GRADUATE STUDENTS' ASSOCIATION
GSA
U of S

UNIVERSITY OF SASKATCHEWAN

RESEARCH CONFERENCE

RESEARCH FOR A BETTER WORLD: A HOLISTIC APPROACH

FEB. 27 - 28, 2019
GSA Commons

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WELCOME MESSAGE

GSA President

The University of Saskatchewan Graduate Students Association (GSA) is an integral part of the research community at the University of Saskatchewan. The GSA supports graduate students in many aspects of their research experience. As research opportunities are important to both graduate students and the University of Saskatchewan, the GSA is pleased to host and welcome everyone to the 2019 Research Conference: "Research for a Better World - A Holistic Approach". This will be a unique opportunity for students to build on and share their research with a broad audience.

Thank you for your participation and attendance at this inspirational event.

On behalf of the GSA executives,

Naheda Sahtout
President,
Graduate Students' Association
University of Saskatchewan

SCHEDULE

WEDNESDAY, FEBRUARY 27th, 2019

9:30 AM: **Registration and Refreshments**

10:00 AM: Opening Remarks

Dr. Andrew Potter. Acting Associate Vice President Research, U of S

Dr. Trever Crowe. Dean, College of Graduate and Postdoctoral Studies

Naheda Sahtout. President, Graduate Students' Association

HUMANICS

10:20 AM: Dr. Manuela Valle-Castro

10:50 AM: Rebeca Bourgeois
The informed behavioural model for bioarchaeology

11:05 AM: Kyler Hudson
Leaders, issues, and campaigns: The 2019 Alberta election

11:20 AM: Nicholas Peat
Critical ecologies and the aesthetics of cultural exchange

11:35 PM: Shatabdi Goon
Influences of neighborhood environments on children's physical activity and sedentary behavior

LUNCH

11:50 AM – 1:00 PM

HEALTH

1:00 PM: Dr. Rana Mustafa
Food futurism: What will our food look like in 2029

1:30 PM: Wanda Seidlikoski Yurach
Community-based participatory research: Developing a community of practice to support the wellbeing of mental health providers working in remote northern Saskatchewan First Nations Communities

1:45 PM: Liliana Rodriguez
Lives on hold: An exploratory analysis on the effects of a secure legal status in the lives, health and well-being of temporary migrant workers in Saskatchewan

2:00PM: Dinesh Wellawa
"Shedding light" on food poisoning

2:15 PM: Emerita Mendoza-Rengifo
Novel structural and chemical approaches to better characterize selenoenzyme interactions with mercury

2:30 PM: Saman Naghieh
Effect of sterilization on the mechanical characteristics of hybrid and composite scaffolds

NETWORKING

2:45 PM – 3:00 PM

THURSDAY, FEBRUARY 28th, 2019

10:00 AM: **Registration and Refreshments**

ENVIRONMENT

10:30 AM: Palash Sanyal

The power of community engagement, collaborative research and communication

11:00 AM: Amy Hergott

11:15 AM: Majing Oloko

Using the traditional food system as an example to accentuate Indigenous People's contributions to sustainability

11:30 AM: Ashley Shaw

Visualizing Indigenous knowledge for forest management

11:45 AM: Alivia Mukherjee

Carbon dioxide capture exploiting novel activated carbon from spent coffee grounds

LUNCH

12:00 PM – 1:00 PM

TECHNOLOGY

1:00 PM: Dr. Daniel Chen
3D Bioprinting scaffolds for tissue engineering applications

1:30 PM: Saeed Ghanbari
Design of a novel process for natural gas dehydration

1:45 PM: Samantha L. Steinke
Testing of a rehabilitation harness and breastplate to aid in healing from musculoskeletal injuries in horses

2:00 PM: Oxana Pimenova
Pipeline approvals: Epistemic success of consultations

2:15 PM: Closing Remarks

NETWORKING

2:30 PM – 2:50 PM

HUMANICS

DR. MANUELA VALLE CASTRO

Dr. Manuela has an incredible history of grassroots activism in Chile and Canada with a flair for facilitation and encouraging thoughtful discussions about social justice with youth. She has achieved a PhD in, Race, Sexuality, and Social Justice, along with her involvement in many different organizations including Girls Rock Camp Saskatoon and Riversdale Community Association. Manuela has held teaching positions at the University of Saskatchewan in the colleges of Arts and Sciences, and brings with her experiences and skills rooted in feminism, conflict mediation, mental health, poverty, environmentalism, Indigenous topics, and many more such subjects.

THE INFORMED BEHAVIOURAL MODEL FOR BIOARCHAEOLOGY

Rebecca Bourgeois

The discipline of archaeology in Canada has transitioned into an era of community driven work as a step to decolonize the practice. Bioarchaeology, on the other hand, has largely become focused on international projects and has all but halted in Canada. Under the recent (2015) recommendations put forth by the Truth and Reconciliation Commission of Canada, this paper proposes the Informed Behavioural Model by which bioarchaeology can re-enter Canada by assuming a consultant role and functioning as a tool for the mortuary management of at risk sites and the preservation of Canadian stories. Drawing on theoretical approaches such as the biocultural model, behavioral archaeology, archaeologies of personhood, shared histories, and general social theory, the Informed Behavioural Model outlines a pragmatic approach to orienting and interpreting bioarchaeological study under a specific intention and a heightened focus on personhood. This model contends that a holistic, community driven approach to bioarchaeological research activates the expertise of communities to achieve meaning- and impactful outcomes.

LEADERS, ISSUES, AND CAMPAIGNS: THE 2019 ALBERTA ELECTION

Kyler Hudson

Campaigns, issues, and party leaders embody the classic conception of politics. Democratic politics is traditionally thought of as an intellectual and social exercise between parties, competing with one another to win the support of voters over the course of a campaign. These same dynamics will appear in the 2019 Alberta provincial election. The new United Conservative Party, headed by Jason Kenney, will challenge the governing New Democrats, led by Rachel Notley. The campaign will likely center around the biggest issues facing Alberta: the economic recovery and the construction of oil pipelines. This paper will describe how the party leaders, their campaigns, and the biggest political issues will impact the election. First I will provide the Alberta-specific context, describing the leaders of the two major parties and the issues dominating headlines in the province. Next, I will review the academic literature regarding the electoral effects of leadership, issue-ownership, and campaigns. These findings will then be applied to the case of Alberta. I will predict how these theories could arise in spring 2019. The conservatives' ownership of economic issues and public opinion data suggest that the UCP is in a good position heading into the election. During the campaign, both parties will attempt to mobilize their voters via canvassing, but as the opposition, the UCP will likely succeed in more competitive districts. In the 2019 provincial election, Jason Kenney and the UCP are likely to benefit from the leadership, issue-ownership, and campaign effects described in the academic literature.

CRITICAL ECOLOGIES AND THE AESTHETICS OF CULTURAL EXCHANGE

Nicholas Peat

This research focuses on the human experience in relation to geologic time. Investigating how different kinds of graphic imagery are generated via processes of the physical environment, Peat employs interdisciplinary artistic approaches that include drawing, painting, collage, printmaking, performance, and photography. Particularly interested in the hard-etched remnants of geologic history, Peat scours his physical environment for information of particular visual interest, generated either by earth systems or the artist himself, in a way so as to explain an interconnectedness in our world that clearly exists, but often eludes us. In 2018, Peat's Master's research took him to the Hubei Institute of Fine Art in Wuhan, China, to further explore these ideas in a foreign context, emphasizing their universality. In 2019, Peat will return to China to pursue independent research into the philosophical underpinnings of traditional Chinese landscape art, for which Peat was awarded a grant through the Canadian Government's MITACS Graduate Research Program. Trained as a geographer at Queen's University in Kingston, Ontario, but currently pursuing his M.F.A. at the U of S, Peat brings an ecological sensibility to the idea of artmaking and the idea of artistic exchange, both in the context of the studio, and in the context of research and cross-cultural cooperation and dialogue.

INFLUENCES OF NEIGHBORHOOD ENVIRONMENTS ON CHILDREN'S PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR

Shatabdi Goon

Background: The evidence based on the associations between neighborhood environments and children's physical activity is still developing, compared to that among adults. A better understanding whether and how neighborhood environments influence children's physical activity is therefore necessary to promote health and wellbeing in children. **Objectives:** This study aimed to estimate the associations between children's perceived, or objectively measured, neighborhood environments with accelerometer-assessed physical activity among children aged 10 to 14 years. **Methods:** This longitudinal study builds on Smart Cities Healthy Kid's study conducted in Saskatoon during the 2009-2015 school years. The perceived and objective measures of neighborhood environments were collected by both children using surveys and independent trained assessors using two validated, replicable tools (Neighborhood Active Living Potential, NALP, and Irvine Minnesota Inventory, IMI). Linear mixed-effect models estimated the associations between neighborhood environments and children's activity over time. **Results:** After adjusting for potential confounders, we found that, children residing in neighborhoods perceived as safe, with good services/facilities, and sidewalks/parks

were significantly more likely to be physically active and to engage in less of sedentary behavior. Objectively measured neighborhood safety was positively associated with MVPA (estimate: 8.19 (95% confidence interval (CI): 5.86, 10.52), p=0.001), however, had no impact on ST. **Conclusion:** Safe, walkable, and aesthetically pleasing neighborhoods, with access to overall and specific destinations and services were found to influence children's physical activity and sedentary time. Further context-specific studies are required.

HEALTH

DR. RANA MUSTAFA

Dr. Rana Mustafa is a visiting professor at the University of Saskatchewan and the R&D Food Scientist at Prairie Tide Diversified Inc. has built her international expertise in food science, product improvement, and product implementation for over ten years of research and teaching at both universities and industries in France, Syria and Canada. In France her main activities included the creation of new natural food colorants through enzymatic modification of polyphenolic compounds. In Syria, Dr. Mustafa developed and taught various food-science courses, and managed research projects in collaboration with the food industry. Her current area of investigation on behalf of a partnership between Prairie Tide Diversified Inc. and the University of Saskatchewan focuses on developing new gluten-free and vegan food products from pulses and flaxseed. This combination of roles in academic research, industry-driven innovation, and project management arose from her specific interest to innovate food products based on local plants and traditional foods and convert them into healthy marketable food products.

FOOD FUTURISM: WHAT WILL OUR FOOD LOOK LIKE IN 2029

Dr. Rana Mustafa

According to 2017 United Nations` population estimates, the world's population is projected to reach 9.8 billion by 2050, and two-thirds of all people are expected to live in urban areas. The steady increase of population growth and urbanization have dramatically changed our lifestyles and driven an increased demand for processed, packaged, and ready-to-eat foods. Plant-focused diets are a proposed strategy form addressing the challenge of feeding future populations. New pulse -based food products are being developed that address the sustained growth in consumer demand for high protein and vegan foods. For most food industries, the web and social media play an increasing role in connecting companies to consumers engaging in the co-creation of new food products. In this presentation, we focus on the top emerging food trends which include dairy, egg and meat alternatives and clean label food.

COMMUNITY-BASED PARTICIPATORY RESEARCH: DEVELOPING A COMMUNITY OF PRACTICE TO SUPPORT THE WELLBEING OF MENTAL HEALTH PROVIDERS WORKING IN REMOTE NORTHERN SASKATCHEWAN FIRST NATIONS COMMUNITIES

Wanda Seidlikoski Yurach

An embedded mixed methods research design will be employed in this study utilizing a community-based participatory research approach to explore mental health providers (MHPs) understanding of the lived experience of providing trauma-informed care/counselling in remote northern Saskatchewan First Nations Communities (RNSFNCs), its impact including levels of secondary trauma and strategies to support their well-being. MHPs are approved through First Nations Inuit Health Branch (FNIHB) of Health Canada to provide short-term trauma-informed care/counselling in RNSFNCs or negotiate contracts directly with First Nations communities to provide longer-term trauma supports. Trauma-informed care/counselling in RNSFNCs involves high trauma caseloads with MHPs listening repeatedly to very graphic stories of suffering from clients. Remote trauma-informed care/counselling can be demanding and isolating which has been identified in literature as increasing MHPs vulnerability to secondary trauma. Secondary trauma is the distress a person experiences when exposed indirectly to the trauma of others. With increasing demand for trauma-informed care/counselling in RNSFNCs and no studies to date it is of great interest to explore their experiences. Participants in this study will be a purposeful sample of 10 female MHPs (registered social workers approved through FNIHB) that have travelled into RNSFNCs (communities north of Prince Albert) to deliver trauma-informed care/counselling. The aim of this study will be to understand as well as transform the way in which MHPs carry out their work. The proposed outcome of this study is to co-create sustainable supports including a community of practice to improve the quality of MHPs' northern healing work environments.

LIVES ON HOLD: AN EXPLORATORY ANALYSIS ON THE EFFECTS OF A SECURE LEGAL STATUS IN THE LIVES, HEALTH AND WELL-BEING OF TEMPORARY MIGRANT WORKERS IN SASKATCHEWAN

Liliana Rodriguez

Background: In the last forty years, Canada has hired thousands of temporary migrant workers (TMWs) to alleviate labour shortages and to boost the Canadian economy. Past research regarding TMWs suggests that the lack of legal status can negatively affect their health and well-being. Nevertheless, little attention has

focused on the relationship between the temporality of TMWs' legal status and their health and well-being. **Purpose:** This research aims to investigate how temporality is perceived and experienced by TMWs in Saskatchewan and how their lack of permanent status affects their health and well-being. This research extends our understanding on the effects of obtaining secure legal status and brings to light that TMWs' health issues are not reported and therefore remain underexplored. **Methods:** Using a qualitative approach on secondary data, the method consisted of analyzing thirty semi-structured interviews that explored TMWs' experiences of housing, employment conditions, and access to health. The interviews were conducted in the Saskatchewan cities of Clavet, Regina, Saskatoon, and Swift Current. **Results:** TMWs come to Canada with the expectations of getting better wages and to achieve a better lifestyle. However, the analysis suggests that TMWs' lives in Canada have left them with the same unfulfilled needs that initially persuaded them to seek work in Canada. When TMWs arrive in Canada to work, they find that the wages are insufficient to cover theirs and their family's expenses. Consequently, this situation prevents them from achieving a better lifestyle compared to the one they had in their home country. Also, both the temporary nature of the workers' position and their lack of legal status, especially if prolonged, contributes to underreported physical and mental ill health. This reluctance to report mental and physical health issues can be explained by TMWs' fear of being deported or losing their possibility to obtain Permanent Residency.

"SHEDDING LIGHT" ON FOOD POISONING

Dinesh H. Wellawa

Salmonellosis, a mainly diarrheal disease caused by Salmonella, ranks top among bacterial food poisoning cases globally. With the emergence of antimicrobial resistant superbugs including multi-drug resistant Salmonella strains, treatment becomes increasingly challenging. Chickens act as a major reservoir for Salmonella strains which account for most human outbreaks in North America. Here we have integrated modern genetic techniques to enable the Salmonella bacteria to emit a low level of natural light (a phenomenon called bioluminescence) so they can be tracked once inside the bird. The emitted light was captured through a special device called bioluminescent imager. After given orally to the chickens, we observed that the bacteria mainly colonized the ceca (two small pouches in the digestive tract where majority of the water is absorbed) and also resided in the yolk of young chicks. The glowing Salmonella also facilitated to understand some of the important genetic requirements to thrive inside the bird, unveiling important therapeutic targets for control. Overall our imaging approach using bioluminescent Salmonella strains provided a powerful tool to understand host-pathogen interactions, and will help to investigate the effect of therapeutic strategies (e.g., vaccination) with benefits for human health and the environment in future.

NOVEL STRUCTURAL AND CHEMICAL APPROACHES TO BETTER CHARACTERIZE SELENOENZYME INTERACTIONS WITH MERCURY

Emerita Mendoza Rengifo

Glutathione peroxidases, (EC 1.11.1.9) is an enzyme family with peroxidase activity that protects cells against many inflammatory cellular mechanisms. For example, the selenoenzyme glutathione peroxidase 1 (GPx-1), is required to prevent and reverse oxidative damage, particularly in the brain and neuroendocrine tissues. Moreover, inactivation of GPx-1 by chemical compounds of mercury (Hg) which are among the most toxic of any element, have been reported to be mainly though depletion of selenium (Se). Studies to date have revealed substantial genetic and biochemical details regarding the interaction of Hg with antioxidant human GPx-1 but a full atomic-level understanding is lacking and many mechanistic questions remain. The aim of this research is to better understand the molecular and biochemical basis of inhibition of the GPx-1 enzyme by Hg and MeHg using X-ray absorption spectroscopy. Extended X-ray absorption fine structure (EXAFS) analysis of the Se in GPx-1 revealed a single Se-C at 2.04 Å in the first shell supporting the presence of Selenocysteine (Se binding the C of cysteine) in the active site of GPx-1. EXAFS data of Hg in the presence of both, GPx-1 and GSH show Hg binding S, from reduced GSH, but not Se from human GPx-1. This is surprising, since the affinity of Hg for Se exceeds that of S by many orders of magnitude. Several studies demonstrated that DTT protects cells against MeHg toxicity, which in this case, may be preventing the interaction of Hg with the Se in the active site of this GPx-1. This evidence is the first step for a better understanding of Hg-induced toxicity. Finally, in order to identify the steps of the catalytic cycle where Hg inhibits the activity of GPx-1, further EXAFS experiments are currently being done.

EFFECT OF STERILIZATION ON THE MECHANICAL CHARACTERISTICS OF HYBRID AND COMPOSITE SCAFFOLDS

Saman Naghieh

Extrusion-based bioprinting has been implemented to create three dimensional (3D) structures, called scaffolds. For various tissue engineering applications, different mechanical properties of scaffolds are required. Having said that, efforts have been oriented towards the identification of elements that can modulate the mechanical characteristics of scaffolds such as biomaterial, design, crosslinking mechanism, and sterilization method. In addition, the creation of either hybrid or composite scaffolds to compensate the poor mechanical or biological properties of a sole biomaterial is of importance. Composite/hybrid scaffolds are made of more than one biomaterial to improve the properties of sole material. In this regard, limited studies have focused on the effect of sterilization techniques on the mechanical behavior of hybrid/composite scaffolds created by 3D boiplotting technique, as an extrusion-based printing method. In this study,

we developed hybrid and composite scaffolds composed of 2% alginate and 6% gelatin. To check the printability, first of all, the flow behavior of the proposed biomaterial was studied and a suitable range of viscosity was observed. Then, scaffolds were fabricated using a 3D bioplotter and sterilized (ethanol and ultraviolet (UV) exposure). Results showed that sterilization technique can significantly modulate the elastic modulus of scaffolds. Results of this study can be implemented to carefully design scaffolds from mechanical characteristics perspective.

ENVIRONMENT

PALASH SANYAL

Palash Ranjan Sanyal is a development practitioner currently working with the School of Environment and Sustainability, University of Saskatchewan. The research work of Palash focuses on multidisciplinary issues like child health and water-food-energy nexus, conflict and food security, the impact of climate change on water. Palash holds multiple masters degrees in Development Studies, Environmental Engineering and Water Security from USA and Canada. He has previously worked with the International Fund for Agricultural Development, UNESCO, WaterAid, TEDTalk, Global Voices, Soliya and many other international organizations. An expert in facilitation and communication, Palash has extensive experience in the WASH sector with new technology design and development, implementation and sensitization. Remote and vulnerable communities like urban pro-poor in Bangladesh and the indigenous population in Canada are some of the groups he has served through his work. Palash was named 30 under 30 leader in Sustainability in Canada for his work in 2018.

THE POWER OF COMMUNITY ENGAGEMENT, COLLABORATIVE RESEARCH AND COMMUNICATION

Palash Sanyal

"Which communities will be the most difficult to bring under the Sustainable Development Goals and why?" is a question very few scholarly bodies have focused. In development diaspora, funding has been the top priority even though there exist adequate resources, projects collapse due to lack of sensitization, stakeholder engagement and most importantly, trust. Baffled for an answer, I looked at what keeps the marginalized communities in Asia, Africa, North America and Europe from living under the sustainability umbrella. In Canada or Bangladesh, involving the remote and marginalized communities remains an issue for the government. As for the citizens, faded attempts and endless promises to deal with the fears diminishes any prospects the government might have for change. The first part of this presentation will focus on how we can engage remote and marginalized communities to foster engagement and a sense of belonging through transdisciplinary research. Research though does not happen in a vacuum (even though you might use a vaccuum to do your research). Anyone who has done research has gone out of their comfort zone, sought reasons and contributed in some way towards increasing the existing body of knowledge. The interconnected nature of

the current world order requires the next generation of researchers to be able to adapt and deliver their work effectively to a broader audience. Often in the process, we forget about the power of relationship building. The second part of my presentation will focus on a model I use to extend my work in the professional world, the 4C model..

THE RATES AND CONTROLS OF NITROGEN TRANSFORMATIONS IN THE PRAIRIE POTHOLE REGION, CANADA

Amy Hergott

USING THE TRADITIONAL FOOD SYSTEM AS AN EXAMPLE TO ACCENTUATE INDIGENOUS PEOPLE'S CONTRIBUTIONS TO SUSTAINABILITY

Majing Oloko

Many view sustainability as a 20th century concept; one that was made popular by the 1987 UN World Commission on Environment and Development (WECD) report *Our Common Future*. What most sustainability historical timelines seem to ignore is the contributions of Indigenous people. Many Indigenous cultures had (and still have) the idea of sustainability enshrined in their customs and traditions. One area of manifestation is the *Traditional Food System*. Using examples from North America and Africa, this presentation highlights the historical contributions of Indigenous people to sustainability as we know it today.

VISUALIZING INDIGENOUS KNOWLEDGE FOR FOREST MANAGEMENT

Ashley Shaw

Few good examples in current literature demonstrate how to effectively and holistically incorporate the knowledge of Indigenous peoples into planning, either empirically or more concretely. My study focuses on the knowledge Indigenous communities have towards the natural and forest resources within the Nisbet Provincial Forest and how Indigenous Knowledge (IK) may be effectively incorporated into a management plan. To do this, I created Geographic Information System (GIS) maps to visually display this diverse knowledge in a comprehensible way. By doing this, I explored how GIS maps may be used as boundary objects to facilitate knowledge and stimulate communication between different groups.

I used Houde's Six Faces of Traditional Ecological Knowledge (2007) as a conceptual framework and was able to categorize IK gathered and display different knowledge using different GIS maps. To analyze the effectiveness of these maps, I combined four

key boundary object criteria used to determine if the GIS maps had the ability to effectively facilitate knowledge across boundaries. These criteria are: flexibility, concreteness, joint process, and information need.
As the literature states, Indigenous communities are rarely specifically engaged to actively implement their knowledge in the decision-making process of natural resource and forest management. My study contributes to this body of literature by adding to both the theoretical and empirical contributions. At the end of my study, I was able to synthesize good practice recommendations towards a more inclusive and effective incorporation of IK into natural resource and forest management processes.

CARBON DIOXIDE CAPTURE EXPLOITING NOVEL ACTIVATED CARBON FROM SPENT COFFEE GROUNDS

Alivia Mukherjee

The increased worldwide demand for energy, intensifies the combustion of fossil-based fuels with escalated greenhouse gases concentration in the ambient atmosphere. The increase of recalcitrant carbon dioxide (CO_2) concentration in the ambient air has become the significant reason for the drastic pace of temperature rise and accordingly contributing to the global warming scenario as a primary contributor. To alleviate the catastrophic environmental scenarios, a quick mitigation effort is required. CO_2 capture and storage (CCS) technologies are becoming a very active research area motivated due to the increasing awareness of global warming.

The utilization of the activated carbons (ACs) instead of the current state of the art technology, which is the chemical absorption based on amine scrubbing, is promising as it avoids higher energy penalty encountered in regeneration step. On the other hand, ACs prepared from waste and readily available biomasses are appealing as adsorbents for post-combustion CO_2 capture due to their contribution towards the waste management technology and adding cost effectiveness to the entire set up of mitigation. In Canada, coffee accounts for almost three-fourth of the hot drinks market. Instead of wasting this material, massive amount of varying organic compounds contained in this can be utilized and exploited for the preparation of higher value-added products such as activated carbon for CO_2 capture and storage.

The purpose of this work is to provide critical analysis of the role and performance of ACs from spent coffee grounds (SCG) in capturing anthropogenic CO_2 flue gas prior to emission to ambient air. The ACs from spent coffee grounds are evaluated for their surface properties and chemistry. This can help in providing future direction of the ACs from waste for CO_2 capture in an industrial setting as an alternative to amine scrubbing process.

TECHNOLOGY

DR. XIONGBIAO (DANIEL) CHEN

Dr. Daniel Chen is a Professor with the Department of Mechanical Engineering and the Division of Biomedical Engineering. He is also the leader of Tissue Engineering Research Group that consists of a number of researchers spanning both engineering and life sciences, with a long-term research goal of developing advanced technologies for the production of various scaffold-guided tissue or organ substitutes. He is the recipient of the New Research Award2012 of the University of Saskatchewan, recognizing his significant contributions to knowledge through research.

Dr. Chen's research interests include Tissue Engineering, Scaffold Bio-fabrication, Mechatronics, and Nano-Positioning. His research has been supporting by the Natural Sciences and Engineering Research Council (NSERC) of Canada, the Canadian Institutes of Health Research (CIHR), the Canada Foundation for Innovation (CFI), the Saskatchewan Health Research Foundation (SHRF), and the National Natural Science Foundation of China (NSFC). He teaches undergraduate and graduate courses in the areas of control systems, mechatronics, and tissue engineering.

3D BIOPRINTING SCAFFOLDS FOR TISSUE ENGINEERING APPLICATIONS

Dr. Daniel Chen

Tissue engineering is an emerging field with the aim of producing ‘artificial’ tissue or organ substitutes, ultimately providing a permanent solution to damaged tissues or organs. In tissue engineering, tissue scaffolds play a crucial role. A tissue scaffold is a three-dimensional (3D) structure made from biomaterials with a highly interconnected pore network or microstructure that is used to facilitate cell growth and transport of nutrients and wastes while degrading gradually itself. Fabrication of scaffolds has proven to be a challenging task. One important barrier is the inability to fabricate scaffolds with a microstructure and spatially-controlled distribution of cells that mimics the structure and cell organization in native tissues, and with both mechanical/biological properties appropriate for tissue engineering applications. Recently, the speaker’s research group has been active to pursue research on 3D bioprinting scaffolds for various tissue engineering applications, including the repair of peripheral nerve injuries, spinal cord injuries, articular cartilage, and myocardial infarction. In this presentation, the

speaker will report their recent work and achievements, and discuss the challenges and the opportunities in this emerging field. The use of synchrotron–based imaging to track scaffold placement and success in tissue engineering applications will also be discussed.

DESIGN OF A NOVEL PROCESS FOR NATURAL GAS DEHYDRATION

Saeed Ghanbari

Natural gas is an important energy source for homes, industry, transportation, and electricity production. It is also used as a chemical feedstock in the manufacturing of plastics and other commercially important organic chemicals that are used daily. The presence of water in natural gas not only substantially decreases the heat value of natural gas, but also damages the transportation pipeline by corrosion and methane hydrate formation. To dehydrate natural gas, technologies such as absorption, adsorption, condensation, and supersonic separation have been developed. Despite satisfactory results from these technologies, problems with pollution and high processing costs still exist. In this research project, a new pressure swing adsorption (PSA) process for dehydration of gases using biosorbents was invented, which is more efficient than the other dehydration processes, environmentally friendly, and economically favorable. High performance biosorbents based on agricultural wastes, flax shives and oat hulls, were developed, which had higher water adsorption capacities and selectivities than those of commercial adsorbents. Furthermore, a life cycle assessment was performed and the results showed that the environmental damages caused by biosorbent production were 10.85 times lower than those of molecular sieves production as the common adsorbent used in industry. In sum, both the invented PSA process and the biosorbent are environmentally friendly and efficient, and this process has a potential for industrial applications such as natural gas dehydration, biogas, syngas, and air drying. This process also creates a big market for Canada's agricultural industry as their byproducts and wastes can be sold to chemical plants.

TESTING OF A REHABILITATION HARNESS AND BREASTPLATE TO AID IN HEALING FROM MUSCULOSKELETAL INJURIES IN HORSES

Samantha L. Steinke

Limb injuries rarely result in death for humans, but for horses' euthanasia is often necessary, which is a major welfare concern for equine sports. Limb injuries in horses can result in death, due to their large size and heavy reliance on limbs for support. The first objective was to design a harness through evaluation of anatomical, physiological and behavioural parameters. The second objective was to test an instrumented breastplate measuring pressure, temperature and humidity. The goal is a rehabilitation harness for

use with a novel computer-controlled dynamic lift system, supporting the weight of the horse through front-to-back or side-to-side adjustments. The harness prototype has been weight tested to 600kg and allowed for a 40% reduction of the horse's weight. Addition of an H-frame allowed for a 46% (140 of 301kg) reduction of weight on the forelimbs. An instrumented breastplate is currently under development to measure the amount and duration of pressure on underlying tissues to improve harness design. The breastplate has been weight tested to 620kg, assessing the safety of its use. This fibreglass prototype is lined with silicone air pockets to alter pressure distribution through an inflation and deflation cycle, allowing blood flow to return to the skin momentarily. The breastplate is equipped with pressure, temperature and humidity sensors to monitor skin surface temperature, humidity and the amount and duration of pressure. Further testing and modifications are ongoing to improve horse comfort. Once breastplate modifications are complete, and it is deemed safe, testing will continue on horses.

TRANS MOUNTAIN CASE: WHEN DEFERENCE TURNS INTO DETERRENCE?

Oxana Pimenova

As the Supreme Court of Canada pointed out, 'consultation is meaningless when it excludes any form of accommodation' (Mikisew Cree First Nation v. Canada, para 54).

I will demonstrate a new epistemological approach to consultations with Indigenous Peoples – one that involves seeking their dissent rather than consent. To be able to consider the full scope of alternatives, the government must seek dissent from stakeholders rather than push forward its decisions as it happens with consent-seeking. As a communicative form of dissent resolution, deliberation is opposed to bargaining. While bargaining is aimed at exchanging information and making promises, deliberation relies on an exchange of arguments between actors who are prepared to change their minds for the sake of a better argument.

Consultation procedures can secure meaningful accommodation of Indigenous concerns if these procedures incorporate deliberation rather than bargaining. To prove it I will introduce a participatory dialogue, which is informed by the principles of recognition and prioritization of Indigenous concerns. In contrast to a situation of standard consultative bargaining governed by the logic of consequentialism, the participatory dialogue relies on deliberations and creates the conditions for a policy dispute governed by the logics of arguing and diversity. These logics are instrumental for government officials to switch from pushing their own interests to embracing a better argument. Ultimately, this shift in communication will drive better justified decisions and foster a more stable environment in the natural resources sector.

The **Graduate Students' Association** would like to acknowledge the generous contributions and support from the **College of Graduate and Postdoctoral Studies.**

UNIVERSITY OF SASKATCHEWAN
College of Graduate and Postdoctoral Studies