend of utilization of imaging in ED before physicians assess patients. Our models show insufficient correlation over the past decade between the timing of physician consults and advanced imaging for both minor and major trauma. While for major emergencies a partial body CT is incomplete and prone to missing major pathologies, a full body CT for minor to moderate emergencies may also be undesirable due to cost and radiation concerns. Hence we suggest full body X-ray for moderate trauma and full body CT for major trauma to avoid treatment delays and associated lethality while satisfying appropriateness criteria of insurance carriers.

## Them Too: Examining Violence and Exploitation of Women Globally

Merlyn Dorsainvil / Nursing Department

The low social status of women in many societies is linked to violence against women. It can include physical, sexual, psychological and economic abuse as well as harmful practices. Cultural attitudes and expectations regarding virginity, marriage and family roles remain rigid in many places, reinforced by anxieties about female sexuality, power and independence. Although women are charged to be the primary caregivers of families in addition to carrying children and giving birth, they are given a lower social status and treated worse in many societies. This results in outcomes that impact the health, social, and economic status of future generations. Violence and exploitation of women violates the ethical principle of justice. The international health and social community, as well as local movements, have shed light on this issue. Progress in improving the status of women varies highly throughout the world.

## Radiation Dose in Mammography: A Practitioner's Perspectives on Dose Estimates between GE Pristina and Hologic Selenia Dimensions' Radiation Output

Evans Lespinasse / Department of Radiologic Technology and Medical Imaging

Mammographic examinations are known to aid radiologists in the diagnosis of breast pathology including breast cancer in its early stage. Early diagnosis helps identify the disease before it spreads to other remote parts of the body, eliminates the need for extensive treatment, and significantly reduces the risk of dying. In the course of the exam, however, the breast is exposed to ionizing

radiation for image capture. For this reason, radiation dose in mammography has been widely examined, measured, and analyzed by researchers and clinicians alike. Clinical studies have been ongoing over time as technology for both hardware and software continue to evolve. This research will make use of a Dosimeter and an ACR Mammography accreditation phantom on two popular units, GE Pristina and Hologic Selenia Dimensions. Exposures will be made in 2D and 3D modes. The entrance glandular dose will be measured with an acquisition technique clinically used on a standard breast. Comparative analysis of the results will be conducted for Radiation exposure dose from these mammographic units.

## Radiation in its Origin: Health Risks Resulting from Prolonged Exposure to Radon

Tetiana Grygoruk, Evans Lespinasse / Department of Radiologic Technology and Medical Imaging

Among non-smokers, radon is the number one cause of lung cancer, and the second cause of lung cancer overall, according to the Environmental Protection Agency. Radon cannot be detected through one's sense of sight, smell, hearing, taste or touch. The only way to detect it is by testing certain spaces or environments with specialized instruments. This radioactive gas is present in trace quantities in the earth and produced by decaying uranium. It enters buildings through cracks in walls, floors, construction joints or gaps around service pipes, electrical wires and sump pits. It emits heavy nuclear fragments of alpha particles (two protons and two neutrons), that can enter the lungs and contribute radiation dose to occupants. It can be detected in homes, workplace, and schools, etc. In this research, three specific places where people gather frequently will be tested using a short-term radon test kit in Brooklyn, New York, including a home, school and office. Lab data from the three locations will be compared and analyzed for potential health risks.

## EBT Payment for Online Grocery Orders: A Mixed-Methods Study to Understand Its Uptake among SNAP Recipients and the Barriers to and Motivators for Its Use

Olivia Martinez,<sup>1</sup> Barbara Tagliaferro,<sup>1</sup> Noemi Rodriguez,<sup>1,2</sup> Jessica Athens,<sup>1</sup> Courtney Abrams,<sup>1</sup> Brian Elbel<sup>1</sup>

<sup>1</sup>Department of Population Health, NYU School of Medicine, <sup>2</sup>Health Services Administration Program, New York City College of Technology, CUNY

**Objective:** To examine Supplemental Nutrition Assistance Program (SNAP) recipients' use of the first online supermarket accepting Electronic Benefit Transfer (EBT) payment. **Methods:** In this mixed-methods study, the authors collected EBT purchase data from an online grocer and attempted a randomized controlled trial in the

South Bronx, New York City, followed by focus groups with SNAP beneficiaries aged  $\geq 18$  years. Participants were randomized to shop at their usual grocery store or an online supermarket for 3 months. Focus groups explored barriers and motivators to online EBT redemption. **Results:** Few participants made online purchases, even when incentivized in the randomized controlled trial. Qualitative findings highlighted a lack of perceived control over the online food selection process as a key barrier to purchasing food online. Motivators included fast, free shipping and discounts. **Conclusions and Implications:** Electronic Benefit Transfer for online grocery purchases has the potential to increase food access among SNAP beneficiaries, but challenges exist to this new food buying option. Understanding online food shopping barriers and motivators is critical to the success of policies targeting the online expansion of SNAP benefits.

## Supermarket Retailers' Perspectives on Healthy Food Retail Strategies: In-Depth Interviews

Olivia Martinez,<sup>1</sup> Noemi Rodriguez,<sup>1,2</sup> Allison Mercurio,<sup>1</sup> Marie Bragg,<sup>1</sup> Brian Elbel<sup>1</sup>

<sup>1</sup>Department of Population Health, NYU School of Medicine, <sup>2</sup>Health Services Administration Program, New York City College of Technology, CUNY

Supermarket retailers are key shapers of the food environment, which influences consumers' diets. This study seeks to understand the decision-making processes of supermarket retailers—including motivators for and barriers to promoting more healthy products—and to catalogue elements of the complex relationships between customers, suppliers and, supermarket retailers. **Methods:** We recruited 20 supermarket retailers from a convenience sample of full-service supermarkets and national supermarket chain headquarters serving low- and high-income consumers in urban and non-urban areas of New York. Individuals responsible for making in-store decisions about retail practices engaged in online surveys and semi-structured interviews. We employed thematic analysis to analyze the transcripts. **Results:** Supermarket retailers, mostly representing independent stores, perceived customer demand and suppliers' product availability and deals as key factors influencing their in-store practices around product selection, placement, pricing, and promotion. Unexpectedly, retailers expressed a high level of autonomy when making decisions about food retail strategies. Overall, retailers described a willingness to engage in healthy food retail and a desire for greater support from healthy food retail initiatives. **Conclusions:** Understanding retailers' in-store decision making will allow development of targeted healthy food retail policy approaches and interventions, and provide important insights into how to improve the food environment.

## Volume (3D) Microscopic Imaging Versus Classic Histology

Liana Tsenova<sup>1</sup>, Akhila Balachander<sup>2</sup>, Amit Singhal<sup>2</sup>

<sup>1</sup>Biological Sciences Department, New York City College of Technology, CUNY, NY, <sup>2</sup>Singapore Immunology Network, Agency for Science, Technology and Research (A\*STAR), Singapore

Classic histology is the gold standard for lung tissue imaging and analysis. The method however is restricted to thin tissue sections by using a microtome. Here, we tested a novel method of volume, three-dimensional (3D) imaging, using ultra microscopy (UM) to study the morphology of murine lung tissues. 3D imaging is valuable for analyzing complex structures and allows quantitative evaluation of cell number counts or distance measurements. We followed an established protocol with three major steps: I. Immunostaining; II. Clearing and III. Imaging – Ultra Microscope (light sheet based). Primary antibodies were used to label endothelium (CD31), neutrophils (MRP14) and monocytes (CX3CR1). Images with excellent resolution were obtained. This method provides a versatile and reliable way to perform immunolabeling of mouse lungs, followed by volume imaging for a wide range of applications such as examining different type of cells, their location and kinetics in pathological lesions. Volume imaging may open a new field of clinical pathology diagnosis of lung diseases.

BUSINESS

## Examining Validity: Survey to Assess Collaborative Consumption of Clothing

Alyssa Dana Adomaitis<sup>1</sup>, Diana Saiki<sup>2</sup>, Eman Saad T. Alshahrani<sup>2</sup>

<sup>1</sup>New York City College of Technology, CUNY, NY, <sup>2</sup>Ball State University, Indiana

Collaborative Consumption (CC) is “Sharing economy, peer economy, crowdsourcing, and maker-movement” (Botsman 2015). CC is a growing consumption trend in the international market place that has the potential to increase to \$335 billion dollars by the year 2025 (Inside Small Business, 2016). Limited research has been done on CC of clothing. This research aimed to test the validity of a model outlining motivations to consume collaboratively, the Attitudinal Model of Collaborative Consumption

(AMCC), by Adomaitis, Kobia, and Saiki (2016). This study established validity testing of a survey to identify the motivations consumers have to participate in CC of fashion/apparel goods and a revised AMCC model was established. Further research includes using the developed survey to test the AMCC and to assess CC behavior and motivations among different demographic groups.

## Wrapped Up: Talismanic Garments in Early Modern Islamic Culture

Nazarin Hedayat Munroe / Department of Business

This study examines clothing inscribed with religious scripture and mystical symbolism as a talismanic device in Islamic culture. Extant garments from Iran, Turkey, and India created between the late fifteenth and mid-eighteenth centuries inscribed in ink and gold were worn as undergarments in diverse circumstances for spiritual and physical protection. The premise for scripture as talisman in Islam, the historic relationship between text and textile, and verses from The Holy Qur’an are included as an analytic device for understanding the Islamic perception of textiles and garments on a literal and metaphorical level, as well as spiritual and political events involving cloth and power.

Textiles as a talisman in the belief systems that preceded the Muslim era in these regions, and the relationship to spells and magic, demonstrates the enduring connection in material culture and religious practice. Addressing the traditions of Zoroastrian, Hindu, and Shamanistic/Turkic religious practices, the relationship between cloth, thread and sacred teachings are explored in relation to the later empires that emerged from these regions. The evolution and importance of talismanic cloth in the later Islamic societies is contemplated in relation to these pre-existing practices.

## What Skills Do Accounting Firms Want in Entry Level Hires: An Exploratory Study

Rachel Raskin<sup>1</sup>, Frimette Kass – Shraibman<sup>2</sup>

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The accounting profession is rapidly evolving and accounting education should be growing and adapting to the industry. Yet, accounting education is not proactive, creating a lag between what the industry needs and how education will adjust to satisfy that need. In support of this assertion, a plethora of research concludes that over thirty years after the initial push for reform, accounting programs are still not doing enough to teach the importance of the professional skills that are crucial to accountants. Accounting classes emphasize the mastery of technical skills and often bypass the critical value of nontechnical skills. With technology replacing routine accounting functions that are being jam-packed into accounting curricula, it is vital that academia recognize

the current industry needs – graduates who can be both accountants and business consultants equipped with critical thinking, problem solving, technological and communication skills. The study surveys CPA firms, Industry firms and recruiting firms to assess the attributes they seek in accounting graduates and their schools. This information will help educators and schools improve their programs and curricula to better prepare students for careers in the profession.

## Consuming Love: The International Billion Dollar Romance Publishing Industry and the Women Who Drive Its Success

Denise H. Sutton / Department of Business

Romance readers are a passionate cult, but not in the ways often assumed. As the life-blood of a billion-dollar publishing industry that spans the world, romance readers have created their own intense realm of star writers, editors, marketers and readers, all interacting with an intimacy and candor unmatched by any other genre. With a focus on gender and the marketing of ideas, **Consuming Love** tells a dramatic story of broken and healed hearts and the genuine passion involved in creating a genre of books that is often derided even as it outsells all others.

From early on, romance publishers took a different approach than literary novel publishers to reach its audience by making the novels available through commercial lending libraries and women's magazines as well as a consumer goods marketing approach. **Consuming Love** contributes new scholarship to the fields of gender and business history and marketing by identifying these innovative marketing strategies and showing how they facilitated the astounding success of Mills & Boon (est. 1908) and Harlequin (est. 1949). These two publishing giants redefined standard publishing practices to reach romance readers at home and around the world. For the most part, these companies relied on the labor of women and the consumption of the product by women—ultimately revealing new insights into the role of women in consumer culture and international business.

## Persimmon Dye Processing

Ashley Kim / Department of Business

The persimmon tree is native to Japan, China, Burma, and India (the Himalayas and Khasi Hills). The trees grow in many places today: the USA, Europe, Brazil, South East Asia, Japan, and South Korea. Persimmon fruit is best known in America as the oriental or Japanese persimmon (*Diospyros kaki*), Chinese plum or Chinese fig when dried. But when it comes to quality and popularity Japanese persimmon fruit is the best and has a long history since the 11th century. Persimmon trees need a mild-temperate climate and moderately fertile land with deep friable subsoil in order to live long and produce many fruits. These

living conditions can be found in the western United States where Californian persimmon trees have been cultivated successfully since 1870. These trees produce fruit that can be spherical, cordate [heart-shaped] or oblate [flat at the poles] in shape. Harvesting full ripening persimmon fruits takes place in fall (October) and early winter (November), long after most fruit trees have already yielded their crops. Late ripening fruits may be picked after a hard frost or light-snowfall. Persimmon trees can grow in a wide range of soils, but they do best in well-drained loam.

## CHEMISTRY

## Spectroscopic Study of the Interaction of Human Serum Albumin (HSA) with Ionophoric Polyphenols

Alberto Martinez, Miguel Gomez, Sinji Shibutani / Department of Chemistry

The distribution, excretion, activity and toxicity of a drug are determined, at least in part, by its interaction 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 we have synthesized and studied important aspects of a series of ionophoric polyphenols as potential anti-Alzheimer's disease agents. As part of our ongoing investigations on the biological activity of these compounds, we are now exploring possible transport mechanisms. In line with this, the interaction of the ionophoric polyphenols with HSA has been studied by fluorescence and circular dichroism (CD) spectroscopies. Our results suggest that the studied ionophoric polyphenols have the ability to form adducts with HSA with binding affinities ranging  $10^4$  to  $10^6$  M<sup>-1</sup>. In addition, CD experiments show only slight modifications on the secondary structure of the protein upon interaction with the compounds. Overall, our results seem to indicate that there is a compound-protein interaction which could have a potential impact on transporting properties of the ionophoric polyphenols.

## A New Strategy for Photoreduction of Radioactive <sup>99</sup>Tc Pertechnetate Using TiO<sub>2</sub>

Ivana Radivojevic Jovanovic <sup>1,2</sup>, Benjamin P. Burton-Pye <sup>2</sup>, Wayne Lukens Jr. <sup>3</sup>, Lynn Francesconi <sup>2</sup>

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The immobilization of <sup>99</sup>Tc in the environment has usually been achieved via reduction of the prevalent pertechnetate, <sup>99</sup>TcO<sub>4</sub><sup>-</sup> anion to relatively insoluble TcO<sub>2</sub> species. Tc (IV) species formed are then typically immobilized in glass or ceramic materials for the long-term storage. We have been studying the use of metal oxide semiconductor TiO<sub>2</sub> to act as a reducing agent for the <sup>99</sup>Tc upon UV irradiation. The TiO<sub>2</sub> system can reduce up to 95% of <sup>99</sup>TcO<sub>4</sub><sup>-</sup> upon irradiation. EXAFS and XANES conducted with these systems show that <sup>99</sup>Tc was reduced to the Tc(IV) oxidation state. The reduction of Tc<sup>+7</sup> to Tc<sup>+4</sup> oxidation state occurs in the solution as well as on the surface of TiO<sub>2</sub> nanoparticles. We postulate that this resulting Tc(IV)/TiO<sub>2</sub> material can potentially be pressed into a dense wasteform.

COMPUTER  
ENGINEERING AND  
INFORMATION  
SYSTEM TECHNOLOGY

## Modeling Light Propagation in the Biological Medium with Tubular Structure

Chen Xu / Computer Engineering Technology Department

Modeling near-infrared light propagation in the biological medium is critical for the applications of diffuse optical tomography, which have demonstrated great potential in the initial diagnosis of tumor and the assessment of tumor vasculature response to neoadjuvant chemotherapy. Currently, most of the simulations model a lesion in the biological medium as a sphere of infinite geometry or semi-infinite geometry. However, this is not accurate for the applications of interest to subsurface tubular structures such as blood vessels, ureters, and bowel. In the paper, the light propagation in a medium with tubular structure is modeled using Monte Carlo method and finite element method. The results and advantages of each method are compared.

## Effective Decision Making Patterns

Mary Tedeschi / Computer Systems Technology Department

Patterns are supposed to describe reality, not invent a new one, according to Ralph Johnson. Patterns in information security ethics may help to create better internet security. The starting point of all achievement is desire. Weak desire brings weak results, just as a small fire makes a small amount of heat. The internet is not a pattern. The internet is not secure. Ethics and ethical decision making help to improve cyber security. Based on teaching an introductory course in computer security several ethical patterns have emerged. Block chain and bit coin technology have patterns in them.

## Efficient Detection of Multi-Narrowband Using the Warped Discrete Fourier Transform

Ohbong Kwon / Computer Engineering Technology Department

This paper presents a multi-narrowband signal processing paradigm that is based on the use of the warped discrete Fourier transform (WDFT). The WDFT evaluates a discrete-time signal in the context of a non-uniform frequency spectrum, a process called warping. Compared to a conventional DFT or FFT, which produces a spectrum having uniform frequency resolution across the entire baseband, the WDFT's frequency resolution is both non-uniform and programmable. This feature is exploited for use in analyzing multi-narrowband signals which are problematic to the DFT/FFT. The paper focuses on optimizing frequency discrimination by determining the best warping strategy and control, using the intelligent search algorithms and criteria of optimization, or cost functional. The system developed and tested focuses on maximizing the WDFT frequency resolution over those frequencies that exhibit a localized concentration of spectral energy and, implicitly, diminishing the importance of other frequency ranges. The paper demonstrates that by externally controlling the frequency resolution of the WDFT in an intelligent manner, multi-narrowband signals can be more readily detected and classified. Furthermore, the WDFT can be built upon an FFT enabled framework, insuring high efficiency and bandwidths.

## Predicting Academic College Track for Incoming Students Using Machine Learning

Marcos Pinto, Ouri Alkade / Computer Systems Technology Department

Mimicking the way we think and react to real-world situations are the objectives of the field of Artificial Intelligence (AI). The implementation is done using machine-learning by repetition or induction. Our application uses data from a survey on areas of interest in computer science conducted with freshman and sophomore students. Using machine learning techniques we can then predict the bachelor track the student most likely will decide on.

## Cooperative Target Tracking Using UAVs in Flexible Formations

Lili Ma / Computer Engineering Technology Department

This research describes the design of coordinated control laws that will command a group of unmanned aerial vehicles (UAVs) to track a moving ground target while maintaining flexible formation patterns. This work is an extension of our earlier results where the control input to each UAV was designed as a combination of two control efforts together: tracking and formation. The tracking control component regulates the 2D horizontal range between each UAV and the target to a pre-specified range reference. The formation control component coordinates the orientation and position of each UAV with respect to its neighbors to reach a desired formation. Two types of formation patterns have been obtained. One is the balanced circular formation where all UAVs spread evenly on a circle, whose center resides at the moving target. The other is a uniform-spacing formation pattern where the relative distances between each two adjacent agents approach a prescribed value. By allowing the 2D range references to be different for the agents and adopting a hierarchical formation structure, more various and flexible formation patterns can be achieved, including formations with sub-groups in the uniform spacing, in line, in L-shape, and in triangular formation.

## Content Analysis of the Design Methodologies Used to Present Facets within the Search Result Pages of Nineteen Search Engines

Elizabeth Milonas / Computer Systems Technology Department

The World Wide Web is an environment in which information is presented and retrieved mainly through websites and search engines. Website information is presented within categories or facets used to organize this information into distinct topic areas. Research in the effective presentation of facets within websites has resulted in established design methodologies. These methodologies have been tested and results indicate effective website facet design plays a major role in the navigation and retrieval of information as well as in the sensemaking process. In recent years, facets have been implemented within the search result pages of many search engines including Google and Bing. However, very little is known regarding the design features used to implement facets in this domain. In this study, one thousand sixty-seven facets located in the search result pages of nineteen search engines were examined. Through content analysis, the design methodologies used to present facets were identified and compared to those used in the presentation of facets within websites. The results revealed an adherence to the accepted design methodologies utilized in the presentation of facets within

websites indicating a commitment to and investment in effective facet design methods within the dynamic search engine domain.

## Implementing Defenses in the Cybersecurity Landscape

Michael Yeh, Palo Nikac, Qazi Abid, Aparicio Carranza / Computer Engineering Technology Department

An encompassing term often associated with computer viruses, phishing scams, and social engineering is cybersecurity. An area typically neglected by end-users and businesses is network security. People may connect to open networks that require no authentication like free public WiFi and their accounts may transmit credentials that can be seen by anyone connected to that network. The data that a person is communicating or transferring over-the-air (OTA) is hidden in hexadecimal format, making it vulnerable, and credentials can be stolen and maliciously used. Networks might have physical and/or virtual attacks with differing levels of sophistication and levels of vulnerability. We will implement a custom-built firewall and utilize information gathering to demonstrate a physical attack and report on the different types of network security vulnerabilities, the dangers we face when using those unsecured networks, and how to be on the offensive, where the end user is the target. We will also test different types of network security vulnerabilities and inform the public of the actual danger they can cause when they leave their digital space vulnerable.

## Browser Exploitation and Vulnerabilities

Carlos Delgado, Yovin Deonarine, Kenneth Lima, Aparicio Carranza / Computer Engineering Technology Department

Kali Linux operating system has become helpful in many security tasks assignments, as well as services for penetration testing, research, and inspection of web applications. Penetration testing is a key technique to find flaws in systems and networks. There are various procedures accessible for hacking using penetration testing in Kali Linux, this makes it a form of open source platform to help security personnel make systems and networks safe while pinpointing weaknesses in different ways. Many web browsers online have vulnerabilities that can compromise the browser that a person could be looking at, such as revealing private information, and damage the performance of the application itself. To illustrate this, we will focus on using the tools called Browser Exploitation Framework (BeEF), XeroSploit and Burp Suite to attack multiple web browsers to compare them and see how each browser responds to the attack and how much information is given to the attacker.

## Wireless Sensor Networks (WSN) Security Overview

Heesang Kim, Xiao Lin Chen, Aparicio Carranza / Computer Engineering Technology Department

Massive amounts of data are being converted into bits for transmitting over the Internet and shared all over the world. The concept of “smart” devices has conquered preconceived notions of daily routines. Smart phones and wearable device technologies have made humans to be continuously interconnected, making distance a factor of no limitation. “Smart” systems are based on a single concept called the Internet of Things (IoT). IoT is a web of wirelessly networked devices embedded with electronic components and sensors that monitors physical and environmental conditions and acquires data to be shared with other systems. Wireless Sensor Network (WSN) is a combined hardware and software network that uses a system of sensors to detect physical phenomena. WSN is being widely used in industrial and consumer applications. Privacy is a key factor of WSN, as it is imperative to secure data that is used, transmitted, or stored. Wireless communication technologies, such as Bluetooth and WiFi, etc., expose users to a plethora of potential security flaws. Security mechanisms such as Cryptography, Firewalls, Secure Routing Protocol and Secure Data Aggregation of WSN using the Raspberry Pi 3 model B, and tools embedded into Kali Linux is explored and reported.

## The Viability of Virtual Machines

Zeesan Bhatti, Patrick Gonzalez, Luis Perez, Amier Metwaly, Aparicio Carranza / Computer Engineering Technology Department

Within the ever-expanding field of technology in our modern age, Cloud Computing has cemented a strong foothold as an implementation in both computing and productivity. Since its inception in the early 2000's, it has erupted into a service widely used by the world's largest technology conglomerates such as Google, Amazon, and Microsoft. When considering the improvements over data sharing, access, and the use of virtualization (as opposed to peripheral devices), Cloud Computing streamlines services across the board, making them easier for end-users and administrators alike. One service that is offered via Cloud Computing is the use of Virtual Machines (VMs). However, how secure and, more importantly, how reliable is the Infrastructure as a Service (IaaS)? We will test the viability of Virtual Machines created with Microsoft Azure, VMware, and Google Computing Engine by comparing various test results to a real world system.

## The Impact of Cybersecurity in Today's World

Syed Ali, Meet Guleria, Aayush Madaan, Aparicio Carranza / Computer Engineering Technology Department

As technology advances every day, there are huge threats that can compromise our data. It is vital for companies

to protect and prevent user's data or information from being conceded. Cybersecurity plays a key role in helping organizations to avoid Internet attacks by enabling protection to its users' information and organization's data. If an organization has successfully been hacked by a hacker, then the company can run into big trouble. We will perform Targeted Testing, Double-blind Testing, Internal Testing and External Testing using Fiddler, WireShark and NMAP using the Kali Linux distribution that provides a great number of readily available tools. Our effort is to find weaknesses and security policy compliances of the systems to prevent security incidents.

## Technologies that Help Ensure Privacy in the Digital Age

Ardavan Hashemzadeh, Vin Jaggesar, Krit Wichitrakarnung, Aparicio Carranza / Computer Engineering Technology Department

In face-to-face human interactions the identity of each party may be easily discerned using their voice and facial characteristics, and privacy may be achieved simply by whispering and/or ensuring no other parties or listening devices are within earshot. Unfortunately, in the digital world the identity of the node on the other end of a signal is not known, and any node in the network path may intercept and eavesdrop on communications. The concept of Public Key Infrastructure (PKI) is based on Public Key Cryptography (PKC), which were both developed to solve the problems of privacy and identity verification in the digital era. We explore and report how public key cryptography works, examine derivative technologies and solutions such as GNU Privacy Guard (GPG), Pretty Good Privacy (PGP), Secure Socket Layer (SSL) and Secure Shell (SSH) in order to prove the effectiveness and determine the best use cases for each technology.

## Comparison of Tools for Web Penetration Testing on Kali Linux

Michael Fan, Edwin Fung, Saint-Cyr Nafterson, Aparicio Carranza, PhD / Computer Engineering Technology Department

Ethical hackers perform web penetration testing to find vulnerabilities that may exist on sites that are even up to date. The sets of exploits found can be reported to the appropriate authorities to help make the specific sites more secure. The resultant actions help companies and businesses to be protected, and from having their information compromised by the attackers. Structure Query Language (SQL) injection and HyperText Markup Language (HTML) injection are examples of code injections that can be used for web penetration testing. The Kali Linux tools SQLmap, NMAP and Oscanner used on vulnerable sites such as buggy Web App (bWAPP) and google gruyere serve to compare the effectiveness of these tools. They are legal sites to perform web penetration testing as they are specifically made vulnerable for users to perform these actions.

## Design of Cloud Based Robots Using Big Data Analytics and Neuromorphic Computing

Yu-Wen Chen, Janusz Kusyk, Ashwin Satyanarayana / Computer Systems Technology Department

Understanding the brain is perhaps one of the greatest challenges facing twenty-first century science. While a traditional computer excels in precision and unbiased logic, its abilities to interact socially lags behind those of biological neural systems. Recent technologies, such as neuromorphic engineering, cloud infrastructure, and big data analytics, have emerged that can narrow the gap between traditional robots and human intelligence. Neuromorphic robotics mimicking brain functions can contribute in developing intelligent machines capable of learning and making autonomous decisions. Cloud-based robotics take advantage of remote resources for parallel computation and sharing large amounts of information while benefiting from analysis of massive sensor data from robots. In the paper, we survey recent advances in neuromorphic computing, cloud-based robotics, and big data analytics and list the most important challenges faced by robot architects. A novel dual system architecture is also proposed for robots where they have a brain centered cloud with access to big data analytics.



EDUCATION

## An Evaluation of Using Information Driven Product Development Framework in Capstone Design Projects

Angran Xiao / Department of Mechanical Engineering Technology

The increasing complexity of engineering and technology requires that students master an increasing amount of abstract engineering knowledge to remain competitive in today's job market. However, today's students find it difficult to create mental images of abstract concepts, especially in product design classes, due to lack of real world experience. In this project,

we introduce a system engineering software package, with which students are able to plan out and manage projects using the design methodologies that they learned in class. We have assessed student learning in a capstone design class in the last seven semesters and analyze student performances before and after using the software package. We have observed that the system engineering software enables students to visualizing and practicing product design methodologies for their design projects. This helps students not only understand the abstract design concepts, but also apply them to accomplish their projects more efficiently.

## The Role of Math Competency in Predicting Program Completion in an Associate Degree Nursing Program

Bridget Maley, Margaret Rafferty / Nursing Department

Selecting students who hold the most promise to function as competent health professionals is an important responsibility for nursing faculty. The high attrition rates of pre-licensure associate degree nursing programs are a concern for nurse educators. In 2017, Treaster, writing in the *New York Times*, reported that administrators using predictive analytics or "Big Data" found that a student's performance in an introductory math course proved an important predictor of success in nursing school. Replication of the results constitutes an urgent research problem. This research study explores the impact of grades in College Algebra and Trigonometry, Pre-Calculus, Calculus, and Statistics on program completion. The results of this study provide support that math competency is an important predictor of success in nursing school.

## Assessing the General Education Outcomes of a Study Abroad Experience

Thalia E. Pericles / Department of Hospitality Management

Using the city of Paris and its hotels and restaurants as classrooms, New York City College of Technology (CUNY) Hospitality Management students in the Thomas Ahrens International Work/Study Programs (TAIWSP) immerse in high-impact educational practices through experiential learning (Kuh, 2008). For the past 19 years, students in the TAIWSP exchange program with CFA Université d'Evry Val d'Essonne in France, participate in place-based learning of cuisine, culture and tourism. In parallel, students from France have similar experiences in New York City.

Research in the area of short-term study abroad programs indicate that these types of experiences lead to several positive benefits, including intellectual and personal growth, intercultural awareness and professional development (Ingraham and Peterson,

2004). The study will survey students before and after they participate in the TAIWSP to determine how their experience achieves the following City Tech stated General Education Learning Goals (adopted by College Council March 2013)

Global/Multicultural Orientation:

- Demonstrate expanded cultural and global awareness and sensitivity
- Communicate across cultural and linguistic barriers

## Mentors as Entrepreneurs: Selling the Mouth-Body Connection

Aida Egues<sup>1</sup>, Gwen-Cohen Brown<sup>2</sup>

<sup>1</sup>Nursing Department, <sup>2</sup>Dental Hygiene Department

The marriage of entrepreneurship and innovation is not expected in all fields of study, particularly among the health professions. As such, it was a challenge conceiving and creating a uniquely multidisciplinary clinical practice guidebook addressing the facets of oral health. Absent or inappropriate oral health diagnosing, education, and screening lead to enormously detrimental health consequences within an individual's body, across an individual's life span. As such, the authors assume roles of mentors as entrepreneurs, selling the need for innovative examination of the mouth-body health connection. Theories of creativity, innovation, and motivation in individuals are adopted in cultivating a productive team of diverse practitioners. Using collaborative lenses, experts in art, art history, biological sciences, dentistry, ethics, health communication, health services, medical malpractice law, nursing, and oral pathology are working together to illustrate how oral health affects overall health. Literature on ingenuity, leadership, and stewardship are embraced to establish a dynamic mentored environment that encourages inclusive innovation regardless of discipline.

## Efficient Knowledge Sharing and Collaborative Learning: Promoting Mentoring within the Classroom

Lisette Santisteban, Aida Egues / Nursing Department

Transforming mentoring within the university classroom setting can be a hard sell. Mentoring is a proven approach to drive development and productive learning for both mentees and mentors, while benefiting the institution. Universities are challenged to focus on improving both faculty and student retention and satisfaction. However, transforming the learning environment into a mentored dynamic, interactive space where the educator guides students in applying concepts and engaging creatively in subject matter is a no easy task. In our classroom, efficient knowledge sharing and collaborative learning are promoted as part of both faculty and student mentoring. Several

proven models of mentoring are incorporated for the promotion of diversity and inclusion and as innovation in developing cross-cultural faculty-student relationships where students, course objectives, educator and outcomes work in concert. The process of cultivating a highly diverse, inclusive mentoring faculty-student community that takes proud ownership of its enduring materials can be embraced by leadership and instructors across academic programs.

## Learning from Re-Viewing Mathematical Practice

Nadia Stoyanova Kennedy / Mathematics Department

The study focuses on preservice-teachers' observations of digital video recordings of 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' understanding of the key aspects of productive mathematics classrooms, and b) signs that they are changing their own teaching in relation to those aspects. The study is inspired by recent research on "responsive pedagogy," where the teacher consciously attends to and responds to students' thinking, fosters equitable student participation, and promotes student agency; and in alignment with "noticing" -- a set of teacher dispositions and behaviors involving observation, description, analysis and interpretation of teaching practice.

This study will focus on changes in how prospective teachers identify and enact the elements of a "powerful mathematics classroom," and for purposes of identifying and analysing these, we will use Schoenfeld's "Teaching for Robust Understanding in Mathematics Scoring Rubric" (Schoenfeld, 2014). Special attention will be given to changes over time in participants' approach to the analysis and interpretation of what they notice and to identify important dimensions of "powerful" classrooms--and to their growing capacity to enact these understandings in their teaching.

## The Effect of Class Size on Progression and Retention in Nursing Education

Camille Phaire-Morton / Nursing Department

Research of the effect of class size on outcomes in elementary education provides evidence that supports the benefits of smaller class sizes in helping students achieve course objectives. Research on the impact of class size on college students has been equivocal. However, little is known about the effect of class size on student progression and retention in nursing education. The average class size in a community college ranges between 25-35 students, while some private nursing institutions continue to conduct large lecture sections

(200 students) for pre-licensure coursework. While the use of advanced pedagogical methods require small class size, maintaining small class size is expensive and challenging for public institutions faced with budget constraints and shortage of nursing faculty. Although students are successful in larger classes, other schools maintain small class size to support student achievement. This poster will explore the literature on the relationship of class size and progression and retention in nursing education.

## STEM Teacher Education in NYC

Fangyang Shen, Janine Roccosalvo, Kendra Guo, Kimberly De La Santa / Computer Systems Technology Department

This poster will describe our project involving a STEM teacher scholarship in New York City awarded from the National Science Foundation. The goal of this CUNY Collaborative Noyce project between City Tech and BMCC is to recruit highly qualified students enrolled in Science, Technology, Engineering and Mathematics majors to become STEM educators, mainly in Mathematics and Technology fields. This project has involved over 450 CUNY students in Noyce internships, scholarships and summer workshops. Currently, we have recruited a total of 16 Noyce scholars. This is year 5 of the grant period which began in 2014 and will finish by the end of 2018.

## Lab Manual Design with Engineering Learning Style and Flipped Learning Model in Computer Engineering Technology Education

Yu Wang, Sunghoon Jang / Computer Engineering Technology Department

We have designed a lab manual based on Felder-Silverman learning style model (FSLSM) and the flipped classroom model for engineering education. This lab manual is developed for the early junior year course of "Microcomputer Systems Technology" and emphasizes student-centered active learning experiences with practical exercises and open-ended questions. Instead of taking traditional assembly language to study computer architecture, we are looking for a different approach to teach students to learn the assembly language by embedding an inline assembly language module into a C/C++ program. Our lab guide consists of practical exercises using various platforms including Microsoft Windows OS, Linux OS, Microsoft Visual Studio, and Visual Studio Community. With this new approach, students will be able to design creative lab projects instead of following a lab procedure. Students are able to work on the platform using multiple programming languages (C/C++ and Assembly), and multiple hardware devices (PC or Laptop, x86 device, Linux). This lab-learning approach, combined with the principle of

flipped classroom and engineering learning styles, can provide additional opportunities to advance the students' engagement in the studies of computer engineering technology.

## Year-long Training in Biomedical Big Data Research

Eugenia G. Giannopoulou / Biological Sciences Department

The NIH-funded Big Data to Biomedical Informatics (BD2BMI) program in 2017-2018 recruited eight (8) Biomedical Informatics (BIB) students and trained them in Big Data research. In this poster we summarize the year-long activities of the project, including: (1) technical sessions in UNIX, SQL, Python and R, (2) professional development workshops hosted at the Professional Development Center at CityTech, (3) invited lectures by distinguished researchers from Weill Cornell Medicine, (4) site visits, (5) a week-long summer boot camp held at Cornell and (6) eight individual Big Data related internship projects with applications in biomedicine. The first cohort of students performed research in areas including: developing software for DNA methylation analysis, social determinants of health, development of software pipeline for quality control processing, implementing PGx testing into clinical decision support systems, speech recognition of tumor boards and clinical data research networks in New York City.

## Evaluation of the Use of Standardized Patient Simulation with First Semester Nursing Students

Mary Palmer MSN RN, Carmel Dato PhD, RN, NPP / Nursing Department

Nursing department faculty are using a unique simulation project with all beginning AAS nursing students. Students interview a standardized patient (SP) (an actor portraying a patient with a specific character, history and health conditions) before they actually set foot in a clinical setting as a student nurse. After a 10-15 minute encounter with the SP the students and the SP do a short assessment and meet together for the SP to give the student feedback, followed by small group debriefing with faculty. The faculty are examining the students' responses to this innovative approach, specifically comparing student self-evaluation and SP evaluation responses regarding completion of objectives for the simulation. Student satisfaction and increased confidence in the development of skills for clinical setting were also assessed.

## Roebling: Before the Bridge: The Early Work of John Augustus Roebling

Paul C. King / Architectural Technology Department

This presentation focuses on the work of John A. Roebling, the engineer that introduced innovations embodied in his most famous work, the Brooklyn Bridge. His early suspension bridges, built in the mid 1800's before the first wagon train crossed the Rockies, included canal aqueducts transporting barges filled with coal to the first suspension railroad bridge over the Niagara gorge. His most noted contribution is the manufacture of the wire ropes which made his suspension bridges possible and helped Otis to develop a safe elevator and the Wright brothers to build the plane they flew at Kitty Hawk.

This scholarship is part of research for a book manuscript titled "Roebling: Before the Bridge" which focuses on the early work of Roebling and the innovations he developed that enabled him to engineer the Brooklyn Bridge. This year's presentation will focus on the Roebling Bridge that connects Cincinnati to Covington, the bridge that was the direct predecessor to the Brooklyn Bridge. Included will be photographs taken from atop the Covington South Tower on a site visit in the fall of 2018.

## Analysis of Driving Factors of Global Lakes Surface Temperature

Hamid Norouzi<sup>1</sup>, Abdou Bah<sup>2</sup>, Cho May Than<sup>3</sup>, Patty Arunyakul<sup>4</sup>, Ronaldo Carhuaricra<sup>1</sup>, Reginald Blake<sup>5</sup>

<sup>1</sup> New York City College of Technology, Construction Management and Civil Engineering Technology Department, <sup>2</sup> The Graduate Center of CUNY, Earth and Environmental Sciences Department, <sup>3</sup> LaGuardia Community College, Environmental Engineering Department, <sup>4</sup> New York City College of Technology, Computer Science Technology Department, <sup>5</sup> New York City College of Technology, Physics Department

Lakes are among vital components of our ecosystem and environment that are crucial for supplying fresh water, recreation, habitat's lives, etc. This project focuses on the application of remote sensing data for change in land cover, and analysis of its impact

on the surface temperature trends of the 300 major lakes around the world. The objective of this study is exploring the differences between the changes of surface temperature of water and their surrounding land to understand underlying factors of lake area changes. An analysis of LST variation over the global lakes have been conducted using observations from the Moderate Resolution Imaging Spectroradiometer (MODIS). A statistical approach was applied to calculate the temperature trends in the lake (water), surrounding land, and the difference between land and water. Moreover, the relationships between the LST trends and potential driving factors such as the landcover changes in the lakes' basins, lakes areas, depth, and location were investigated. The results show that there is a direct relationship between changes in the lakes area and the trends in the lake temperature and the surrounding land temperature. Lakes with smaller surface areas showed more significant changes in LST when compared with larger lakes.

## 2018 Toronto World Cities World Class University Network

Freddy A. Ruiz<sup>1</sup>, Daniel Korwan<sup>2</sup>, Kevin Hom<sup>1</sup>

<sup>1</sup>Architectural Technology Department, New York City College of Technology, <sup>2</sup>Technical University of Berlin, Germany

The project's purpose is to retrofit an existing campus building at Ryerson University by creating a sustainable building. The problem is that the 50-year-old building is no longer efficient in energy conservation. Energy consumption is higher than today's standards. The building did not engage the campus community. The solution would be to redirect circulation for better access for the college community as well as for public access. The design team found out that they must enclose the roof, which would create new uses such as an urban farm that would be part of a sustainable roof design, where fruits and vegetables could be grown for student consumption. This farm has to be maintained, community groups can come together to help maintain the urban farm in optimum condition. We integrated classrooms in the roof area for students and incorporated bio-friendly technology such as a bio-reactor that use algae to produce green energy through a process similar to photosynthesis. This technology will be located between the double glassing of the structure placed on the roof.

## Performance Simulation for Precision and Articulation in Architectural Design

Jihun Kim / Architectural Technology Department

The research demonstrates how environmental performance simulations can be integrated in a

creative architectural design process and solution. The use of performance simulations primarily aims to discover design problems and optimize solutions. A site-specific climatic information was generated by using CFD (computational fluid dynamics) and Daylight simulation for prevailing wind and light condition for building occupants. The generated quantitative information became a critical tool for the following process of the human-centered design. The performance simulation was also used to justify and articulate the architectural expression, particularly for skylights and building envelopes. Using simulation for both quantitative and qualitative matters, the integrated design approach showcased how a building design may incorporate one of the pressing agendas of our time, environmental sustainability, while meeting building-scale requirements toward a new architectural typology. This experimental research project is a part of an architectural design competition entry for the International Competition for Writing Museum in South Korea 2017.

## **Inter-Industrial Collaboration: Nursing and Architectural Technology Visions for Transforming Brownsville**

Kathleen Falk<sup>1</sup>, Bridget Maley<sup>1</sup>, Esteban Beita Solano<sup>2</sup>, Augustin Maldonado<sup>2</sup>

<sup>1</sup>Nursing Department, <sup>2</sup>Architectural Technology Department

Children living in Brownsville are not benefiting from the advances in health and wellbeing due to economic divides of poverty and disparate allocation of resources. Two diseases that Brownsville's children are heavily burdened with are uncontrolled asthma and obesity. Prof. Kathleen Falk and Prof. Bridget Maley, Nursing faculty, have been educating nursing students about inequitable health outcomes and how to advocate for change. Their experiences led to a proposal for an innovative model of healthcare that removes existing silos between healthcare and children's public education.

Towards this goal, two very different academic departments at CityTech came together: Nursing and Architectural Technology. They collaborated in the design of a multi-purpose center to promote equity in health outcomes of children and which also addresses many of the challenges facing Brownsville. Professors Augustin Maldonado, Esteban Beita Solano, Illya Azaroff and Vesselin Milev worked with their Urban Design students to create proposals for a building that stimulated opportunities for regional employment and growth alongside community healthcare by incorporating programs such as enclosed swimming pools, spaces for after school activities, and a youth development provider. The project attempts to show how urban healthcare and design are dynamically linked.

## **Design of *Hidden Symmetries* at Stony Brook University at the New York Transit Museum**

Johanna Goldfeld / Department of Communication Design

*Hidden Symmetries* is an exhibition featuring pre-Columbian textiles at the Simons Center for Geometry and Physics at Stony Brook University. Works on view are from the collection of Tony Phillips, a math professor fascinated with the geometry reflected in these pieces. This poster will explore how the designer began with complex content and, through use of fonts, layout and color selection developed a coherent and engaging exhibition. It will also showcase relevant work from other institutions such as the Museum at Eldridge Street and the St. Vartan Armenian Cathedral.

## **Signaling Trouble: The North Atlantic Right Whale**

Mary Ann Biehl / Department of Communication Design

*Signaling Trouble* is a series of artworks depicting the plight of the North Atlantic Right Whale, as it faces possible extinction. Original graphics, along with images from the North Atlantic Right Whale Catalog, are combined with international maritime signal flags, enabling the whales to directly communicate the urgency of their situation. The major causes currently threatening their survival - ship strikes, fishing gear entanglements, and new migratory patterns in their search for food - are referenced throughout the artworks. The series aims to raise awareness of their troubling situation, and the need for multiple communities - governments, scientific researchers, fishing industry and general public - to work together on behalf of this critically endangered species and the waters they inhabit.

Permissions were granted for use of specific whale photographs by Heather Pettis, Research Scientist and executive administrator for the North Atlantic Right Whale Consortium. Consultation to review the artworks for accuracy was conducted with Research Scientist Philip Hamilton, from the Anderson Cabot Center for Ocean Life at the New England Aquarium.

# Immersive Educational Systems with Procedure-Oriented Combinations of Real and Virtual Environments

Zhou Zhang<sup>1</sup>, Shaojin Zhang<sup>1</sup>, Mingshao Zhang<sup>2</sup>, Sven K. Esche<sup>3</sup>

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Insufficient users' feel of immersion often slows the further adoption of Virtual reality (VR). Many solutions with a focus on the results rather than the details of the interactions between the objects in the real and virtual worlds have been developed. Therefore, the real procedures are distorted and the users lose their perception of in-person participation.

In order to overcome this disadvantage, a procedure-oriented approach for the combination of real and virtual environments is proposed here. It emphasizes the details of the procedures: how to capture, track, operate and interoperate the real and virtual objects. In order to illustrate this idea, a prototype of mixed real and virtual assembly, in conjunction with object recognition and rigid-object tracking functions based on robotic vision techniques, is presented as an example. This prototype of planetary gear system is designed relying on a game-based virtual laboratory system. The physical parts are marked with QR code. The main assembly with one missing planetary gear is accomplished in the virtual environment. The position and pose of the missing planetary gear is tracked and recognized by a Kinect to finish the final assembly. This method can let users get realistic experience with the assembly process.

HOSPITALITY  
MANAGEMENT

## Brooklyn Tourism Marketing

Heejun Kim, Susan Phillip / Hospitality Management Department

Over the past decade, Brooklyn has expanded at a rapid pace by attracting new businesses and tourists. As a result of the City of Brooklyn's effort to promote the multifaceted characters of the city and to position as a safe and dynamic destination, approximately 15 million visitors came to the borough in 2015, contributing to the economy by spending on hotels, restaurants and other attractions (Brooklyn Chamber of Commerce, 2016). Particularly in Brooklyn, Tourism and Entertainment is the second fastest growing industry, accounting for nearly 15% of the new jobs created (The Office of the New York State Controller, 2016). Considering a rapid expansion of tourism and leisure-related businesses in Brooklyn, it is essential to understand visitors' sociodemographic characteristics, and their travel needs, perceptions and behaviors. However, a majority of tourism studies have been conducted for Manhattan and very few studies are available for the Brooklyn area at present. Therefore, this research aims to (1) profile Brooklyn visitors' characteristics and their travel behaviors and (2) examine Brooklyn visitors' perceptions of tourism products and services in terms of importance and satisfaction.

## The Changing Framework of Communication Education

Julian Thomas Costa / Department of Humanities

From as far back as Ancient Greece, the subject of communication has been a highly valued area of study. Over the years, the curricular focus of communication education, as well as its place within academia, has seen drastic change. Much of this change took place in the latter half of the twentieth century. David Campbell, who taught communication from 1964 to 2000, got to witness these changes first hand. Since his area of emphasis was technology, he also had to keep up with the ever-steepening changes in mediated communication. Beginning with a chalkboard and overhead projector and ending with digital photography and the Internet, Campbell's career provides a lens (no pun intended) into the evolution of one of the most dynamic and popular fields of study in modern higher education.

## Globalization, Gating, and Risk Finance

Unurjargal Nyambuu / Department of Social Science

The growing interdependence between economics, finance, and geopolitics has contributed not only to global growth, but has also raised concerns. Globalization, which in this context implies increasing freedom to trade and faster movement of capital, resources, people, and technology around the world, has been transformative. Because countries' macroeconomic fundamentals, trade policy, geopolitical and social agendas, and national interests are at stake, "gating," i.e., the implementation of trade agreements, tariffs, and financial regulations, has become an increasingly important policy tool. The resulting financial-economic-geopolitical interconnectedness is presented in this book. In particular, we describe how these trends have created a new financial and economic environment which presents both opportunities and challenges for economists, policy makers, and risk-finance professionals.

## Anti-Poverty Effects of In-Kind Transfers among Divorced or Separated Women in the United States

Gulgun Bayaz-Ozturk / Social Science Department

This study examines the anti-poverty effects of increased welfare spending in the United States five years into the recovery (from 2009 to 2015) by focusing on an economically vulnerable population of divorced/separated women. More specifically, I examine the anti poverty effects of the Supplemental Nutrition Assistance Program (SNAP), the National School Lunch Program (NSLP), the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), the Earned Income Tax Credit (EITC), Temporary Assistance for Needy Families (TANF), and housing and energy assistance using the Sen, Shorrocks, and Thon poverty index. I find that the anti-poverty effects of means tested programs worked primarily through reduction in headcount ratio without much amelioration in poverty intensity and inequality. Large-scale programs such as SNAP, EITC, and housing assistance were the most effective, whereas WIC, TANF, and energy assistance were the least effective programs in the fight against poverty.

## The Personal is Historical: Slavery, Black Power and Resistance in Octavia Butler's *Kindred*

Megan Behrent / English Department

The year 1966 marked Stokely Carmichael's first invocation of "Black Power" and the birth of the Black Panthers in Oakland. As a student at Pasadena City College in the late 1960s Octavia Butler encountered the politics of a growing student Black Power movement—a memorable moment in her literary and political development which marks the genesis of her novel, *Kindred*.

The student political movement Butler encountered and participated in at Pasadena City College became a microcosm of debates playing out on the national stage, as strategic questions of resistance rose to prominence, including the right to self-defense, interracial relationships and solidarity and the efficacy of direct action and negotiation as political strategies. Published a decade later, *Kindred* is Butler's attempt to resolve her "sixties feelings" and her conflicted views on the political movements of the period while grappling with the cost of their demise. In this paper, I analyze *Kindred* as a meditation on political debates that arose from the Black Power movement, exploring how the novel engages with the debates of the period while highlighting the continuities between the resistance of her generation and generations past.

# Resilience and Resistance During World War II: Early Experiences of Societal Unrest as a Foundation for Today's Society

Lisa Pope Fischer / Social Science Department

This poster presents the first 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. World War II exemplifies a society in flux and uncertainly as illustrated by Szabella's recollections of being a young Jewish woman during this time frame. This chapter recounts a senior Hungarian Woman's detailed description of escape and survival to illustrate how she maneuvered within systems of oppression. This period not only illustrates societal unrest, and feelings of loss of control especially in terms of starvation, and fear of death, but also the force of populist trends asserting nationalism and scapegoating, and in this case, especially anti-Semitism. Her story acts as a springboard for drawing in other people's experience as they overlap or fill in gaps to hers. These powerful early life experiences impact these women's lives and give telling insight into perceptions of today's goulash populist society.

# African American Studies and Black Women's Studies At, Before, and Beyond Fifty: Intellectual Activism and Emancipatory Intersubjective Humanism

Dionne Bennett / Department of African American Studies

This poster examines African American intellectual life in the context of African American Studies, which in 2018, reached its fiftieth anniversary as an official academic discipline, and the discourse of Black Women's Studies, which emerged with it. It addresses the race and gender politics of how African American Studies was forged by student activism within the Black Freedom Movement in the 1960s and by an enduring black intellectual tradition, which both fuels and long precedes the formal inauguration of the discipline. Black Studies, Black Women's Studies and their canonical texts are informed by an Emancipatory Intersubjective Ethos, an intellectual, political and moral framework, characterized by the values of both freedom and intersubjectivity. Intersubjectivity, a term from both philosophy and psychoanalysis, can be understood as a subject-with-subject dynamic sustained by the mutual recognition of an interdependently-constituted humanism. Although the term is not explicitly used in much of the black intellectual tradition, the principle of intersubjectivity, and specifically emancipatory intersubjectivity, pervades black intellectual labor and institutions. African American Studies and Black Women's Studies are intersubjective expressions of intellectual activism, agency, and liberation that are both part of black and feminist social justice movements and an achievement of freedom and justice unto themselves.

LAW AND  
PARALEGAL

# Judicial Decision Making in the Digital Age: #Attorney-Client Privilege, #Hacking, #Spoliation of Evidence

Marissa J. Moran / Law and Paralegal Studies Department

The role of a judge in the American legal system is that of decision maker. Legal experts have shared their thoughts and experiences about the function of jurists. Justice Blackstone viewed judges as the oracles of the law. Founding Father and attorney Alexander Hamilton's view on judges was that they exercise judgment but not will. Using humor and in an effort to make the role of judge more readily understood by a sports loving society, John Roberts, at his confirmation hearing, observed that the role of the judge was similar to that of an umpire in the sport of baseball. He stated that judges, even Justices of the U.S. Supreme Court, are merely umpires, calling balls and strikes. Yet, the role and function of a judge today must also include an ability to assess and decide issues involving a litigant's use of science and technology and how this may impact on the federal/state rules of court procedure and the attorney-client privilege. The need and importance of attorneys' ethical responsibilities to their clients is addressed in the following cases. The New York Court of Appeals has stated that attorney-client privilege is the oldest among common-law evidentiary privileges and is intended to foster the open dialogue between lawyer and client that is deemed essential to effective representation. Similarly, the Court of Appeals in *People v. Shapiro*, ruled on the sanctity of the attorney-client privilege, finding that "[a]ny other policy than strict inviolability, unless expressly waived, would seriously hamper the administration of justice..." In a recent decision by a judge in a family law divorce proceeding in Brooklyn Supreme Court, the hacking of the attorney-client privilege and the technology assisted destruction of evidence, spoliation, was disclosed. This paper will examine how a judge's grasp of law and technology led to decision making which both preserved the attorney-client privilege and upheld the rules of procedure.

i William Blackstone, 1 Commentaries \*69.

ii The Federalist No. 78, at 412 (Alexander Hamilton) (J.R. Pole ed., 2005).

iii Confirmation Hearing on the Nomination of John G. Roberts, Jr. To Be Chief Justice of the United States: Hearing Before the S. Comm. on the Judiciary, 109th Cong. 55 (2005) (statement of John G. Roberts, Jr.).

iv *Spectrum Systems Intern. Corp. v. Chemical Bank*, 78 NY2d 371, 575 NYS2d 809 [1991].

v *People v Shapiro*, 308 NY 453, 459, 126 NE2d 559 [1955].

## Native Son

Nandi Prince / Library

Novelist Richard Wright forced his readers to appraise the political, social, and economic climate of some of the most fraught moments in American history. The American Civil Rights Movement, still in its infancy, and the fight for civil liberties in a post-slavery era are central to how race is treated in the narrative. This work is explored using a Marxist lens.

## Combinatorial Aspects of Vertex Operator Algebras

Corina Calinescu / Department of Mathematics

The theory of vertex operator algebras provides constructions of integrable highest weight modules and principal subspaces of these modules, for affine Lie algebras. These constructions have been studied in conjunction with combinatorial identities. In this work we study the principal subspaces of higher level integrable highest weight modules for the affine Lie algebra  $A_2^{(2)}$ . We show that their characters are given by the Nahm sum of the inverse of the tadpole Cartan matrix. Some of these characters are related to Gollnitz-Gordon-Andrews partitions identities.

## Bernstein Algebras

Hans Schoutens / Department of Mathematics

We define a new class of (associative, non-commutative, unitary) algebras over some manifold (or even non-smooth scheme), called Bernstein algebras, so that all the fibers are Weyl algebras. To a Bernstein algebra, one can associate a commutative, graded ring, which in addition is a Poisson algebra, and any commutative Poisson algebra can be obtained this way. Another example is obtained by taking the universal algebra of an alternating form (on some finitely generated module).

## Mean Row Values in $(u, v)$ -Calkin-Wilf Trees

Sandie Han, Ariane M. Masuda, Satyanand Singh, Johann Thiel / Department of Mathematics

We fix integers  $u, v \geq 1$ , and consider an infinite binary tree  $T^{(u, v)}(z)$  with a root node whose value is a positive rational number  $z$ . For every vertex  $a/b$ , we label the left child as  $a/(ua + b)$  and right child as  $(a + vb)/b$ . The resulting tree is known as the  $(u, v)$ -Calkin-Wilf tree. As  $z$  runs over  $[1/u, v] \cap \mathbb{Q}$ , the vertex sets of  $T^{(u, v)}(z)$  form a partition of  $\mathbb{Q}^+$ . When  $u = v = 1$ , the mean row value converges to  $3/2$  as the row depth increases. Our goal is to extend this result for any  $u, v \geq 1$ . We show that, when  $z \in [1/u, v] \cap \mathbb{Q}$ , the mean row value in  $T^{(u, v)}(z)$  converges to a value close to  $v + \log 2/u$  uniformly on  $z$ .

## Exploring the Mathematics of the Lights Out Game and its Variants

Boyan Kostadinov / Department of Mathematics

We explore the Lights Out game played on an  $n$  by  $n$  grid of switchable lights. When the game starts, a random number or a given pattern of these lights is switched on. Pressing any of the lights will toggle it and the adjacent lights. The goal of the puzzle is to switch all the lights off. Mathematically, solving the classical game amounts to solving a linear system of  $n^2$  equations modulo 2. We implemented a solver for the forward Gaussian elimination and back-substitution algorithm mod 2 that gives the solution when the game is solvable. We also investigated numerically the solvability likelihood of the classical game by simulating a large number of random games for several board sizes. We plan to extend the numerical implementation to game boards with different boundary identifications, including a Mobius strip and other surfaces. We also plan to extend the solver to work mod  $k$ , so that each light is allowed to have  $k$  distinct colors, rather than a binary setting. This project was my part of the investigations of a 6-member research group, headed by Gizem Karaali (Pomona College), organized and sponsored by the American Institute of Mathematics in San Jose, June 2018.

## Laplace Transform Approach for the Dynamics of N Qubits Coupled to a Resonator

Mirko Amico, Oleg L. Berman, Roman Ya. Kezerashvili / Physics Department

An approach to use the method of Laplace transform for the perturbative solution of the Schrodinger equation at any order of the perturbation for a system of N qubits coupled to a cavity with n photons is suggested. We investigate the dynamics of a system of N superconducting qubits coupled to a common resonator with time-dependent coupling. To account for the contribution of the dynamical Lamb effect to the probability of excitation of the qubit, we consider counter-rotating terms in the qubit-photon interaction Hamiltonian. As an example, we illustrate the method for the case of two qubits coupled to a common cavity. The perturbative solutions for the probability of excitation of the qubit show excellent agreement with the numerical calculations.

## Polynomial Representations of Integration-By-Parts Relations

Ray D. Sameshima / Physics Department

Scattering amplitude in quantum field theories allow us to compare the phenomenological prediction of theoretical models with the measurement data at collider experiments. The study of scattering amplitudes, in terms of their symmetries and analytic properties, can provide a framework to develop techniques and efficient algorithms to evaluate cross sections. To evaluate higher-order amplitudes, a computational technique called Integration-By-Parts Reduction is at present an unavoidable step. In this process, a large set of linear relations between integrals is generated; by solving them, we can get a set Master integrals, which are necessary ingredients for our calculations. In our poster, we describe some interesting representations for this formalism and their applications to generate Integration-By-Parts relations. Within these representations, integrals are fully characterized by a single polynomial, and the Integration-By-Parts relations become a polynomial identity.

## Spin Hall Effect for Polaritons in a TMDC Monolayer Embedded in a Microcavity

Oleg L. Berman<sup>1</sup>, Roman Ya. Kezerashvili<sup>1</sup>, Yurii E. Lozovik<sup>2</sup>

<sup>1</sup>Physics Department, New York City College of Technology, CUNY,

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The spin Hall effect (SHE) for polaritons in a transition metal dichalcogenides (TMDC) monolayer embedded in a microcavity is predicted. We demonstrate that two counterpropagating laser beams incident on a TMDC monolayer can deflect a polariton flow due to generation the effective gauge vector and scalar potentials. The components of polariton conductivity tensor for weakly-interacting Bose gas of polaritons in the presence of Bose-Einstein condensation (BEC) and superfluidity and also for non-interacting polaritons without BEC are obtained. The obtained results are applicable for a two-component system of A and B polaritons. The polariton SHE for both superfluid and normal phases was studied. We propose to study the superfluidity of microcavity polaritons by experimental measuring of the components of the total conductivity tensor as functions of the synthetic magnetic field at different temperatures. It is shown that the concentrations of the normal and superfluid components and the Kosterlitz-Thouless phase temperature of occurrence of superfluidity can be determined by experimental measuring of the components of the total conductivity tensor. The possible experimental observation of the spin Hall effect for microcavity polaritons is proposed, that also provides the signature of the superfluidity of microcavity polaritons.

The work is supported by US Department of Defense under Grant No. W911NF1810433 and PSC CUNY under Grant No. 60599-00 48.

## Associated Hadroproduction of a Top Quark Pair and a Massive Vector Boson

Andrea Ferroglia / Physics Department

The associated production of a top-quark pair and a massive vector boson (Higgs boson, W boson or Z boson) is a family of processes measured at the Large Hadron Collider at CERN. These processes are important in order to determine possible anomalous couplings if the top quark with the Z or Higgs boson and as background for new physics searches. In a research program developed over several years, we increased the precision of the Standard Model predictions for these processes. In particular, we evaluated QCD corrections at next-to-next-to-leading logarithmic accuracy in resummation improved perturbation theory and we combined them with next-to-leading-order electroweak effects.

## Investigation of the Impact of Fiber Parameters via EDFA and/or Raman Amplified 256-Gb/s PDM-16QAM WDM Transmissions

Lufeng Leng / Physics Department

The impact of fiber properties is investigated for coherent systems employing polarization-division multiplexed high-level quadrature amplitude modulation, wavelength-division multiplexing, and erbium-doped fiber amplifier and/or distributed Raman amplification. This is done by comparing the performances of fiber links of various attenuation coefficients and effective areas via experimentally verified analytical methods. Results show that the excess noise, which originates at amplifiers compensating for the losses of filters and switches located between fiber spans, can weaken or even diminish the performance enhancement brought about by lowering the fiber attenuation coefficient, especially if distributed Raman amplification is employed. This leads to the difference in the link performance assessment between our analytical results and some previously published figures of merit (FOM). On the other hand, increasing the fiber effective area results in the same amount of performance improvement regardless of the amplification scheme or the excess noise, which agrees with the FOMs. Since the larger effective area causes poorer pumping efficiency for systems employing distributed Raman amplification, a tradeoff between high performance and low power consumption needs to be determined for such systems.

## Bose – Einstein Condensation and Superfluidity of Trapped Photons with Coordinate – Dependent Mass and Interactions: Numerical Analysis

Leonid Pomirchi / Physics Department

We studied the effect of coordinate-dependent effective mass and photon-photon coupling parameter  $g(r)$  on the superfluid and normal density for the trapped cavity photons. Such an approach is useful for mirrors of smaller radius with high trapping frequency, which provide BEC and superfluidity for a smaller critical number of photons at the same temperature. Due to the mirrors' axial symmetry the wave function  $(r)$  of the 2D photon condensate has the axial symmetry and the corresponding equation in the case of coordinate-dependent parameters was provided in Ref. [1]. In this research we designed a complex of computer programs using Runge-Kutta method of 4th order to find an exact numerical solution of the equation for density profile of photon in BEC for different parameters: radius of a

mirror, photon-photon interaction. The computerized solutions were compared with the analytical Thomas-Fermi approximation.

[1] O. L. Berman, R. Ya. Kezerashvili, and Yu. E. Lozovik, J. of the Optical Society of America, B 94, 1649 (2017).

## Heat Conduction in Halo Gas Clouds

Jerry Ortiz, Ariyeh H. Maller / Physics Department

For a warm gas cloud within hot halo gas, the internal energy of the warm gas cloud will be regulated by two primary processes: energy gained through thermal conduction with the surrounding gas, and energy lost due to thermal radiation. Usually thermal conduction is not included in hydrodynamical simulation of galaxy formation. Here we explore how including thermal conduction between a cloud and its surrounding environment would affect the dynamics of that region.

## Tunable Optical Absorption by Excitons in Xenex via an External Electric Field

Matthew N. Brunetti, Oleg L. Berman, Roman Ya. Kezerashvili / Physics Department

We study the binding energies and optical properties of direct and indirect excitons in monolayers and double-layer heterostructures of Xenex: silicene, germanene, and stanene. In addition to the exciton binding energy, the optical transition energy, oscillator strength, and absorption coefficient are also calculated. It is demonstrated that an external electric field can be used to tune the eigenenergies and optical properties of excitons by changing the effective mass of charge carriers. The Schrödinger equation with field-dependent exciton reduced mass is solved by using the Rytova-Keldysh (RK) potential for direct excitons, while both the RK and Coulomb potentials are used for indirect excitons. It is shown that for indirect excitons, the choice of interaction potential can cause significant changes in the eigenenergies. Furthermore, our calculations show that the choice of material parameters has a significant effect on the binding energies and optical properties of direct and indirect excitons. These calculations contribute to the rapidly growing body of research regarding the excitonic and optical properties of this new class of two-dimensional semiconductors.

The work is supported by US Department of Defense under Grant No. W911NF1810433.

# Wilson Surface Central Charge from M-theory Using Gauge/Gravity Duality

John Estes<sup>1</sup>, Darya Krym<sup>1</sup>, Andrew O'Bannon<sup>2</sup>, Brandon Robinson<sup>2</sup>,  
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<sup>1</sup>Physics Department, New York City College of Technology,

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M-theory is a candidate for a theory of quantum gravity which does not suffer from divergences at high energy. M-theory is defined as the (presumably unique) high energy (often referred to as UV) completion of 11d supergravity (SUGRA),

Gauge/gravity duality (often referred to as holography) relates theories in 11-dimensional supergravity (or M-theory) with intersecting M2 and M5 branes to conformal fields theories.

Entanglement entropy (von-Neumann entropy) is a measure of how different parts of a system correlate with each other. It describes the entropy of one part of a system due to the lack of information about another part of a system. Gauge/gravity duality methods can be used to compute entanglement entropy for a 1+2 dimensional boundary theory corresponding to intersecting M2/M5 branes in 11-dimensional supergravity (M-theory). The entropy is proportional to the entangling surface. Entanglement entropy applies to the study of black holes with the horizon behaving as an entangling surface. This could shed light on the black hole information paradox.

We present several holographic calculations of a central charge associated with Wilson surfaces in the M5-brane theory, for arbitrary representations/partitions.

## ORGANIZING COMMITTEE

Roman Kezerashvili, Founder and Chair

Candido Cabo

Corina Calinescu

Andrea Ferrogli

George Kiezik

Darya Krym

Alberto Martinez

Anna Matthews

Hamidreza Norouzi

Alexander Rozenblyum

Stephen Soiffer

Mai Zahran



First row l to r:

**Roman Kezerashvili,  
Candido Cabo,  
Corina Calinescu**

Second row l to r:

**Andrea Ferrogli,  
George Kiezik,  
Darya Krym**

Third row l to r:

**Alberto Martinez,  
Anna Matthews,  
Hamidreza Norouzi**

Fourth row l to r:

**Alexander Rozenblyum,  
Stephen Soiffer,  
Mai Zahran**



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