UNBC Research Week

Tuesday, March 1st, 2022

10:0am–11:00am

Equity, Diversity and Inclusion (EDI) in Research Environments
Dr. Nicole Kaniki, Founder and Director of Senomi Solutions Inc.

Zoom link:
https://unbc.zoom.us/j/64798081225?pwd=MGxTZXNKRDVDc0dNczJEWjlCZThhUT09
Meeting ID: 647 9808 1225 Passcode: 249935

*** This session will be using a waiting room for non-UNBC participants to minimize to risk of potential disruptions to the session so please log in to Zoom using your UNBC sign-in if possible.**

Dr. Nicole Kaniki is the Founder and Director of Senomi Solutions Inc., an EDI Consulting Company that provides strategic EDI support to organizations. She holds a MSc Kinesiology, and a PhD Health and Rehabilitation Sciences, and a MA Gender, Sexuality and Women's Studies from Western University. Nicole have over 6 years of experience in the academic research environment and has had roles in research ethics, research development, and EDI in research and innovation. also completed at Western doing research in Black Feminist Narratives in the Academy. She has a passion for social justice and uses an anti-racism and decolonization framework in her EDI work.

This session will provide a foundational understanding of the basic concepts of EDI, and how systems of oppression operate in academia. We will discuss the challenges and barriers faculty, students, trainees and staff from underrepresented groups face in the research ecosystem which has led to the lack of diversity we see in these environments. Participants will be provided with principles and best practices of equity and inclusion, and how these can be embedded within the research environment.

Objectives
1. Foundational understanding of equity, diversity and inclusion (EDI) and definitions
2. The importance of EDI to research excellence
3. Discussion of the challenges and barriers underrepresented groups face in academia
4. Strategies for implementing equity and inclusion best practices that encourage and support diversity.

Outcomes
1. Understanding and awareness of EDI in academia
2. Strategic approaches to EDI best practices
3. Responding to EDI requirements in research proposals and grant funding applications.

11:00am–11:45am Break

11:45am–12:45pm

Presentations – Mushroom extracts, cancer trials, global stock markets, and settler ableism

Zoom link:
https://unbc.zoom.us/j/69842592917?pwd=cjhHcXZkQ05aelovNFJRVTRXeVVGQT09
Passcode: 196449

Evaluation of Extracts from Mushrooms Native to BC for Antiproliferative Activity Against Human Cervical Cancer Cells
Shamikh Lakhani, BSc Student, Biochemistry & Molecular Biology

Natural products are one of the best sources of novel anticancer compounds. This is because natural products have the ability to interact with a wide array of biological systems as natural metabolites, allowing for more potent drug effects. For discovery of natural products, mushrooms represent a significant source of novel anticancer compounds as mushrooms have been known throughout history to possess medical properties. Furthermore, compounds previously identified from mushrooms have shown to possess a variety of anticancer activities, including inhibition of cell proliferation, induction of apoptosis, reduction of tumor proliferation signaling, and control of human immune system modulation. Despite this, it is estimated that only 10% of mushroom species are known to science. For the purpose of natural product discovery, Dr. Chow Lee's lab at UNBC has collected wild mushroom samples from forests across North-Central British Columbia (BC) to investigate for potential bioactivities. The purpose of this study is to screen mushroom samples for antiproliferative activity against HeLa human cervical cancer cells. Ethanol, water, and dichloromethane were used as solvents to obtain crude extracts from each sample. Both manual extraction and Dionex ASE 350 Solvent Accelerator extraction were used for such purposes. Various concentrations of crude extracts were then incubated with HeLa cells for 48 hours and cell viability was assessed using the cytotoxic MTT assay. This study represents the first step towards isolation, identification, and characterization of potential anticancer compounds from mushrooms native to BC.

Population-based phase II trial of Stereotactic Ablative Radiotherapy (SABR) for up to 5 Oligometastases: SABR-5 Trial
Dr. Robert Olson, Affiliate Associate Professor, Division of Medical Sciences

Background: After the publication of the landmark SABR-COMET trial, concerns were raised over high-grade toxicity of SABR for oligometastases.

Objective: This study was designed as a bridge from phase II to III trials, with the primary objective to document toxicity of SABR in a larger cohort from a population-based program.

Methods: From November 2016 to July 2020, 399 patients across British Columbia (BC) were enrolled in this single arm, phase II trial of SABR in patients with oligometastatic disease. During this period, patients were only eligible for SABR in these settings on trial within BC, and therefore this analysis is population-based, with resultant minimal selection bias in comparison to previously published SABR series.

Results: The median follow-up was 28 months. The mean age was 68 years (SD 11.1, range 30-97). The most common histologies were prostate cancer (32%), colorectal cancer (14%), breast cancer (11%), and lung cancer (9%). Most (69%) of the patients had a solitary metastases treated. The most common sites of SABR were lung (32%), non-spine bone (30%), spine (15%), lymph nodes (11%), liver (5%) and adrenal (4%). Grade 2, 3, 4, and 5 toxicity cumulative incidences were 14.2%, 4.2%, 0%, and 0.3% respectively.

Conclusions: The incidence of grade 3+ SABR toxicity on this population-based study was less than 5%. Furthermore, the rates of grade 2+ toxicity (18.7%) is lower than previously published on SABR-COMET (29%). These results are encouraging that SABR treatment for oligometastases has acceptable rates of toxicity and supports further enrollment in phase III trials.

International Political Uncertainty and Climate Risk Premium

Dr. Chengbo Fu, Assistant Professor, School of Business

This paper investigates how political uncertainty affects firms' climate risk premium from a global point of view. We use the presidential election events in the United States as well as that from all countries with a stock market as proxies for political uncertainty. We find that the global stock markets respond significantly to political uncertainty induced by the U.S. presidential elections, but not so for elections from their home countries. Although we do not observe a significant change in return premium for firms with different level of climate risk during the periods of political uncertainty, we find that firms with higher climate risk experience much higher return volatility and return correlation amid uncertainty associated with U.S. elections. The results are consistent with the literature that U.S. presidential election is a better indicator of international political uncertainty. At the same time, we uncover the new evidence on how political uncertainty affects the riskiness of firms with high exposure to climate risk.

Decolonizing disability: Settler ableism and Indigenous identities of difference

Dr. Rheanna E. Robinson, Assistant Professor, Department of First Nations Studies

Researching the profound and enduring interruption colonization has had on the lives, lands, and ways of being for Indigenous peoples in North America permeates scholarship in multi-faceted and interdisciplinary ways. Although not typically dominating Indigenous-related academic discourse, discussions related to traditional Indigenous perspectives of difference and disability are emerging as important tenets to include in Indigenous-related research when considering settler ableism and "disability" as a colonial and socially constructed identity. This presentation will problematize how settler ableism in Canada and the United States contributed to the creation of structural inequities where ableist-related power and privilege disrupted traditional Indigenous views of physical, sensory, psychiatric, cognitive, neurological, and intellectual difference. This talk will reflect on traditional Indigenous perspectives of difference and the way Indigenous peoples customarily embraced personal variances as a rich part of human diversity and that ultimately, on a relational-basis, Nation members were included in community regardless of ableist circumstances. Indigenous worldviews have much to teach about respectful, responsible, and relevant considerations of equity and inclusion. Decolonizing "disability" has the potential to be transformational in our understanding and engagement with disability-associated peoples enveloped by a history of assumptions and indifference. How settler ableist ideologies impact Indigenous identities of difference deserves scholarly attention and I look forward to advancing awareness in this important area of research.

12:45pm–1:00pm Break

1:00pm–2:00pm

Interdisciplinary Weekly Seminar Series (IWSS): Inference of Dynamic Systems from Noisy and Sparse Data via Manifold-constrained Gaussian Processes

Dr. Samuel Wong, Associate Professor, Department of Statistics and Actuarial Science, University of Waterloo

Zoom Link:
https://unbc.zoom.us/j/69080355948?pwd=SlFERHlpRmRzZ0Q2QW1ES214WUhWZz09
Meeting ID: 690 8035 5948 **Passcode: iwss2022**

Ordinary differential equations are widely used as models for dynamic systems in science and engineering, such as gene regulation, epidemics, and ecology. An important problem is to infer and characterize the uncertainty of parameters that govern the equations, based on the data that can be observed from the system. In this talk, I will present an accurate and fast inference method using manifold-constrained Gaussian processes, such that the derivatives of the Gaussian process must satisfy the dynamics of the differential equations. Our method completely avoids the use of numerical integration and is thus fast to compute. Our construction is embedded in a principled statistical framework and is demonstrated to yield fast and reliable inference in a variety of practical problems, including when a system component is unobserved. This is joint work with Shihao Yang (Georgia Tech) and Samuel Kou (Harvard).

2:00pm–4:00pm

The Materials Technology and Environmental Testing (MATTER) Team Panel

Zoom link:
https://unbc.zoom.us/j/67269551609?pwd=NW5ud3RUU0ptZS9PVFEyc1pMa0dYdz09
Passcode: 378036

Lignin-coated Cu-based metal-organic framework as a green bioactive platform for drug delivery

Hoorieh Jahanbani

This work aims for the synthesis of a Cu-based metal-organic framework (MOF-199) and a green coating procedure with Lignin natural polymer to achieve an effective transport vehicle for carrying of Ibuprofen as an oral PH-sensitive drug. The single ligand MOFs with benzene tricarboxylate (BTC) or lignin and mixed ligands lignin-coated MOFs nanocomposite (Lignin@MOF) were prepared through a convenient and green one-pot approach of the MOF components and Lignin alkaline powder both under room temperature and hydrothermal methods. The physicochemical properties of the synthesized MOFs and the Lignin@MOF nanocomposites were studied by analytical techniques i.e., Fourier transforms infrared

(FTIR), XRD, Brunauer Emmett Teller (BET), Thermo Gravimetric Analyzer (TGA). Ibuprofen (IBU) was used as an analgesic and anti-inflammatory drug model and loaded into the single MOF and Lignin@MOF nanocomposite. The loading capacity and encapsulation efficacy of MOF-199 and Lignin@MOF nanocomposite for IBU will be investigated and the in vitro pH-dependent release behavior of IBU will be studied in two simulated body fluids (stomach and intestine) at 37 °C.

Comparison of chromium species interconversion and recovery using three different filter treatments
Ann Duong and Mya Schouwenburg

The purpose of this study is to compare the recovery of soluble and insoluble chromium III and VI from samples collected at a Chrome plating facility using three filter treatment conditions, 1) untreated 2) HSE Method DHS 52/3 using 1 M NaOH and 3) INRS method Metropol 43 using a solution of 10 g magnesium sulfate and 1 ml of 1 M sodium carbonate made up to 100 mL with water. The filter treatment with the best recoveries as determined by EPA method 6800 (SIDMS) using IC-ICP-MS will be used for sampling in highly reducing environments present during chrome plating or welding operations that can cause the conversion of Cr (VI) to Cr (III) during the sampling process, underestimating the amount of Cr (VI) exposure to workers that can adversely affect their health and safety.

Modification of LTA Zeolitized Coal Fly Ash with Cationic Surfactant as a Novel, Efficient, and Low-Cost Adsorbent for Removal of Glyphosate
Sarah Haghjoo

The aim of this study was to develop a novel, efficient, and low-cost adsorbent for the removal of Glyphosate (Gly) from contaminated water. To accomplish this, (LTA) zeolite was hydrothermally synthesized from Coal Fly Ash (CFA) as a waste material and then modified with Hexadecyl Trimethyl Ammonium Chloride (HDTMAC) cationic surfactant. Analytical instrumental methods such as ICP-OES, XRD, XRF, FTIR, SEM, TGA, and BET were used to characterize modified and unmodified adsorbents. pH an important factor in the adsorption of glyphosate, with the highest removal efficiency of glyphosate (96%) prevailing at pH 6, while the adsorption capacity declined significantly with rising pH. At pH 6, the electrostatic interaction between the adsorbent and the adsorbate may be facilitated by the negative surface charge of gly and the positive surface charge of modified zeolite. The batch adsorption method was conducted to determine the effects of pH, reaction duration, starting concentration, and adsorbent dose on adsorption performance. The Absorption process appeared to be relatively rapid, with the equilibrium achieved in 2 h.

Production of Sustainable Wood-based Foam Materials
Nasim Ghavidel

A variety of manufacturing processes such as packaging, insulation, filtering, and construction rely on foam products derived from petroleum-based materials, i.e., expanded polystyrene (EPS) and polyolefins. However, governments have started implementing regulations and bans on the use of single-use plastics, which include EPS foam products used in different industrial sectors. Foaming with renewable and sustainable materials will be necessary to meet changing regulatory requirements but will also provide an opportunity to develop novel processes with the feasibility to substitute petroleum-

based materials in a wide range of applications such as filtering, thermal insulation, sound insulation, and cushioning.

The main objective of this project is to identify, design, develop, and implement the use of wood-based materials as a sustainable substitute for EPS food packaging. Additionally, the technology should have broader applicability to other foam-based applications, such as sound insulation, or cushioning that could benefit from a sustainable alternative. As a novel design and innovative approach to adapt to an existing process, biodegradable foam blocks (sheets) will be produced via wet foaming technique using wood-based materials (fibers) to replace EPS sheets. After use, the material could be recycled like cardboard in an existing supply stream, combusted for its caloric value, or simply composted.

Design and Synthesis of MOF-based Composite for CO_2 Adsorption Application
Hossein Zeinalzadeh

Today, global warming is a major issue throughout the world. Increasing the emissions of greenhouse gases from burning fossil fuels for energy production is one of the main causes of this problem. This implies that during the start of the Industrial Revolution, the quantity of carbon dioxide in the atmosphere was about half of what it is now. For this reason, it has been discovered that there are many different forms of porous materials, such as mesoporous silica, zeolites, porous carbons, and metal-organic frameworks (MOFs). Among the mentioned materials, MOFs are a desirable approach and a new generation of materials which have caught the attention of most scientists in the last two decades. MOFs have very large specific areas, high porosity, and they provide a brilliant future in this area. It is noteworthy that these materials have low thermal stability which is one of their disadvantages.

The purpose of this study is to design and synthesis of MOF-based nanocomposite for CO_2 capture process. Zeolitic imidazole framework (ZIF-8) has been synthesized over SAPO-34 using solvothermal method. SAPO-34 is one of the common zeolites that has been applied for processes on industrial scales. Our expecting is the combination of ZIF-8 and SAPO-34 will improve high thermal gravity of samples and will have high CO_2 adsorption capacity in comparison with pristine samples. In this term, XRD, TGA and CO_2 Isotherm analysis will be applied for the samples to evaluate the effect of composite creation on mentioned process.

Metal modified zeolite as a means to eliminate bacteria from drinking water
Lon Kerr

Previous research has shown that zinc modified zeolites eliminate harmful bacteria from sources of drinking water. Canada has a wealth of naturally occurring zeolites that are potential candidates for this application. Zeolite samples are characterized physically and chemically and then modified with zinc, and copper mixtures. To test the application of the material, a control strain of *e.*coli is grown in solution with metal modified zeolite. While other research groups have demonstrated the efficiency of this technique, the state of the water post treatment is questionable.