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SCHOOL OF GRADUATE STUDIES
GRADUATE RESEARCH ACHIEVEMENT DAY
March 5, 2020 | Hyslop Sports Arena

Judging Session: 1 p.m. to 3 p.m.

Public Viewing: 1 p.m. to 3:30 p.m.

Awards Ceremony & Reception: 3:30 p.m. to 4:30 p.m.
PPG can provide greater information on cardiovascular responses to fluid shifts from the upper to lower part of the body under the condition of orthostatic stress. The current study investigated the ability of PPG derived LVET and other PPG derived features to identify progressive central hypovolemia induced by Head-up tilt (HUT) and evaluated the potential use of LVET as an early noninvasive indicator of blood loss. Continuous finger PPG, blood pressure, and electrocardiography were recorded simultaneously during 5-minutes of baseline and HUT of 20°°, 40°°, and 60°° from 15 participants (age: 26.5 ± 3 years; height: 177 ± 8 cm; weight: 72 ± 10 kg, mean ± SD). Beat-by-beat pulse rate (PR), systolic amplitude (SA), systolic time (ST), diastolic time (DT), and PP Interval (PPI) and Ratio of pulse rate over systolic amplitude (PR/SA) were derived for each stage. LVET was derived from each stage. Friedman test followed by post-hoc analysis using Tukey-HSD was conducted to highlight the significance of changes induced by HUT. Application of 60°° HUT (i.e. moderate category simulated hypovolemia) resulted in a significant change in PR (80±3 bpm vs 68±3 bpm, p=0.0008), DT (264±7 ms vs 303±4 ms, p=0.0008), ST (110±6 ms vs 117±7 ms, p=0.02), PP interval (764±39 ms vs 869±25 ms, p=0.0045), PR/SA (112±16 vs 82±21, p=0.012) , SA (0.875± 0.2 vs 1.69±0.6, p=0.012) and LVET(292 vs 351ms,p= 0.0008) compared to baseline. LVET has a strong association with the change in central blood volume and may be used as a sensitive early marker of progressive hypovolemia. The findings of the study support the hypothesis of differentiating simulated hypovolemia based on PPG alone.

Black spot disease in fish is caused by the larva of some trematodes (parasitic flatworms). The disease is characterized by raised, black nodules on the skin, fins, and eyes of fish. In high infections, black spot disease can cause a range of health problems including death. We surveyed the larval parasites on the skin of fish throughout Minnesota and adult parasites from the intestines of fish-eating birds collected in North and South America. We used DNA sequence data to match larval and adult parasites, differentiate between species and study the interrelationships of agents of black spot disease. In total, we collected 14 species of trematodes from 9 genera within 4 families from fish and an additional 9 trematode species from birds which are likely associated with black spot disease. Several species were previously unknown to science. Our results demonstrate the diversity of black spot disease agents to be dramatically underestimated.

Endolysosomes, acid organelles responsible for degrading cellular waste, are important for long-lived post-mitotic neurons. Endolysosome de-acidification has been linked to the pathogenesis of Alzheimer's disease (AD), thus endolysosome re-acidification represents a new therapeutic strategy. Given that AURKA activity is decreased in postmortem brain tissues of AD patients, we tested the hypothesis that decreased AURKA activity results in endolysosome de-acidification and contributes to the pathogenesis of AD. We demonstrated that AURKA was expressed in primary rat neurons, adult mouse brain, and in human brain. AURKA phosphorylation was decreased in hippocampus of AD patients and in 3xTg-AD mice. Significantly, activation of AURKA resulted in endolysosome acidification and decreased levels of Aβ (key pathological marker of AD), whereas inhibiting AURKA increased levels of Aβ. These findings support our hypothesis and provide us with rationale for developing AURKA activator as a preventative and therapeutic strategy against AD. (Supported by MH100972, MH105329, MH119000 and DA032444)
The harnessing of renewable energy resources, such as wind, has been on the rise within the past decade due to environmental concerns. However, electric power production from wind resources is highly dependent on wind speed. The unpredictability of wind speed makes wind power generation variable over time. Due to its intermittent and fluctuating nature, forecasting of wind power is extremely beneficial to power utilities. In this work, four machine learning algorithms are used to predict the wind-based power production over short-, medium- and long-terms, and a comparative analysis of each forecasting method is presented. The predictions are made by varying the number of features and selecting important features for the corresponding methods. Four years of Meteorological data from high wind power potential sites in the Midwest, such as Minnesota, North Dakota, and South Dakota, along with West and East coasts, have been used as training data.

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<th>8</th>
<th>Laura Akindo</th>
<th>Geography</th>
<th>Floodplain Changes of the Red River of the North: 1997-2018</th>
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<td>This study evaluates the effects of the 1997 Red River flood on the woody riparian vegetation in urban and rural portions of the river. Woody vegetation extents were digitized using historic and recent aerial imagery of a portion of Grand Forks County, North Dakota, and Polk County, Minnesota. The overall change in vegetation cover along the study segments was determined over the 20 year period since the 1997 flood.</td>
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<th>79</th>
<th>Shravan Kumar Akula</th>
<th>Electrical Engineering</th>
<th>Formal specification framework for microgrid components</th>
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<td>Microgrids are deemed to be the future of modern power systems. Microgrids are complex systems consisting of different entities ranging from electric vehicles, smart energy storage, and complex communication infrastructure. Currently, in modeling microgrids, several practical aspects are considered, but few to no attempts of formalization, which can improve the reliability and reduce system operating costs and time, are considered. This work demonstrates how complex systems such as microgrids can be modeled elegantly using a formal specification method. Unified Modelling Language (UML) can describe the behavior of any system by describing its normal and disruptive chain of events and the resulting system states during the day to day operations. UML uses temporal logic expressions of the system state diagram for verification purposes. Using the UML model state checker, the state diagram of a microgrid is developed and verified. The verified state diagram is then implemented using the UPPAAL model checker.</td>
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<th>Communication</th>
<th>The Effect of Social Media on Women in Saudi Arabia</th>
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<tr>
<td>This paper explores how Saudi women are shaping new identities for themselves through social media and opening real spaces on these platforms to express their vision and perspective towards various social issues.</td>
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<th>63</th>
<th>Ashrifa Ali</th>
<th>Biomedical Sciences</th>
<th>CRISPR Research innovation of the decade sparks a biomedical science revolution.</th>
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<td>CRISPR is a powerful DNA editing tool originally discovered as a quirk in the immune system of bacteria wherein it creates a rouge gallery of invading viral genetic material in order to identify and prevent subsequent attacks. Scientists have adopted this naturally occurring phenomenon to edit the genetic material of plant, animal, and human cells with greater precision and efficiency because the Cas9 enzyme is guided to a target region by a synthetic RNA called a guide RNA - resulting in a double stranded break followed by an insertion or deletion that culminates in an altered genome. Here, I report on the rapid advances of the CRISPR toolbox, how I use this tool to investigate the role of each variant of scaffolding protein gravin in endothelial cell function, applications of CRISPR in the clinic, and the reasons why CRISPR will be at the center of economic growth for the biotech sector.</td>
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<th>126</th>
<th>Essa Alkathiri</th>
<th>Communication</th>
<th>Does Playing Video Games Cause Aggression: Exploratory Study of the United States and Saudi Arabia</th>
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<tbody>
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<td>This paper explores how Saudi women are shaping new identities for themselves through social media and opening real spaces on these platforms to express their vision and perspective towards various social issues.</td>
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Over the years, global nations have recognized the need to re-examine the relation between playing violent video games and the development of aggressive behavior among the players. Countries such as United States of America and the Kingdom of Saudi Arabia have experienced a high prevalence rate of playing violent video games. Playing video games has become part of popular culture especially among the young generation. Researchers have also found out the relation between existing underlying mental conditions and the development of aggressive behavior. For example, mental disorders such as depression and Post Traumatic Disorder can accelerate the rate at which an individual who habitually plays violent video games develop aggression. This research study takes an exploratory approach by examining the impact of playing violent video games on the development of belligerent behavior in the US and SA.

| 120 | Hussain Almalki | Communication | The Use of Citizen Journalism in Conflict Areas - Citizen Journalists in Warfare - Challenges, Motives, and Roles |

This present study (Course-based research) explores the experiences of citizen journalists in conflict areas around the world. This paper seeks to identify the challenges and risks that a number of citizen journalists faced while covering conflicts in some countries. Moreover, the paper aims to understand the moral and personal motivations that encouraged some citizen journalists to go to and stay in conflict areas. Last, social media used by citizen journalists to report on violence and tragic stories that many people have faced is the third goal this study seeks to understand. In addition, the interview method will be chosen to conduct this qualitative study, and 10 citizen journalists from different countries will be interviewed. The discussion of expected results and future research are dissected at the end of the paper.

| 118 | Samah Alotaibi | Communication | Corporal Punishment (CP) as a Global Issue |

This paper explores strict families’ experiences of using spanking, smacking, and slapping as different ways of corporal punishment. It seeks to know why some parents believe that corporal punishment is effective to control children, and what are some effects on personal relationships between families’ members.

| 93 | Turki Alrashid | Communication | Arab Facts and American Movies |

This paper examines how American movies present Arab facts. Many researchers have criticized how American movies present Arab people and put them in specific frames such as being a Bedouin, aggressive, or terrorist. On the other hand, there is different reality for Arabs. They have unique cultures with a lot of different characteristics. Some researchers who are interested in Arab facts pointed out that Arabs have important roles in the development of human civilization in various fields such as science, medicine, chemistry and mathematics. This paper examines whether American movies fully present Arab reality or not. This paper uses the method of content analysis to investigate how American movies present the reality of Arabs through watching Hollywood and Disney movies over a span of 10 years. The study expects to find significant results. One of the most important results is that American movies still show Arabs negatively without mentioning any positives for financial reasons. Another important expected result is that big events in the Arab region, such as the Arab Spring and terrorist attacks, were a major reason for American movies to portray Arabs in specific frames. Finally, this study suggests a future research question for those who are interested in this aspect: Why do American movies not present the reality of Arabs in an objective way?

| 127 | Mohammed Alsaadi | Educational Foundations & Research | Enhancing the effectiveness of Saudi Arabian undergraduate students’ participation in the United Nations to achieve the Sustainable Development Goals |

This paper aims to enhance the effectiveness of Saudi Arabian undergraduate students’ participation in the United Nations to achieve the Sustainable Development Goals.
This research proposes to analyze to what extent are Saudi Arabian university undergraduate students currently aware of and/or participating with the United Nations (UN) in the Sustainable Development Goals (SDGs). Also, this research measures the knowledge of undergraduate students about the UN and the SDGs. The research investigates the role that undergraduate students can play to help the UN achieve the 17 Sustainable Development goals.

Research Questions:

To what extent are Saudi undergraduate students aware of the United Nations and the Sustainable Development Goals (SDGs)?
Is there a valid and reliable communication between the United Nations and students at higher education institutions in Saudi Arabia?
How would the participation of Saudi undergraduate students help/ do not help the United Nations achieve the Sustainable Development Goals (SDGs)?

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<th>Khalifa Alshaya</th>
<th>Teaching &amp; Learning</th>
<th>ELL Teacher’s Attitude Towards Digital Games</th>
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<td>Attitude is a critical measure as it influences a person’s intentions in performing or implementing a particular action based on their deeply held beliefs. Findings from this study show a clear bias among ELL teachers towards digital games. Even when some indicated the desire to incorporate them in the future and after listing their potential benefits to their students, they are still cautious of their potential harm. This work is one part of a larger PhD dissertation.</td>
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<th>107</th>
<th>Chirby Ambo</th>
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<th>Investigation of the Bacterial Degradation of Lignin Model Compounds using Liquid Chromatography and Mass Spectrometry</th>
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<td>In response to rapid climate change, alternative energy sources have been sought. The utilization of lignocellulosic feedstocks from inedible biomass to produce biofuel is a solution. Additionally, lignin is the only large volume renewable source of aromatic compounds which are potential precursors for industrial compounds. Enzymatic hydrolysis is the milder, more energy-efficient and more environmentally friendly method to valorize lignin. The degradation of lignin by the enzymes found in three different types of bacteria was investigated. Samples comprising of the bacterial strains, Pseudomonas putida JAB 1, Burkholderia xenovorans LB400 and Rhodococcus jostii RHA1, were grown in a medium containing two lignin model dimers, Guaiacylglycerol-β-guaiacyl ether, a phenolic dimer, and 4-formyl-2-methoxyphenyl benzoate, a non-phenolic dimer. Optimum conditions for analysis of the degradation of the lignin model compounds utilizing high performance liquid chromatography and electrospray ionization- mass spectrometry were determined. Agilent MassHunter Software was used to qualify and quantify the degradation products.</td>
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<th>78</th>
<th>Ademola Amida</th>
<th>Teaching &amp; Learning</th>
<th>Examining Faculty Motivation to Use Learning Analytics in Improving Teaching Effectiveness</th>
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<td>This study examined the factors that motivate faculty members to use learning analytics (LA) to improve their teaching and enhance students learning. Specifically, this study tested a model based on motivational theory SDT and subjective value theory that postulated the faculty’s subjective value of the use of LA will predict their motivation. Faculty motivation will then promote LA usage as well as teaching effectiveness. The study also investigated whether there is a difference in faculty usage of LA based-on disciplines, academic rank, and tenure status, as well as teaching experiences.</td>
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<th>35</th>
<th>Houssein Amjaour</th>
<th>Chemistry</th>
<th>Biomass-Based Truxinate and Truxillate Derivatives Synthesized Using Photoenergy and Esterification</th>
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Truxinate and truxillate esters and amides are found throughout nature and have been shown to have a wide range of biological activities. A series of novel esters of the biorenewable and thermally recyclable diacid building block β-truxinic acid (CBDA-4) were prepared using esterification and [2+2] photocycloaddition. They can be readily prepared from a number of commercially-available bio-based starting materials using clean, efficient [2+2] photocycloaddition. This process dimerizes suitable molecules to form a cyclobutane ring between them. For example, CBDA-1 (truxillic acid) and CBDA-4 (truxinic acid) can be synthesized from different polymorphs of the biorenewable molecule cinnamic acid. These building blocks show promising potential for use in wide-ranging applications such as recyclable polymers and metal organic materials.

### 6  Lacey Anderson  Educational Foundations & Research  Visualizing Sexual Assaults in the Oil Patch: Using Quantitative Data to Humanize Patterns of Victimization

The purpose of this study is to investigate the impact of the oil boom on crime rates in North Dakota communities, focusing on sexual assault and crimes against persons using data from publicly available crime reports. Mapping software is utilized to show a visual product of where sexual assaults occur by North Dakota counties. Visualization of sexual violence patterns will lead to a better understanding of sexual assault, with practical application in prevention and intervention work.

### 115  Alexis Archambault  Geological Engineering  Quantifying Water Storage Capacities of Prairie Pothole Depressions Using LiDAR Data

Increased wetting in the Prairie Pothole Region (PPR) since the early 1990s has caused significant flooding, and billions of dollars of agricultural and infrastructure damages. The relatively flat landscape of the PPR consists of millions of topographic depressions that become connected through the fill and spill process under wet conditions. Light Detection and Ranging (LiDAR) technology has proven effective to quantify the water storage capacity of these depressions using pre-existing field-observation data and geospatial algorithms. I propose to incorporate the remotely-sensed (LiDAR) potholes into a physically-based modeling framework to further understand the fill-and-processes and their influence on streamflow generation in the prairie landscape. With recent climate models predicting continued increased wetting in the region, it is essential to interpret how pothole depressions are responding and will respond to the changing climate. This study takes place in the Starkweather subbasin of the Devils Lake Basin (DLB) in eastern North Dakota.

### 44  Youness Arjoune  Electrical Engineering  5G

The fifth generation (5G) of wireless networks have to meet the unprecedented demands for high-speed data rates, ultra-low latency, and high reliability, all of which are primordial to unlock many cutting-edge technologies such as autonomous driving and internet-of-things. Thus, the ultimate goal of this research project is to improve the performance of 5G networks by developing innovative techniques to increase the network capacity and their resilience to the interference, specifically develop smart antenna based upon the theory of machine learning and signal processing.

### 71  Vida Atashi  Civil Engineering  Hydraulic and hydrologic routing parameters in natural channels in North Dakota under spring snowmelt conditions
Snowmelt is one of the processes intervening in the hydrological cycle and interacting with many other processes. Many large regions of the Earth, including North Dakota, involve hydrological processes that are related to snow. The purpose of this study is to re-examine the development, calibration, and application of hydrological model for the natural channel which flows between Devils Lake and Stump Lake, North Dakota. Two case studies are to be investigated: (1) the changes in the water elevations of two selected lakes connected by a natural channel, and (2) the impacts of the morphology of several selected natural channels in river reaches subjected to flooding during the past years. The outcomes will enable us to provide accurate flood forecasting for the coming years by flow routing with observing hydraulic and hydrologic data in the field, collecting past records from published data, modeling using hydrologic and hydraulic software packages.

After the technology advances in horizontal drilling and hydraulic fracturing, unconventional plays came to the foreground of oil and gas industry. Although there are huge amounts of original oil in place in unconventional plays, the recovery factor remains very low. It is imperative to find the solution to unlock those billions of barrels left behind after the primary depletion phase. In unconventional plays, all the previous studies showed that, due to the unfavorable reservoir conditions, secondary recovery methods, such as water-flooding, are not feasible. After the natural depletion stage, only tertiary oil recovery techniques can be considered. In this study we investigated the potential of CO2 enhanced oil recovery technique in one of the largest tight oil-bearing formations in North America. We studied the effect of injection pressure and soaking time on oil recovery and we have been able to optimize those parameters. Under typical reservoir conditions, the experimental results showed that CO2 Huff-n-Puff technique has a great potential to increase the recovery factor in both the Middle Bakken member and Three Forks formation.

Advertising has been one of the most effective elements of marketing communication used to persuade audiences to behave in a certain way. Many studies examined factors that affect ads positively. Increasing loyalty was classified as the primary goal of companies. Thus, advertisements were commonly used to achieve this goal. On the other hand, even though many studies discussed advertising elements that might generate negative impacts, the possible results of these ads were not sufficiently addressed. Through the theory of planned behavior, this study aimed to explore the role of the cultural value as an element impacting loyalty negatively by a survey that measures people's attitudes toward anti-culture ads. The study was conducted in Saudi Arabia due to the Saudis' high interest in cultural values compared to peoples of some Arab countries, as some studies showed. Participants from all groups reported a significant negative impact of such advertisements on loyalty.

Accurate wind power forecast plays vital roles in energy market efficiency and effective management of revenue and risks. This paper presents a hybrid model for wind data characterizing and forecasting. This method that combines the results from Support Vector Machine (SVM), Gradient Boosted Machine (GBM) model with an auto-regressive integrated moving average (ARIMA). This method is comprehensively utilized on onshore and offshore datasets. Onshore data were obtained from North Dakota, South Dakota, Minnesota, and California while the offshore data was collected from the sites, representative of the East Coast and West Coast. The SVM and GBM single methods showed superior forecasting accuracy when compared to ARIMA but the hybrid demonstrated consistency in improving accuracy of ARIMA predictions.
Music is constantly changing and evolving: so should our pedagogy. One of the challenges and joys of performing contemporary classical music is expanding the capabilities of the flute by exploring new sounds. These techniques are often referred to as “extended techniques” because they extend beyond the pure, single tone a flute traditionally makes. In my research, I am examining resources to see how extended techniques are being taught to younger flutists. Learning these techniques is typically reserved for older, more advanced students, and, unfortunately, music and instructional materials geared toward younger students are lacking. There are many benefits to learning these techniques, as they help develop all-around greater control of the flute. My goal is to make learning extended techniques accessible to younger flutists. I have developed my own method book that teaches how to play extended techniques through pieces in our contemporary repertoire, making the learning experience fun and exciting.

111  Allyson Marie Bento  Communication  Social Media’s effects on Sports Journalism

The journalism industry has historically been a competitive field, journalist competing with each other for the best and quickest breaks on a story. Now, rather than competing with journalists from another paper or TV station, the industry has competition with the ever-evolving social media platforms. The New York Times wrote that SportsCenter once was the most popular program to get all the highlights from a nights worth of sports first (The New York Times, 2019), and that may not be the case anymore.

52  Marie Bergelin  Geology  Million-Year-Old Ice Found Buried Underneath Thin Layer of Dirt;
    Ong Valley, Antarctica

We collected two 10-m ice cores from ancient glacier ice in Ong Valley, Transantarctic Mountains, Antarctica. The ice mass is buried under a thin layer (< 1 m) of glacial debris. The age, origin and rate of which the ice is disappearing are determined by measuring concentrations of the cosmic-ray produced nuclides 10Be, 26Al, and 21Ne within trapped sediment in one core. These nuclides are produced by cosmic-ray interactions with minerals near the Earth’s surface.

Large downcore variation in measured cosmogenic nuclides suggests that the last few meters of the ice core may belong to a separate older ice body which have previously been exposed at the surface and most likely buried during glacial advancement into Ong Valley. The two separate million-year-old ice bodies can potentially provide information about Antarctic paleoclimate, past atmospheric chemistry, and ancient life forms than most currently known ice bodies on Earth.

108  Aaron Bergstrom  Communication  Determining Support for Quantifiable Regenerative Agriculture in North Dakota

Regenerative Agriculture is the practice of implementing Climate-Smart methodologies in farming and ranching to improve soil health through increased biodiversity and input reduction. These practices can reduce overall Greenhouse Gas (GHG) emissions and sequester large amounts of carbon in North Dakota (ND) soils. With the establishment of Cap-and-Trade markets for GHG in California and Quebec, the adoption of Regenerative Agriculture practices could provide new sources of revenue for ND agricultural producers. However, to participate in these markets, the climate impact value of these practices must be made quantifiable. Increased financial support from the state government for research and educational programs in these areas could enable a Quantifiable Regenerative Agriculture industry within ND and allow ND farmers and ranchers to earn additional revenue through emerging carbon markets. My research will use Qualtrics surveys to determine the attitudes of agricultural producers toward increased public investments in these areas.

122  Kyle Bernhardt  Psychology  (General/Experimental)  Differentiating Active and Passive Fatigue with the use of Electroencephalography
Desmond and Hancock (2001) proposed that two types of cognitive fatigue can arise depending on the nature of a task: active or passive. The purpose of this study was to use electroencephalographic indices of task engagement and a candidate marker of strain to differentiate these two fatigue states. Participants (N = 84) performed a generalized flight simulation task for 62 min under either active, passive, or control conditions. Passive fatigue was characterized by reduced EEG engagement and initially elevated and stable ratios of Fz theta to POz alpha power compared to active fatigue. No performance differences were found between the fatigue conditions; however, an overall speed-accuracy trade-off was observed from pre to post fatigue induction. These results support theoretical and empirical distinctions between active and passive fatigue and have potential applications for developing augmented cognition technologies to deliver appropriate fatigue countermeasures in automated operational environments.

This study focuses on a machine learning workflow for finding hotspots in an image and estimation of surface temperatures. Thermal images captured using the UAV system are fed into a K-means model which clusters each image based on (R, G, B) color-space. Min., max., and average temperatures of all clusters were processed from CSVs containing pixel temperatures. The cluster corresponding to the maximum average temperature was masked as white. The temperature values of multiple images of the Museum of Art were graphically represented. K-means clustering algorithm was chosen to segment images into a desired number of images. The results found by this method show K-means as an effective method to find hotspots in thermal images and for estimating the surface temperatures.

Transition metal chalcogenides (TMCs) have attracted a lot of attention for Lithium Ion battery (LIB) and Na-ion battery (SIB) applications due to unique physical and chemical properties such as high electrical conductivity, thermal stability, etc. In addition, TMCs offer higher theoretical specific capacities for LIB/SIBs compared to commonly used intercalation anodes. Another important point to make is that transition metal chalcogenides are electrochemically more reversible than their metal oxide counterparts due to the faster charge transfer kinetics. However, there are still a lot of unknowns regarding the chemistry and physics of these systems.

There is powerful literature supporting podcasts as effective educational tools. However, very little research has been done in first year nurse anesthetist students learning from podcasts. This study is a post test design that measures overall student satisfaction with podcasts relating to beginning clinical for the first time. A series of 6 fifteen minute podcasts will be assigned to first year nurse anesthetist students about to start their first clinical rotation. The students will have 2 weeks to listen to all the podcasts. The students will then rate their perceived benefit and satisfaction with the podcasts.
Agriculture is a vital economic force in North Dakota. About 90 percent of the state's land is used for agriculture, totaling 40 million acres devoted to farming and ranching. The disposal of un-rinsed pesticide containers and agricultural chemical residues in landfills and open dumps has been one of the most serious hazardous waste problems in the state. Nutrients from agricultural waste and lawn chemicals, such as nitrogen and phosphorous are impacting streams in North Dakota. Most of these nutrients promote and support the growth of algae and results in poor odor and colorization of water. The development and proliferation of algal blooms likely result from a combination of environmental factors including available nutrients, temperature, sunlight, ecosystem disturbance (stable/mixing conditions, turbidity), hydrology (streamflow and water storage levels) and the water chemistry (pH, Dissolved Oxygen, and Biochemical Oxygen Demand). The low dissolved oxygen level, excessive growth of cattail plants, water flow, and high nutrient content may be the causing factor of algal blooms, poor odor, and decolorization of water bodies. In this research, the English Coulee stream is used as a study area to understand the causing factors of water quality in an urban stream in North Dakota. Once we have a thorough understanding of water quality management in the English Coulee, the bioremediation methods used can be applied to similar issues in other North Dakota water bodies. In this proposed research, a primary study of agricultural waste nutrients such as phosphorus and nitrogen are studied in the English Coulee stream passing through Grand Forks. An increase in Dissolved Oxygen (DO) levels is achieved using aerators, and the excess nutrients are utilized by floating hydroponic plants. Therefore, the excessive growth of the cattails or other weeds will be controlled.

Keywords: Agriculture, English Coulee, Urban Stream, Nutrient, Nitrogen, Phosphorous, Pesticides, Waste, Chemicals, Algal Bloom, Dissolved Oxygen, Bioremediation, Water Quality, Hydrology, Environment, Hydroponic, Plants, Aerators, Cattail, Ecosystem, North Dakota
Predicting energy consumption in residential, commercial, and industrial buildings based on square foot, geometry, load profile, and weather conditions is a challenging task. To effectively plan for the energy demand management, forecasting has become a key element for operators and buildings' owners to monitor their energy usage. Predicting the energy demand patterns on a monthly and yearly basis helps improve building energy management.

This research work contains data sets from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) on building types such as educational, offices and residential users. Based on one-year training data, we were able to predict the next two-years energy demand of 1500 buildings using three different forecasting models: Light GBM, Artificial Neural Network, and Linear Regression. The preliminary findings indicate that Light GBM outperforms over other models.

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<th>Cody Boyle</th>
<th>Biomedical Sciences</th>
<th>Oxytocin Receptors Excite Later Nucleus of Central Amygdala by PLC{\textsuperscript{2}} and PKC-dependent Depression of Inwardly Rectifying K{\textsuperscript{+}} Channels</th>
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Oxytocin (OXT) is a nonapeptide that exerts anxiolytic effects in the brain. The amygdala is an important structure involved in the modulation of fear and anxiety. A high density of OXT receptors (OXTRs) has been detected in the capsular (CeC) and lateral (CeL) nucleus of the central amygdala (CeA). Previous studies have demonstrated that activation of OXTRs induces remarkable increases in neuronal excitability in the CeL/C. However, the signaling and ionic mechanisms underlying OXTRs-induced facilitation of neuronal excitability have not been determined. We found that activation of OXTRs in the CeL increased action potential firing frequency recorded from neurons in this region via inhibition of the inwardly rectifying K{\textsuperscript{+}} channels. The functions of phospholipase C (PLC) and protein kinase C (PKC) were required for OXTRs-induced augmentation of neuronal excitability. Our results provide a novel cellular and molecular mechanism whereby activation of OXTRs exerts anxiolytic effects.

There is a lack of literature regarding the association between acquired hearing loss (AHL) and current depression (D) in South American countries. This study investigates the relationship between AHL and D among the adult general population of Brazil with diabetes mellitus (DM) as an effect modifier. The exposure was self-reported AHL, and the outcome was D measured by the PHQ-8. To investigate this relationship, multivariable weighted and adjusted logistic regression models were conducted while adjusting for sociodemographic characteristics. In the final study sample, the prevalence of D was 7.99% and of AHL was 1.94%. Those with AHL had 103% significant increase in the odds of depression. Among YA there was no significant association between AHL and D (AOR=2.15, 95%CI: 0.73-6.28). There was a significant association among MAA (AOR=2.39, 95%CI: 1.50-3.80) and OA (AOR=1.82, 95%CI: 1.25-2.66). Those with AHL are a unique group of individuals and interventions should be tailored to them. These individuals may benefit from auditory rehabilitation like hearing aids. Further investigation is necessary to better understand this association.
The social interactions children have with peers play a very important role in their development, impacting their social skills, cognitive, emotional and language development. These are all critical aspects of an individual's quality of life. However, for children with disabilities, these interactions tend to be fewer, impacting their development, sense of belonging, and acceptance. The current qualitative participatory observational case study examined the social context within a Multiple Impairment Classroom and the social interactions of three children with multiple disabilities and limited verbal language. It was found that all three of the children had very limited interactions with peers in both their specialized classroom and their general education classes. The majority of their social interactions were with adults, but these were also limited and mostly occurred during schoolwork. This was heavily impacted by the classroom being understaffed, and there not being sufficient time to give adequate training to new paraprofessionals.

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Temporal and spatial variability in seasonal snow cover is an important variable in both climatological and hydrological studies because of its relationship to environmental energy and mass flux. This research explores the utility of the network of PhenoCam Project cameras to estimate Fractional Snow Cover (FSC) in a mid-latitude grassland. The goal is to operationalize FSC estimates from PhenoCams to inform and improve satellite-based determination of phenological metrics.

Poly- and perfluoroalkyl substances (PFAS) are a large group of organic compounds that have been mass-produced since the 1950s for a variety of products and processes. Once released to the natural environment, long-chain PFAS (7 perfluorocarbons) may bioaccumulate and biomagnify through food webs. The U.S. EPA has recently set a drinking water advisory on the combined level of PFOA and PFOS at 0.070 g/L, making removal of PFOA/PFOS from drinking water and remediation of PFAS-contaminated sites a priority issue. PFAS are not easily removed during conventional drinking-water treatment.

In this research, we developed and tested the performance of an innovative treatment system for effective and practical removal of PFAS from surface water. This system can seamlessly be integrated with conventional drinking-water treatment processes. We found it can remove up to 99% of the PFAS captured on activated carbon. Research is underway to understand the decomposition mechanisms of PFAS in this newly developed treatment system.

The world of shipping business is expecting a transformation in the near future due to the rise of delivery via Unmanned Aerial Vehicles (UAV), commonly known as drones. However, the mass adoption of UAVs for delivery purposes in urban and suburban areas faces certain challenges that are unique and currently an area of active research. For the reliable city-scale operation of delivery drones, which are a swarm of autonomous Unmanned Aircraft Systems (UAS) operating at low altitude airspace outside line of sight, reliable algorithms to avoid obstacles, geofenced structures, and other drone traffic is absolutely necessary. This paper presents an improvement over state of the art on a path-planning algorithm that enables UAS to fly a designated mission factoring in geofencing and real-time traffic. This planning algorithm relies on a rapidly exploring random tree methodology to maintain clearance from other drone traffic and geofenced objects. Heuristic-based termination criteria for tree expansion allow for low computation times, which is a good fit for UAVs with limited computing capability onboard.

Refrigeration plants play an important role in any economy particularly in relation to transportation, preservation of food and air-conditioning. Such plants are most commonly vapour-compression systems. As power-consuming plants, their design would pursue the maximization of coefficient of performance (COP), the minimization of power input, or both. On the other hand, all proprietary software, such as Cycle-Tempo 5, also has the propensity for implementing and enhancing learning. As such, all 21st Century mechanical engineers can gain virtual, but non-the-less, functional design experience through the use of such software especially during initial education and training. To aid this learning process, design case studies were considered, one each in relation to domestic, commercial and industrial level of refrigeration. This study therefore provides information on the use of the software and fundamental strategies needed in the design of vapour-compression systems based on the cases studied while also discussing their results.
Sexual violence is a serious problem, but despite the plethora of research addressing this topic there is still significant disagreement surrounding its measurement. While previous work (Hamby et al., 2006) has addressed the issue of response format on endorsement of intimate partner violence, none has done so in the context of sexual violence. The current study investigated the effect of two different response formats on endorsements of sexual violence victimization and perpetration. Two samples were collected via MTurk to investigate perpetration (N = 355) and victimization (N = 293) respectively. Individuals were randomly assigned to receive a scaled (0,1,2-5,6,-10+ times) or dichotomous response version of the Post-Refusal Sexual Persistence Scales. Response format had an effect on reports of perpetration(p<.01), across genders and sexual orientations (p< .05). The association between condition and endorsement of victimization was non-significant (p> .05). Results suggest scaled response formats increase reporting of sexual violence perpetration.

19  Trevor Dufner  Kinesiology  Global Temporal Strength Trends in Adults

PURPOSE: To estimate national and international temporal trends in handgrip strength for adults.

METHODS: Data were obtained from a systematic search of studies reporting temporal trends in handgrip strength for adults aged 20-89 years, and by examining national fitness datasets. Sample-weighted temporal trends were estimated using best-fitting regression models relating the year of testing to mean handgrip strength. RESULTS: Trend data from nine studies/datasets representing 2,550,360 adults from seven countries between 1967 and 2017, collectively showed a negligible decline in mean handgrip strength of 2.6% (95%CI: 2.8 to 2.4). National trends ranged from a decline of 6.3% (95%CI: 7.2 to 5.4) per decade in England to an improvement of 3.3% (95%CI: 2.8 to 3.8) per decade in Mexico. CONCLUSIONS: Despite a negligible improvement from 1967 to 2000, handgrip strength has declined among adults over the past two decades, which is suggestive of a modern decline in overall strength capacity.

129  Jennifer Eccles  Nursing  Nurse Leader Influence and Nurse-Sensitive Outcomes in Critical Access Hospitals

Introduction: Nurse leaders may influence improved patient outcomes. The purpose of this study was to determine the differences among nurse leader influence and nurse-specific outcome scores in rural critical access hospitals (CAHs) in North Dakota as compared to other states in the US.

Methods: Nursing leaders across 600 CAHs in 20 states in the US were surveyed. The questionnaire included data from the LIPPES, the HCAHPS survey, and the EDTC survey.

Results: Significant differences were found among four influence factors of collegial administrative approach, internal strategy and resolve, access to resources, and overall influence. No significant differences were found among nurse-specific outcomes scores.

Conclusions: CAH nurse leaders in North Dakota reported comparatively lower collegial administrative approach, access to resources, and internal strategy and resolve levels than those in 18 other states. Support should be concentrated on those areas for leaders in North Dakota.

112  Grant Ellis  Mechanical Engineering  Synthesis and Characterization of Novel Lignin Composites

Lignin is an abundant constituent of biomass. Currently, it is a waste product from paper and pulp industries that has great commercial potential. However, its heterogeneous chemical structure makes it difficult to valorize. In this poster, we will report the study on the design, manufacturing, and characterization of novel lignin based composites. We will explore the recent development of two lignin composite systems (lignin-copper and lignin-DDGS), and report the detailed microstructure and mechanical behavior characterization of these composites. The material properties of the SE systems will be compared with our laboratory’s past work on pyrolyzed lignin.

34  Ahmed Elsaharti  Mechanical Engineering  UAV Autonomous Localization Using Macro-Features Matching with a CAD Model
Research in the field of autonomous Unmanned Aerial Vehicles (UAVs) has significantly advanced in recent years, mainly due to their relevance in a large variety of commercial, industrial, and military applications. However, UAV navigation in GPS-denied environments continues to be a challenging problem that has been tackled in recent research through sensor-based approaches. This paper presents a novel offline, portable, real-time indoor UAV localization technique that relies on macro-feature detection and matching. The proposed system leverages the support of machine learning, traditional computer vision techniques, and pre-existing knowledge of the environment. The main contribution of this work is the real-time creation of a macro-feature description vector from the UAV captured images which are simultaneously matched with an offline pre-existing vector from a Computer-Aided Design (CAD) model. This results in a quick UAV localization within the CAD model. The proposed system is evaluated through simulations and experimental prototype implementation that show the algorithm's low computational burden as well as its ease of deployment in GPS-denied environments.

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This paper is based on a Masters degree thesis.

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<th>Jessica Emond</th>
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Lignin is an organic macromolecule that is found in plant cell walls and is recovered as a large-scale waste byproduct of the paper making industry. Lignin utilization often centers on its solubility and fractionation in various solvents. In this study the solubilization of Kraft alkali lignin in various organic solvents was investigated using their various ratios with water. The lignin solubility was assessed by gravimetry and confirmed by thermal carbon analysis (TCA). The molecular weight (MW) of soluble and insoluble fractions was evaluated by GPC. Aprotic polar solvents in a 1:1 ratio with water yielded the best solubility. The observed trends are consistent with Hansen solubility parameters. Thermal desorption-pyrolysis-gas chromatography-mass spectrometry was utilized to characterize both solid and liquid fractions, showing some fractionation via dissolution.

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<th>96</th>
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The aim of this independent study is to identify if self-efficacy mediates the relationship between fatigue and Quality of Life (QoL) in the adolescent and young adult female oncology population similar to patterns in older adult cancer populations. In an ongoing study, 224 female-identified participants, ages 15-39 years, who are or have been treated for cancer were recruited to take an online anonymous survey. Participants were asked to self-report using three scales; PROMIS Fatigue Short Form, the Quality of Life Scale, and the Brief Cancer Behavior Inventory. As hypothesized, significant bivariate correlations were found between Fatigue and Self-Efficacy ($r = -.41$), Fatigue and QoL ($r = -.44$) and Self-efficacy and QoL ($r = .58$). When we then tested a SEM Model with self-efficacy mediating the relationship between fatigue and quality of life. Results indicate that self-efficacy partially mediates the relationship between fatigue and quality of life.

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<th>97</th>
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The main goal of this work is to propose a new cardio-postural model of blood pressure regulation during standing in a group of people with PD. The blood pressure homeostasis is challenged using progressive application of head-up tilt test with an increment of 20 degrees up to 80 degrees (5 min at each stage). Simultaneous electrocardiogram (ECG), photoplethysmogram (PPG), blood pressure (BP), electromyography (EMG), and center of pressure (COP) were acquired from 3 participants. Beat-to-beat Heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean aerial pressure (MAP) were extracted from ECG and blood pressure. Preliminary results showed that the application of 80 degrees resulted in a significant change in HR (70±10 bpm vs 85±7bpm, p< 0.05), compared to rest, while no change was observed in SBP, DBP, and MAP (p>0.05) as a consequence of head-up tilt test application.

In the adolescent and young adult (AYA) population with cancer higher Self-Efficacy has been linked to better treatment adherence and higher rates of health-promoting behaviors (Hertz et al., 2017). Furthermore, minority groups experience disparities and perceived discrimination during cancer treatment which impacts their psycho-social health (Kamem et al,2015; Meriuzzi et al, 2015). However, less is known about how minority stress impacts the AYA population. This independent study aims to better understand how microaggressions that occur in an oncology setting impact the self-efficacy of the female-identifying AYA population with cancer. Results indicated that approximately 25% of participants experienced a racial microaggression from a health care provider. Further, there was a significant difference in cancer-related self-efficacy between participants who reported one or more microaggressions (M = 5.30, SD = 1.24) compared to those who did not (M = 6.32, SD = 1.26); t(39) = 2.23, p < .05.

Not only do eating disorders affect a person's mental health, but they have a huge impact on their physical health and vitality as well. Though disordered eating affects people from all walks of life, there is little research targeting the male population. Even fewer studies have investigated the relationship between fraternities and disordered eating. The purpose of this study is to expand the limited research surrounding Greek membership and gender within eating disorders by comparing rates of disordered eating symptoms, anxiety levels, perfectionism, and body image differences from approximately 206 undergraduates using multiple self-report questionnaires. This data will be analyzed using a 2x2 ANOVA followed by exploring the significant correlations. It’s hypothesized that females and Greek members will show greater rates of eating disorder symptoms, evidenced by higher EDE-Q scores, which can be partially explained with the STAI, PSPS, and OBCS.

Galaxy clusters are important laboratories for the study of formation and evolution of galaxies over the age of the Universe. Observations of the star formation rate (SFR) in galaxies provide key information towards this study. Most information on star formation properties of galaxies comes from integrated light measurements in the ultra-violet (UV), infrared (IR), nebular recombination lines (mostly H), or from radio-continuum measurements. The main objective of this research is to analyze the SFR in galaxy clusters using observations in the UV-band, U-band, IR-band, H lines, and radio wavelengths. Data of approximately 200 galaxy clusters obtained using KPNO 0.9m, CTIO 4m, CFHT 3.6m, WINGS, GALEX, WISE, Spitzer and VLA telescopes will be used for the analysis of this research. IR data of this sample will also be used to study the presence of spiral galaxies in cluster red-sequences.
Student Service Members and Veterans (SSM/Vs) often face more life stressors than their civilian counterparts. Many have more serious mental health concerns (Borsari et al., 2017), and have trouble adjusting to their new lives as college students (Barry, Whiteman, & MacDermid—Wadsworth, 2014). This population also faces the additional stress of stereotypes and the stigma associated with their identity as a service member (see Borsari et al., 2017).

Several positive psychology variables have emerged as correlates to general psychological health, and these variables may be even more important among at-risk populations (Chakhssi et al., 2018). However, there have not been any specific studies that examine the role of resilience, grit, and self-compassion with SSM/Vs specifically. Previous studies (e.g., Pietrzak et al 2010) have found that resilience mediates social support and psychosocial functioning in Veterans and is associated with fewer manifestations of PTSD (Church et al., 2016). Grit has not been studied in relation to the general well-being and symptomology of SSM/Vs, but grit (interest and perseverance) is negatively associated with academic stress (Lee, 2017) among all students. The literature on self-compassion shows a protective effect against chronic stress in students (Yonghong et al, 2016), anxiety and depression, and is associated with many positive psychological strengths, social connectedness and life satisfaction (Neff & Dahm, 2003). While it has been studied in relation to war trauma and PTSD in Veterans (Dahm et al., 2015) it has not been examined in relation to student veterans or their general well-being and academic performance.

The goal of the current project (independent study) is to develop an understanding of three psychological variables in SSM/V populations: resiliency, grit, and self-compassion. Researchers will compare whether SSM/Vs differ from their civilian counterparts regarding these variables. In addition, the variables will be related to outcome variables of interest in college populations, such as collegiate adjustment, academic performance, and symptomology.

**Research Design and Participants**

Three hundred undergraduate students from a large four-year public university in the Midwest will be recruited: 150 self-identified SSM/V and 150 non-SSM/Vs. Participants from all groups will complete a number of measures, including the Self-Compassion Scale (Neff, 2003), the 12 Item Grit Scale (GRIT-S; Duckworth, 2007), the Brief Resilience Scale (BRS; Smith, 2008), the Social Adjustment to College Questionnaire (SACQ; Baker & Siryk, 1989), and the Brief Symptom Index (BSI;

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<th>Danielle Germundson</th>
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Food allergy (FA) is increasingly recognized to affect behavior and mood. Anxiety, depression, and autism have been correlated with FA, but not all allergic patients exhibit neuropsychiatric manifestations. Human leukocyte antigen II (HLA-II) is a set of polymorphic receptor proteins on immune cell surfaces, which recognize and present foreign substances to initiate immune responses. Therefore, we hypothesized that some variations in HLA-II predispose individuals to behavioral changes by FA. We sensitized mice expressing different HLA-II variants to the milk protein, \( \beta \)-lactoglobulin, and measured their physical, behavioral, and immune responses. We found that only sensitized HLA-DR15 mice, which had mild allergic reactions, showed altered behavior and brain physiology. These results establish that HLA-II variation influences both FA reactions and behavior symptoms. HLA-II typing, which requires only a small blood sample, may help improve quality of life for individuals with FA-triggered behavioral disorders.

| 64 | Emily Gibbens-Buteau | Communication | When Clickbait Works: Exploring Positive and Negative Reactions to Clickbait Advertising on Facebook |
This study defines the concept of clickbait advertising, a branch of native advertising, and employs persuasion knowledge to explore the positive outcomes of clickbait advertising and uses metadiscourse to understand the characteristics found within clickbait advertising. A content analysis was conducted of 750 clickbait advertising posts on Facebook posted by 15 top companies promoting their brands or products. The findings indicated that the use of endophoric and person markers, specific linguistic techniques of metadiscourse, generated more positive outcomes than the use of evidentials, hedges, or emphatics. In addition, the use of formatting clickbait and teasing clickbait resulted in more positive outcomes, whereas the use of bait-and-switch clickbait resulted in significantly less positive outcomes. Theoretical and practical implications are discussed.

Near-infrared (NIR) fluorescence imaging is an ideal cellular and tissue imaging because of the low absorption of biological molecules in this region and it can be performed in low background noise. Semiconducting polymer dots (Pdots) have received great attention due to their unique characteristics, including high water solubility, good light stability, excellent biocompatibility, and low cost. Herein, we report the nanoprecipitation route for the preparation of Pdots exhibiting NIR emission. Furthermore, the Pdots are proved as a very reliable temperature sensing probe (at 25-50°C). Impressively, the dual-readout approach featured with good accuracy and high sensitivity for temperature detection. Also, the Pdots possess outstanding optical properties and biocompatibility, making them a promising NIR imaging agent for in vivo targeting.

The conception of tenure for university faculty in the United States originated with the American Association of University Professors (AAUP) 1940 statement of Principles on Academic Freedom and Tenure. Traditional criteria for tenure and promotion (T&P) are scholarship, teaching, and service. In response to institutions adopting "collegiality" as an integrated/separate criterion for T&P, the AAUP released a statement that does not support this trend (AAUP, 2016). Contrary to this stance, institutions and departments continue to incorporate collegiality in T&P evaluations. A challenge with studying collegiality is a lack of clarity that exists in defining the term (Cipriano, 2011; Cipriano & Buller, 2012). The purpose of this research is to conduct a document analysis that examines collegiality in T&P policies for education programs at ten R2 universities in the United States. This research will conceptualize collegiality as defined by selected T&P guidelines and attempt to determine its use in T&P criteria.

Program synthesis systems can be used to automatically generate code to fit a wide variety of applications. NASA has developed and uses two of these systems, AUTOFILTER and AUTOBAYES. Though much can be gained in terms of time and cost efficiency, they suffer from an issue that is inherent in all code generator systems, the verifiability of the correctness of the generated code. Previous work has been done by Grant et al. in collaboration with NASA to develop a rigorous approach to system correctness verification for AUTOFILTER. However, it has yet to be applied to other domains. The purpose of the research for this master's thesis is to extend their approach to the data analysis domain, by applying it to AUTOBAYES. The results of this study will then be compared to the previous results for AUTOFILTER and can be used to validate the usefulness and extensibility of their approach.
North Dakota (ND) is a low population density state with increasing rates of sexually transmitted infections (STI) that has experienced a 12% population increase in the recent decade, largely attributed to the influx of workers in oil producing counties (OPC). 2002-2017 county-level STI and oil field data were obtained from the Centers for Disease Control and Prevention (CDC) and the ND Department of Mineral Resources, respectively. Rate ratios (RR) and 95% confidence intervals (CI) were calculated for STIs state-wide and in 18 OPCs compared to 2010 case rates. The largest increase in 2017 OPC STI rates was Syphilis (RR=9.96; 95% CI=1.30-76.60), followed by Gonorrhea (RR=6.40; 95% CI=4.18-9.79). In 2017, Chlamydia experienced a non-significant increase (RR=1.01; 95% CI=0.91-1.12) but peaked in 2014 with a significant increase (RR=1.32; 95% CI=1.20-1.46) compared to 2010. These data provide evidence for an association between increases in STI rates and population growth in OPCs in ND. There is a need for increased public health efforts to reduce STIs through education, intervention, and prevention strategies in OPCs in ND.

| 25 | Alex J. Holte | Psychology (General/Experimental) | Boredom proneness mediates the relationship between Anxious-Ambivalent Attachment and Fear of Missing Out (FoMO) |

Fear of missing out (FoMO) describes the state in which individuals have concern they are missing out on rewarding experiences. This concept derived from the proliferation of social media use. Currently there are gaps in the literature as it relates to FoMO, such as if anxious-ambivalent attachment dimensions influence this concept? Similarly, boredom proneness could potentially be a factor that influences the extent to which one experiences FoMO. A sample of 450 adults from the United States was recruited. Structural Equation Modeling (SEM) was used to test our model of anxiety and depression predicting anxious-ambivalent attachment, which predicted FoMO and boredom proneness. We found that anxious-ambivalent attachment mediated the relationship of FoMO with anxiety and depression. Anxious-ambivalent predicted FoMO, and this relationship was mediated by boredom proneness. We discuss the multi-dimensional nature of FoMO and the theoretical basis for our results.

| 124 | Jordan Jaeger | Educational Foundations & Research | How Does Faculty Members' Grit Relate to their Emotions and Success in Teaching and Research? |

Grit is passion and perseverance towards long-term goals and has been widely studied among student populations; however, grit may also be applicable to university faculty as their work involves long-term tasks. One-hundred thirty-one faculty completed a grit scale, which had good reliability, yet was found to separate into two sub-constructs: perseverance of effort and consistency of interest. Higher correlations were found between grit and research emotions (versus teaching emotions); specifically, grit positively correlated with positive emotions and negatively with negative emotions for research. Grit also had significant positive correlations with perceived value and success in research. Results have implications for faculty development and prospective faculty, such as exploring mechanisms to promoting grit thereby increasing the likelihood of research success.

| 50 | Ethan Kalinowski | Biology | Designing a mixed-mode survey for collecting deer and turkey hunter harvest data in North Dakota |
Harvest surveys are a critical tool used by natural resource agencies to manage game species, but current methods such as commonly used mail surveys are time-consuming and biased towards some hunter demographics. North Dakota Game & Fish (NDGF) has been using self-administered mail harvest surveys for decades to help inform management, but with limited resource allocation and increased needs for robust data, management agencies are looking for more efficient ways to gather unbiased annual hunter harvest data. We are attempting to discern a more efficient way to conduct harvest surveys for the benefit of NDGF. We designed and are comparing an internet survey with a mail follow-up, a mail survey with an internet follow-up, a mail survey with an internet option, and a control. We hypothesized greater efficiency with tested treatments and are prepared to offer insights following year two of data collections of three and preliminary results.

Depletion of petroleum-based resources requires the development of high-valued chemicals from renewable sources. One such chemical is lactic acid, which can be used as a building block to produce a variety of biodegradable plastics. Traditional fermentation methods for lactic acid synthesis have proven costly, making it difficult for its subsequent products to compete economically. Alternatively, the use of a Lewis acidic heterogeneous catalyst, Sn-Beta, can be used to produce lactic acid quicker and cheaper. Preliminary results showed that Sn-Beta can convert the two most abundant sugars in lignocellulosic biomass, glucose and xylose, to lactic acid at yields of 20 and 30% (on an inlet carbon basis), respectively. Addition of CaSO4 to the aqueous reaction solvent neutralizes the Brnsted acid sites on the surface of Sn-Beta, decreasing the formation of unwanted dehydration products. This resulted in increased lactic acid yields, reaching 73 and 80% for glucose and xylose, respectively.
This study examines the effects of social media usage on the self-authorship of college students. Social media as a means for social interaction has become a constant in the life of young adults. At a time when students have traditionally established their own beliefs and identity and begin to move towards self-authorship, these social mediums have become a venue for students to look to others for a definition of who they are or who they should be. Current literature on college students' use of social media has focused on the relationship between social media usage and online social behavior, including self-disclosure, social capital, and self-presentation. Research has not considered how the saturation of social media influences students' ability to define their own sense of self on the journey to self-authorship.

Foreign language learning strategies are specific actions or techniques employed by the learner for the purpose of learning language, making learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations, according to R. Oxford.

Since its design in 1990, the Strategy Inventory for Language Learning (SILL) has been one the most frequently employed language learning strategy use screening instrument. At the same time, modern technologies and their extensive use in education are changing instructional approaches, formats of learning, and learners' attitudes to their personal learning achievements, thus affecting learning choices and preferences of language learners.

The purpose of the present study is to find out correlations among the use of specific groups of technological language learning supporting applications and six established second/foreign language strategies (memory, cognitive, metacognitive, compensation, affective, and social). The study is in progress at the moment, so working hypothesis rather than conclusive statements have been developed.

This topic will discuss the challenges faced by individuals in rural areas seeking medication assisted treatment for Opioid Addiction. Research will examine SAMHSA-listed buprenorphine providers in 10 states: West Virginia, New Hampshire, Kentucky, Ohio, Rhode Island, Pennsylvania, Massachusetts, New Mexico, Utah and Tennessee. Providers listed as practicing within a 25-mile radius of the county with the highest drug-related death rates in 2017. Appointments were secured with just 28% of providers contacted. 27.1% of SAMHSA providers listed reflect incorrect contact information, 25.9% do not offer treatment. The resulting effect of these discrepancies on overdose numbers in these rural communities, and possible solutions.
Scanning electron microscope (SEM) image segmentation of rock samples plays an essential role in microstructure analysis. However, segmenting mineral phases manually is time-consuming. Machine learning methods are a promising technique in image segmentation. In this study, performances of five supervised classification algorithms, including Logistic Regression (LR), Linear Support Vector Machine (SVM), k-Nearest Neighbor (k-NN), Random Forest (RF), and Artificial Neuron Networks (ANN), were examined and compared for the goal of mineral phases segmentation for Scanning electron microscope - Energy Dispersive X-Ray Spectroscopy (SEM-EDS) image data. SEM-EDS images of a sample taken from the Bakken Formation with 13 mineral phases were classified. Hyperparameters of models were tuned through the grid search method.

Prediction results of all classification algorithms showed high test scores with a range of 86% to 92%. The RF showed the best performance among the five models, with f1 score of 0.92. Sensitivity analysis on the size of data demonstrated that the LR algorithm and the SVM were less sensitive to the size of data, while the models of k-NN, RF, and ANN were more influenced by the size reduction of the training dataset. Sensitivity analysis of noise suggested that noises added on the element of Silicon, Aluminum, Magnesium, Calcium, Potassium, and Iron would decrease the performance of the RF, and the noise in Silicon has the most effect on the prediction result compared to the other minerals. In addition, those non-linear classifiers showed a larger performance score drop if the noise was simultaneously added into element densities.

Access to space is generally a costly, lengthy process that span negotiations for rideshare positions to large monetary outlays associated with single payload launches. For academia and research organizations, the cost and delays associated with getting experiments into space in a timely manner may be mitigated through the use of smaller launch systems optimized for payloads of a hundred kilograms or less, the "micro" class of launch vehicles.

This paper explores the concept of using small, less costly launch vehicles to mitigate the wait times for scientific exploration while providing significant data from very small payloads for analysis purposes.

It will be shown that the use of small launch vehicles can provide a satisfactory niche solution to providing near on-demand space access for specific payloads and missions that would benefit the scientific community and academia. Existing technologies in launch vehicle design and propulsion can be adapted in the role of cost effective small payload launches.

Further consideration of the optimized use of smaller launch vehicles is recommended where budgetary issues are a significant driver and restrict the advancement of scientific exploration of space for national purposes.
I completed a writing project for a class a few years ago on which I will base this poster. The poster will outline arguments for and against trigger warnings and speech codes on college campuses. The pros and cons or arguments for and against such warnings and codes are framed around civil rights and human rights of those in our democracy. Take-aways will include implications and strategies that institutions of higher education could implement in order to find a balance between the pros and cons, thus ensuring freedom of speech while fostering access to education for our students.

Stable isotope studies of calcareous marine fossils such as foraminifera have provided a wealth of paleoclimate data. However many marine and freshwater deposits are devoid of foraminifera but contain abundant biogenic silica. As with calcareous organisms, oxygen isotope composition of diatoms must be a function of both temperature and the isotopic composition of water in which they grow and thus may provide a valuable record of paleoclimate. Extracting a temperature record from fossil and batch-cultured diatoms have not always produced consistent results. Some of the disagreement may result from varying silica concentration during diatom growth, meaning that chemical equilibrium was not achieved. Surface seawater contains several ppm silica, but diatoms need over 100 ppm to deposit their tests, possibly leading to fractionation. The objective of this study is to investigate the effects of silica concentration on the oxygen isotope composition of diatoms. Chemostat continuous culturing experiments containing three widely different silicic acid concentrations were conducted successfully to grow marine diatoms at constant temperatures. The oxygen isotope analyses of cultured media have shown satisfactory results. Oxygen isotope data of biogenic silica and cultured media will define whether silica concentration has any control over diatoms oxygen isotope composition. The results of these experiments may address some of the inconsistent results in the literature. This research will establish a foundation for interpreting the oxygen isotope composition of biogenic silica of different ages and environments.

Severe hailstorms occur frequently around the Calgary area which has resulted in approximately 500 (CAD) million worth of property damage in the last two decades. Insurance companies have funded weather modification programs since 1997 to reduce property damage from hail storms. The effectiveness of the Calgary weather modification program is being evaluated using data from the project’s operational radar and radars operated by Environment Canada. The LIDAR Radar Open Software Environment (LROSE) software package is used to quantify the amount of damaging hail within observed storms. Two metrics, Vertically Integrated Liquid Water Content (VIL) and Storm Area with reflectivity greater than 60 dBz, are used to determine the differences between treated and non treated storms. Statistical analysis of storms from data collected over several years is used to obtain an overall project effectiveness, which would be used in a cost-benefit analysis of the program.
Neural stem cells (NSCs) are versatile cells derived from the ectoderm of a developing embryo that are critical to brain formation, including the cortical region (the cortex). The cortex is the outermost part of the brain that is responsible for higher-level thought processes and sensory integration. To form the cortex, NSCs must proliferate to form more cells as well as undergo a process known as differentiation to form specialized cell types. NSCs give rise to a variety of distinct cell types that have different functions in the cortex. As the primitive cortex expands to form a more complex structure, blood vessels are required for support. Recent evidence suggests vascular cells may also play a role in regulating NSC proliferation as well as their fate choice in terms of the cell type they will become. Our project is designed to investigate the interplay between NSCs and vascular cells during cortical development.

Wastewater sludge (WWS) is a by-product of wastewater treatment. Moisture holding capacity, high organic, complex inorganics, and zeolite-like chemicals contents can make WTS a potentially valuable pavement additive. In this study, the effect of 1%WTS on the performance of binders in terms of Multiple Stress Creep Recovery (MSCR) for rutting, Linear Amplitude Sweep (LAS) for fatigue cracking and 4mm parallel plate geometry Dynamic Shear Rheometer (DSR) for low-temperature cracking were investigated. Furthermore, the effect of 1%WTS on the compaction effort and performance of field mixed, laboratory compacted HMAs were investigated. Two compaction temperatures (290°F and 240°F) were used to evaluate the effect of WTS as a compaction aid. Results indicated that WTS is a potential pavement compaction aid and performance enhancer additive. It improved the cracking performance of the HMA and reduced the compaction effort by maintaining the rutting performance within the specification limits in general. Results also indicated the compaction effort for the control HMA compacted at 290°F and WTS modified HMA compacted at 240°F was similar.
Body Mapping (BMG) is a form of somatic (mind-body) instruction designed specifically for musicians. It is a process of correcting and refining that map for more effective movement. There is very little quantitative research regarding BMG, something I have begun to address with this early dissertation project.

Throughout the last semester, I provided BMG instruction to a UND choir. Each session lasted approximately 5-7 minutes and focused on six places of balance within the body. At semester’s end, the ensemble participated in a retrospective survey to assess instruction effectiveness. Happily, most of the results were statistically significant, and 100% of participants found BMG to be beneficial to their singing practice.

Therefore, I submit Body Mapping to be an effective method for teaching kinesthetic balance for choral ensembles, and view this project as a first step towards communicating the benefits of Body Mapping to choral conductors on a larger scale.

INMED: NEUROscience is a unique program in that it provides a holistic approach that is both science-driven and culturally sensitive. Our poster will highlight the innovative program that has been developed and carried out in its first year. We will showcase our original project design that brings teachers from American Indian tribal middle and high schools together into a cohort to study and perform research in biomedical laboratories, connect with each other for peer support, build professional relationships with biomedical education faculty for pedagogical support, and draws on the experience and resources of INMED for social and cultural support. Together, these components help teachers identify ways to effectively translate laboratory research into inquiry-based, engaging learning opportunities for students. This targeted teacher professional development aims to reach American Indian youth at a critical age with the expectations of having lasting positive downstream effects.
Cybersecurity is a growing concern among vehicular manufacturers, transport policy makers, drivers, and other third-party software service providers. Hackers, terrorist organizations, hostile intruders are real threats in exploiting vehicular communication to cause disastrous collisions and traffic disruptions. Today's modern vehicles contain at least 80 ECUs (Electronic Control Units), several in-vehicle networks, cables, I/O ports, and millions of lines of code. Such onboard firmware increases the threat landscape and the attack surface. This poster proposes a hierarchical three-layer framework comprising of sensing, communication, and control layers and lists possible cyber-threats and their countermeasures for the communications layer.

Unconventional drilling in the United States is estimated to generate 15-25 billion barrels of produced water each year and about 5 million m³/day of high TDS-produced water (FP). The FP water from a wellsite in the Bakken are typically very saline containing high total dissolved solids (TDS) in the range of 220,000 gm/l to 350,000 mg/l. However, due to the economic and environmental impact of produced water management and disposal, effective treatment tools and technologies are required for recycling hypersaline brine for reusable purposes. Recycling of FP water for fracking requires TDS < 70,000 mg/L, it would be desirable to reduce the TDS sufficiently to access high value water markets, such as irrigation, well maintenance and potable supplies. A proposed treatment method is the Supercritical Water Desalination process. The objective of this thesis is to evaluate the economic advantage for treatment of F/P water and to demonstrate SCWD as an effective technology for treatment of organic and inorganic components present in produced water. The salt components investigated are salts predominantly found in produced waters (NaCl, CaCl₂, and MgCl₂). Experiments were conducted at varying temperatures and pressures near and above supercritical conditions, while observing dissolved salts removal. The results from the experiments for the SCWD process indicates a potential desalination rate of 80% - 90% of the investigated salts.
Every system that can fail shall fail. The engineering questions center around "when", "why", and "how" things fail. These questions seek explanations of the time-dependencies, causes and mechanisms of system failures, respectively. Theoretically, therefore, if exact dynamics of failure process are fully comprehended, internal failures of systems could be predicted with certainty. Practically, however, failures seem random due to limited knowledge of physical state of components or failure-causing processes.

Common-Cause Failure (CCF) is a type of failure in engineered systems where multiple components fail due to single underlying cause. Introduction of CCF quantification in reliability theory, saw lots of researchers laboring to improve the concept. This Non-Thesis project identifies those researches, showcasing progressive CCFs quantification, and tells a "story" of emergence and transformation of CCF analysis.

There is unanimity, amongst experts, that strict consideration of CCFs resulted in safer engineered systems. Failure and reliability predictions moved closer to realistic expectations.

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This study aimed to examine motivation and its relationship with teaching and research success among pretenure faculty members, while furthermore accounting for the social-environmental variables of balance, clear expectations, and collegiality. Analysis of a multinational sample of 235 faculty using structural equation modeling found intrinsic motivation to positively predict perceived success in both teaching and research. For teaching specifically, professional balance positively predicted teaching autonomy and competence. Alternatively, for research, balance and clear expectations were positive significant predictors of faculty members' research perceived success with professional balance having the most predictive effect. Faculty members' competence and relatedness for research both negatively predicted their introjected motivation, which is a key finding for faculty development as an avenue to improve performance.

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Aspirin and aspirin-like drugs such as Motrin (Ibuprofen) are among the most used medications but also injure the stomach, causing ulcers and gastritis. Although we can treat ulcers by reducing stomach acid, no drugs directly accelerate the healing of stomach injury. Focal Adhesion Kinase (FAK) is a critical protein that helps cells move across wounds to heal them. Our lab has shown that it is possible to activate FAK by small molecules. One such small molecule is called D3. We, therefore, hypothesized that D3-molecule could treat such injuries. In initial testing, D3 stimulated the closure of wounds in cultured gastric cell monolayers. In mice receiving chronic aspirin, D3 reduced gastric injury as well as omeprazole (the most potent drug currently available) and the combination of D3 and omeprazole was even more effective. These results suggest that drugs based on D3 might someday be used to prevent or treat a gastric injury from aspirin and aspirin-like drugs.

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Rare earth elements (REE) are recognized as crucial material for a wide range of consumer goods, energy systems components and military defense applications. As a result of increasing application of REEs in modern technology, strategies are being developed to obtain or develop additional sources of REE materials. Coal and coal byproducts are considered as a source of domestic rare earth element. REE can be associated with both the inorganic mineral fraction as well as the organic fraction of the coal and can vary greatly based on the coal rank. Low-rank coals have higher amounts of carboxylic acid functional groups than high-rank coals, which can act as potential bonding sites for REE. Low-rank coals, such as lignite, have a higher percentage of REE associated with the organic content of the coal when compared to high-rank coals, where REE are more likely to be inorganically associated.

Albedo, or the reflectivity of material, has a significant influence on the absorption of the Sun's energy, which can influence various Earth processes. For example, the darkening of glacier surfaces (or decrease in albedo) due to atmospheric deposits is known to have a positive feedback effect on glacial melting. The Bull Lake Basin in the Wind River Range in Wyoming contains several glaciers whose snow and ice melt feeds into lakes and reservoirs which is used for economic activities, such as agriculture, and for domestic purposes. Late-summer glacier albedo values were calculated between 1985 and 2016, with results indicating a downward trend over this time period. Analysis of glacier area change over time was conducted and compared with the changing glacier albedo as a measure of the possible impact of the decreasing albedo values on glacial melting.

Understanding pore structure and pore heterogeneity aids in characterizing the flow channel, pore connectivity and storage capacity of the shale rock. Mechanical changes take place in the process of saturating shale rock with CO2, which influences the storage capacity. In this study, pore structure distribution methods were employed to analyze gas adsorption isotherm for pore structure characterization in the Bakken (Upper Bakken and Lower Bakken). Bakken pore size are not uniformly distributed, and the sizes range from nanometer to micrometer. When CO2 is injected into shale rock, it dissolves and changes the acid-base equilibrium that triggers the dissolution and precipitation of minerals. As a result of the dissolution, flow channel may be formed in the rock, the permeability and porosity of the rock unit exposed to CO2 may change. This can induce changes in the microstructure of the material over a long exposure time. The changes in the pore size and pore connectivity might alter the retention capabilities of the rock matrix.

Transition metal silicides have attracted quite an attention for industrial applications due to their promising electrical and optical properties and their high thermal and chemical stability. Furthermore, most of the transition metal silicides are environmentally friendly materials. Semiconducting silicides, such as CrSi2, MnSi1.7, FeSi2, and ReSi2 have been the subject of extensive research because of their potential thermoelectric application. Due to their narrow energy gaps (0.1-0.9 eV). In this work, we studied the early stages of the Cr/Si (110) interface formation with the help of scanning tunneling microscopy/spectroscopy. For less than one monolayer coverage, CrSi2 nano-crystallites formed on the surface. Although the bulk CrSi2 is a semiconductor with a bandgap of about 0.35 eV, the nano-crystallites are metallic in nature.
Energy audit in buildings is an essential task for optimal energy management and operations. This paper focuses on a machine learning pipeline to quantify heat loss using 60,000 thermal images in buildings. The images are captured from a small Unmanned Aerial System (sUAS) over the last two years to form a large thermal data repository. Intense efforts are made to annotate multiple sections of the buildings (e.g. windows, doors, ground, facade, trees, and sky). Data augmentation processes are then applied to generate a large comprehensive training data set. Object detection and instance segmentation models such as Mask R-CNN, Fast R-CNN, and Faster R-CNN were trained, and tested. The preliminary results indicate that Mask R-CNN has a larger mean average precision (mAP) of (83%) over R-CNN (51%), Fast R-CNN (62%), and Faster R-CNN (62 %) for a threshold of 50%. The surface temperature values from these thermal images (pixel-by-pixel) were then used in the standard heat transfer coefficient (U-value in BTU/hr/Sq.ft./F) calculations.

Currently, oil and gas production from shale plays is led by the United States, and several other countries, including China and Argentina, are pursuing to develop their shale oil and gas resources. Since shale formations are ultralow-permeability reservoir rocks with a complex porosity structure, reserve estimates and recovery factors in these plays pose critical uncertainty to operating companies. Here we present a study of the Cretaceous-age Muerto formation in the Talara basin of NW Peru with a high potential for shale gas development. We characterize an integrated porosity distribution model for the Muerto shale reservoir by considering matrix (inorganic), fracture, kerogen (organic), and adsorbed gas. This integrated porosity is quantified from wireline well logs, total organic carbon data, and core samples.

The research begins by calibrating the total organic carbon (TOC) from well-logs and compared to TOC from wells and outcrops from the Muerto formation. Then, kerogen porosity and matrix (inorganic) were estimated based on TOC. Total porosity was estimated from bulk density and neutron porosity. Fracture porosity was computed using sonic porosity and total porosity. The results show that kerogen plus matrix porosity have similar values of sonic porosity and total porosity. Overestimates the gas storage capacity by including volume in pores that are already occupied by adsorbed gas. This research presents that free gas was overestimated by 18%. Finally, the simulation method and the volumetric method are compared, considering that the simulation method uses two types of porosity (matrix and fracture); however, it does not consider adsorbed gas. This gas-in-place value calculated by simulation method is similar to value of free gas calculated by the volumetric method. That means total gas-in-place calculated by simulation method is underestimated by 9% in comparison to the estimation by the volumetric method considering adsorbed gas.

The last part of this work investigated how is affected the Technically Recovery Resources (TRR). I hypothesize that free gas and adsorbed gas has different recovery factor. I found that considerations of recovery factor (geology, mineralogy, well spacing, and completion aspects) only affect free gas; however, adsorbed gas is not considered because of its dependents principally of the pore pressure declination.
Electronic databases were systematically searched for randomized controlled trials (RCTs) reporting the effect of exercise training on basal total testosterone concentrations in men. Ten RCTs were identified and descriptive data were extracted. Review manager v5.3 was used to calculate the intervention effects (as standardized mean differences [SMD]), which were calculated relative to the control group.

Results
Data from 389 men aged 20-70 years across 14 intervention groups participating in aerobic, resistance, or combined training, were included in the analysis. Overall, exercise training had a negligible effect on total testosterone concentrations (mean SMD [95% CI]: 0.02 [-0.22 to 0.18]) ranging from moderate negative (SMD [95% CI]: -0.62 [-1.59 to 0.36]) to moderate positive (SMD [95% CI]: 0.71[-0.18 to 1.60]) effects.

Conclusions
Exercise training does not appear to effect basal total testosterone concentrations in men.

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Horizontal drilling and hydraulic fracturing are the two major techniques utilized in production improvement in unconventional reservoirs. The existence of natural fractures in different scales and directions significantly affects the propagation orientation of induced fracture. By analyzing and summarizing the trend of BHP under different interaction modes to predict the induced fracture propagation direction and length in the naturally fractured reservoir. Xsite, a new, lattice-based software was used to modeling the interaction to characterize the BHP trend regarding the properties and orientations of natural fractures. A summary of trend features will directly assess the extension of the induced fracture in the reservoir through the analysis of the BHP in the oilfield fracturing treatment, partially replacing the role of expensive microseismic events. The analysis of the data was performed with the help of log-log plot, an analytical tool, that describes the net pressure respond when induced fracture interacts with natural fractures.

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Fixed costs related to accounting, procurement, and HR are some of the major ones that can be converted into variable costs through the usage of outsourcing. A partnering supplier’s specific knowledge can be an innovative source, which could be difficult to obtain otherwise. Some common reasons that companies are benefiting increasingly from outsourcing are specialist talents and resource limits. Improved capacity through partners' knowledge can reduce costs and shorten the cycle of development.

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Big data has become the most popular and influential to exist in this competitive digital world. In this regard, the selection of suitable quality attributes in big data software architecture can play a million-dollar solution. In this paper, we work on gathering and understanding key non-functional requirements in the domain of big data systems. Using Systematic Mapping Study (SMS) as research methodology, we find more than 40 different quality attributes related to big data systems. Then, we implement ISO/IEC 25010:2011 quality model to map all these arbitrary NFRs into 8 characteristics of ISO/IEC 25010:2011. Finally, we show performance efficiency, functional suitability, reliability, security, usability and scalability should be the most important quality attributes for a data intensive system. Surely, outcomes from this survey will assist software developers in understanding and identification of NFRs long before implementing them in practice.
Information delivery in a visual format is always a better way of communication. Even with many data visualization techniques available, visualizing enormous amounts of data has always been a challenge. With recent advancements in technology, many new visualization techniques unfold, one of which is visualizing data through Augmented reality (AR). AR and big data have always gone together as AR requires large data sets to render information virtually in a real-time environment, and big data provides the same. Here, we explore some of the conventional visualization techniques and discuss the scope and possibilities for AR data visualizations.

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<th>Sarah Reagen</th>
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The nanoparticle subset graphene quantum dots (GQDs) have peaked recent interest due to their photoluminescence properties, low toxicity and biocompatibility features for bioimaging applications. In this study, GQDs were synthesized from the biomass-derived organic molecule cis-cyclobutane-1,2-dicarboxylic acid via one-step pyrolysis. The resulting GQDs were characterized by various analytical, microscopic, and spectroscopic methods. Moreover, the photostability and stability over pH were also investigated, which indicated the excellent stability of the prepared GQDs. Incubating the GQDs with RAW 246.7 cells resulted in the GQDs entering the cells through endocytosis and thus could be used as fluorescent bioimaging agents. Additionally, the GQDs depicted relatively enhanced fluorescence when treated with different metal ions, indicating that the GQDs could be used for metal ion detection in biological samples as well.

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Use of small Unmanned Aircraft Systems (sUAS) for commercial applications is growing. Once approval is granted to conduct flights Beyond Visual Line Of Sight (BVLOS), utilization of sUAS will accelerate. Hazards associated with sUAS flight, including weather hazards, must be understood when flying BVLOS. One of the leading weather hazards is wind. In this study, nested Weather Research and Forecast (WRF) model simulations with horizontal grid spacings of 12 km, 4 km, 1.33 km, and 0.444 km were conducted to evaluate the impact changing resolution has on wind fields and, thus, on forecasting of sUAS wind hazards. The simulated area lies within Central New York; the surrounding topographic features commonly generate small-scale wind patterns, creating excellent opportunities to explore the dependence of winds on model resolution. Higher resolutions unveil detailed atmospheric features while also being computationally expensive. Results suggest the importance in increasing model resolution to increase safety.

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Psoriasis is a chronic skin disease that causes red, scaly patches to appear on the skin causing severe physical pain and psychological distress for the patients. Current assessment methods are limited to visual inspection resulting in inconsistent assessments among clinical professionals. However, ease of high-quality image capture through smartphone cameras have provided an opportunity for remote monitoring of psoriasis severity progression through automatic image analysis and reporting of results to the patients and physicians. In my research, image processing algorithms based on deep learning approaches are designed to estimate clinical parameters for the psoriasis lesions that include lesion area, redness level of the lesion compared to the normal skin (also known as erythema) and the presence of white silvery scales (scaling). These three parameters are used to quantify the severity of the psoriasis lesions for the patients. This work is anticipated to enable automatic assessment of psoriasis disease severity.

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<th>146</th>
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<th>Nursing</th>
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Nearly 50% of women in the United States will experience urinary incontinence at some point during their lives. Urinary incontinence impacts multiple aspects of a woman’s life, yet remains underdiagnosed by primary care providers. The purpose of this project is to implement education and reminders for primary care providers, to improve urinary incontinence knowledge and assessment for women 18 years of age or older. The project was implemented in a primary care clinic with primary care providers serving as the participants.

A quasi-experimental one-group pretest-posttest design was utilized. Data from a five question pre- and posttest was compared. Statistical significance was demonstrated in all five questions. Results indicate implementation of a urinary incontinence educational session coupled with reminders can improve primary care provider knowledge and clinical decisions regarding urinary incontinence in women, as well as improve patient outcomes.

While extensive research on unmanned aerial vehicles (UAV or drones) detection for wildlife surveys has been done, less is known about potential behavioral responses to UAVs and most research suggests species-specific responses. The objective of our project is to evaluate behavioral responses of nesting ducks in central North Dakota to UAV surveys using two different UAV/drone platforms. We collected preliminary data in the summer of 2019 using a fixed-wing Trimble UX5 and a quadcopter DJI M200 flown at 80m AGL. We located duck nests using a chain-drag method and installed miniature surveillance cameras at 12 nests that included three species, blue-winged teal (Spatula discors), mallard (Anas platyrhynchos), and gadwall (Mareca strepera). We classified behaviors into four main categories: none, active, alert, and off-nest. Two nesting ducks in each of our treatments (M200, UX5, and no flight) displayed a vigilant response during our observation period.
Allergic asthma consists of diverse immune phenotypes exhibiting differential lung pathology, remodeling of the respiratory tract and mucociliary bronchial clearance. These diverse inflammatory immune mechanisms may promote or resist microbial infections in allergic human and mouse models. IL-6 governs optimal T-cell and inflammatory response leading to the resolution of bacterial and viral infections in respiratory airways. Additionally, IL-6 plays an important role in maintaining the integrity of airway barrier response during microbial infections. We hypothesized that lung IL-6 responses alleviate Streptococcus pneumoniae (Spn) pathogenesis during fungal allergic asthma caused by Aspergillus fumigatus.

Using a murine Aspergillus fumigatus asthma model, we show that IL-6 deficiency exacerbates lung inflammation and promotes Spn disease pathogenesis in allergic host. IL-6 deficiency was associated with increased lung damage, which correlated with higher levels of lung eosinophilia, inflammatory cytokines and chemokines. Additionally, IL-6 deficiency correlated with increased TGF-β1 cytokine levels, increased epithelial-mesenchymal transition and dysregulated barrier proteins in asthmatic mice.

We conclude that IL-6 offers a significant protective role in the control of Spn pathogenesis during allergic asthma by regulation of immune cell recruitment and maintenance of lung epithelial barrier integrity.
Semi-rigid building blocks for materials synthesis are uncommon. One such class of structures is cyclobutane-containing building blocks (CBBs). They bridge the gap between their flexible aliphatic chain and rigid aromatic counterparts. The unique blend of rigidity and flexibility, due to the presence of one or more conformationally strained four-membered aliphatic rings in CBBs, make them a viable option in the design and synthesis of novel materials. In addition, their stability towards thermal cycloelimination and near UV radiation substantiate their candidacy in developing materials of choice. One such example is cyclobutane diacid (CBDA). Various types of CBDAs were readily synthesized from olefins derived from agro-residues via environmentally friendly [2+2] solid-state photoreactions. A diverse array of polymers were synthesized by polycondensation of CBDAs and biomass-derived diols to demonstrate the potential applications of CBDAs in material synthesis and to study their thermal and mechanical properties. Despite the presence of the strained cyclobutane ring, these biobased polyesters showed promising thermal, chemical, and photo stability.

| 33 | Muneer Shaik | Chemistry | An Efficient Approach to Cyclic and Block polyesters via Ring-Opening Polymerization using Zinc Amidooxazolinate Complexes |
| 60 | Miranda Shanks | Geology | Mapping Location of Buried Ice Masses, Transantarctic Mountains, Antarctica |
| 43 | Kshipra Sharma | Public Health | The association between arthritis and current depression among adult Brazilians |

Cyclic polymers are a fascinating class of macromolecules. The properties of these topologies remain poorly understood when compared to its linear counterparts. Due to its quite formidable synthetic routes, it is difficult to synthesize pure and high molecular weight cyclic polymers. Herein, we describe the synthesis of high molecular weight, cyclic polymers by the application of amidooxazolinate zinc complexes in ring-opening polymerization. Experiment results show that the amidooxazolinate zinc complexes efficiently activate the cyclic lactone monomers, affording well-defined cyclic polyesters. The polymer architectures are supported by a combination of techniques such as nuclear magnetic resonance (NMR), electron spray ionization (ESI), gel permeable chromatography (GPC), thermal gravimetric analysis (TGA), and differential scanning calorimetry (DSC), and by comparison with their linear counterparts. Fabrication of block or gradient copolymers can be possible by using different monomers of different reactivity.

Global climate change threatens Antarctic ice that contains vital information on paleoclimate, paleoatmosphere, and ancient organisms, which can be used to aid in predictions of future climate. Ancient buried ice masses, protected by thin layer of debris, provide evidence that extends past existing records. Only few such buried ice masses have been identified to date, with potential for many more isolated archives to exist. The objective of this research is to locate more sites containing buried ice.

We use a set of physical features to find buried ice based on visual satellite imagery at submeter resolution, and digital elevation model. Since there is limited knowledge on the abundance of buried ice masses we strive to find a sufficient number of these to analyze for spatial and elevation patterns, further improving evidence of past ice extent and paleoclimate.
Arthritis is a chronic inflammatory disease which affects joints and surrounding tissues, leading to painful movement. This study aims to evaluate the association between arthritis and current depression (CD) among adult Brazilians. The study sample for this study was based on Brazilian National Health Survey 2013. The CD was measured using the Personal Health Questionnaire-8. Multivariable logistic regression was used to calculate weighted and adjusted odds ratios with 95% confidence intervals to investigate the association between arthritis and CD after adjusting for age, gender, race, obesity, diabetes, hypertension, physical activity, current smoking status, heavy drinking and health insurance. After adjusting for the confounders, arthritis was significantly associated with CD. Age group was found to be an effect modifier of the association between arthritis and current depression (p=0.02). Therefore, among individuals of age group 18-39 years with arthritis, the weighted and adjusted odds of CD were highest among all age groups.

The required change in velocity for a satellite to change inclination has prompted studies of efficient orbital transfers. Modeling the motion of a spacecraft by including the gravitational forces associated with the Sun, Earth, and Moon has historically proven effective in obtaining new scientific knowledge. In modeling the motion of satellites, the circular restricted three body problem (CR3BP) demonstrates the interactions from two primary bodies and a satellite. The dynamics created about the equilibrium points within the CR3BP can be used to construct low-energy transfers. The invariant manifolds of the libration point orbits (LPO) can be used to create an orbit using a weak stable boundary (WSB) to approach a coplanar Lagrange point. Following the use of two distinct libration point orbits a satellite can adjust for a return at a greater difference of inclination compared to a one impulse maneuver. On approach to the second Lagrange point, the satellite follows a horizontal Lyapunov orbit to use another maneuver placing the satellite in a vertical Lyapunov orbit. Following the vertical Lyapunov orbit the weak unstable boundary is used for a return toward Earth at a different inclination. Given the trajectory created, a 90-degree inclination change has been developed. The maneuver cost is compared to a Hohmann transfer and bi-elliptic transfer for a decrease in fuel as well as an increase in the time of flight. An analysis of the periodic orbital transfer created in this research is performed, as well as other orbits from associated research articles suggest that a significant amount of velocity savings can be achieved. Continuing with the use of such constructed trajectories, a brief investigation on to financial and environmental impacts are also reviewed. The result of this study demonstrates the utility of periodic orbital transfers and their importance in mission design for plan change maneuver.

Oral health disparities are one of the biggest public health issues faced by American Indian and Alaska Native (AI/AN) populations in the United States. Due to the rural location of many tribal communities, they have poor access to oral health care, resulting in adverse oral health outcomes. Dental therapists may be a feasible solution to overcome this shortage. These licensed providers deliver preventive care like oral exams, x-rays, and cleanings as well as restorative dental care like fillings under the supervision of dentists at a lower cost and with reduced waiting time. A dental therapy model has been successfully established in 12 states across the U.S., however, North Dakota has failed to pass relevant legislation. This literature review examines the causes and effects of oral health disparities in AI/AN communities and provides evidence that a dental therapy model may be an appropriate solution in North Dakota.
Ash content naturally occurring from combustion of solid fuels such as coal or biomass, pose threatening issues to boiler operations due to corrosion, erosion, slagging, and fouling of heat transfer surfaces. The ability to predict ash deposition rates is crucial to effective and efficient boiler operation in any process industry. CFD-DEM models of an experimental oxy-fuel combustor were developed to simulate ash deposition on heat exchange surfaces, and gain a better understanding of slagging and fouling effects in a combustion process. Simulation results were analyzed for relationships between ash deposition behavior and properties of the multiphase flow regime. Stokes and Weber numbers were identified as promising operational parameters for estimating impaction and capture efficiencies to predict ash deposition rates from various solid fuels.

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Food allergies are often found comorbid with neuropsychiatric disorders such as anxiety, depression, and autism spectrum disorder. The symptoms and severity of allergies are variable, some patients present atypical or no visible symptoms which potentially leads to misdiagnosis based on behavioral symptoms. There is an obvious need for reliable clinical markers to predict an individual's risk of food allergy-induced behavioral changes to avoid improper treatment with behavior modulating drugs. To investigate potential markers, we sensitized mice known to exhibit mild allergy symptoms to the milk protein β-Lactoglobulin (BLG) and correlated clinical measurements including anaphylaxis score, abundance of allergen-specific immunoglobulins, circulating cytokines, and abundances of microbiota species with their exhibited behavior symptoms. Our results indicate the anxiety-like behavior observed in male BLG-sensitized mice does not correlate with allergy symptoms but exhibits stronger relationships with the abundances of IL-13 and TNFα in the blood, and Bacteroides species in the gut.

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Horizontal well and hydraulic fracturing have been widely applied in the stimulation for the low permeability reservoirs around the world. The Bakken formation is one of the largest shale oil formations in the United State. Due to the application of horizontal well and hydraulic fracturing, the Bakken formation continued to contribute high oil production even when oil price was low. The objective of my research is to analyze the factors influence the hydraulic fracture propagation in the Bakken formation using numerical simulation.

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Social science designed, implemented, and disseminated only within the confines of academia is in essence, research in a vacuum because in this paradigm the data derived from research often does not reach non-academics. One way to counter the isolating affects of academically-driven research is to embody and engage in the use of community based participatory research (CBPR) methodology. Our project will discuss the impetus to pursue CBPR as a mechanism for equity and pursue policy change within a small midwest city and the resulting social change. Specifically, this is a retrospective auto-ethnographic case study revolving around two major events:

1. A public school district’s support for Indigenous students to honor their cultural heritage and identity by donning the Eagle Feather as part of their graduation regalia
2. A city council’s ratification of Indigenous Peoples Day to replace Columbus Day at the city governmental level.
Here, we report a one-pot synthetic method of Ru-based nano-catalyst using RGO as matrix for electrochemical synthesis of ammonia under ambient conditions. The process was based on a single step of reduction of RuCl3 into Ru-NPs and GO into RGO with the using of glucose as the reducing agent. Based on the HRTEM images, the size of the Ru-NPs were around 2 nm. The electrochemical catalytic activity of RGO/Ru in ammonia preparation was tested which achieved a Faradaic efficiency of 24%.

Alzheimer’s disease is a neurodegenerative brain disorder and the fifth leading cause of death among people aged 65 and older. Until now, there is no efficient treatment for this disease; thus, an early diagnosis can save lives by providing more opportunities for patients to be considered for clinical trials and allowing them to plan for medical and financial expenses related to this disease. Mild cognitive impairment is a transitional state between being healthy and Alzheimer’s disease so it can be considered as the first sign of this neurodegenerative disease. Existing techniques have major drawbacks as they are not able to detect mild cognitive impairment more accurately and thus predict the Alzheimer’s disease. Therefore, this project aims to investigate the efficiency of artificial intelligence models, including machine learning techniques, in automatically detecting mild cognitive impairment with high validity and reliability.

Traditional electrical grid has major shortcomings, including the inability to include diverse generation sources such as green energy, high cost and expensive assets, high carbon emission, and frequent blackouts. Smart Grid is a new electrical grid that includes a variety of operations and energy measures, including smart meters and renewable energy. It uses the information technology to deliver energy to consumers through a two-way flow of communication. Smart grid has new functionalities such as, real-time control, operational efficiency, grid resilience, and better integration of renewable technology which will decrease carbon footprint. Due to the inherent security weaknesses of communication technology, smart grid is subject to a number of cyber-attacks that violate the privacy and confidentiality requirements. Therefore, this project aims at developing robust authentication techniques to secure smart grid communication and preserve the privacy and confidentiality.
Respiratory syncytial virus (RSV), is negative-sense RNA virus (Pneumoviridae family) that can cause severe respiratory tract infections including bronchiolitis and pneumonia in children under 5 years of age worldwide. RSV becomes a global health concern and an enigma to researchers because of (1) the higher child mortality and morbidity, (2) the absence of any FDA approved vaccine or cost-effective therapeutics, (3) the absence of an appropriate animal model. We have successfully established an in vitro airway epithelium model by culturing primary human bronchial epithelial cells in an air-liquid interface 3D culture system. RSV infection in the airway epithelium modulated cytoskeleton resulted in cellular expansion, which is termed as cytoskeletal inflammation. Interestingly, RSV mediated cytoskeletal changes did not impact on epithelial barrier integrity and ciliary function. Thus, our results suggest that cytoskeletal proteins can be a potential target for future anti-RSV therapeutics.

Current research in the field does not address the need for a temporal profile of scale formation of different salts. Therefore, it is important to provide a temporal profile of scale formation to better infer the effect antiscalants can have on the formation of scale. This research seeks to provide this temporal profile of scale formation of different salts. Currently testing is being conducted to provide precipitation rates at different concentrations over a period of 10 days. We have found that most of the formation happens during the first 24 hours of the experiment at any concentration. By building onto this initial finding we hope to create temporal profiles on multi-salt precipitation.

Annually, 300,000 individuals are estimated to get Lyme disease in the U.S. and can experience a variety of symptoms that range from minor aches and pains to long-term neurological complications. The bacteria that causes Lyme disease, Borrelia burgdorferi (Bb), has been found in the cerebral spinal fluid (CSF) of patients. This fluid surrounds the central nervous system (CNS): the brain and spinal cord. However, it is unknown how or where Bb is able to enter. There is a very important barrier that separates the CNS from the rest of our body, this is called the Blood-CSF-Barrier. In our experiments, we infected cells from this barrier with Bb and performed genetic analysis. We observed a robust immune response and observed a decrease in genes that form this barrier. We concluded that this response may play an important role in neurological symptoms and provide a window for Bb to enter the CNS.

Project includes intergenerational play interviews conducted, as well as my own responses to interview questions. Project looked at how play has changed over the years as well as similarities and differences between my childhood play and interviewees. Research findings that draw correlations between what was discussed in interviews and what has been found in other parts of the world are included as is a general discussion of trends seen in play today.
In the present study, the creep response of magnesium (Mg) reinforced with 0.25, 0.5, and 0.75 vol.% of carbon nanotubes (CNTs) is investigated through nanoindentation tests against pure monolithic Mg. The poor creep resistance of Mg at elevated temperatures limits the wider industrial application of Mg. Further, replacing heavy aluminum, titanium, and stainless steel parts in vehicles with Mg-CNT nanocomposites can potentially save considerable weight and reduce emissions. The creep tests were performed at the following temperatures: 25, 100, 200, and 300°C. Peak load for all tests was 50 mN/s and three strain rates (0.5, 5, and 50 mN/s) were tested. Results of the study indicate that peak hardness and creep resistance are obtained at intermediate, i.e., 0.25-0.5 vol.%, CNT loadings. It was also found that the dominant creep mechanism at elevated temperatures is a complex mixture of dislocation motion, grain boundary sliding, and diffusion creep.

92  Purna Chandra Rao  Chemistry  Pd(II)-Catalyzed Arylation of Arylboronic Acids with Triarylphosphines

Transition metal-catalyzed reactions resulting in the formation of an (sp2)-(sp2)C bond are well known and widely used in organic chemistry. The significance of such transformations was emphasized by awarding the Nobel Prize in Chemistry in 2010 to R. Heck, E. Negishi, and A. Suzuki, who studied Pd-catalyzed cross-couplings. As a rule, these reactions require the application of aryl halides or triflates as aryl sources. Our group investigates the possibility of using triarylphosphines as arylating sources in the Pd-catalyzed reactions with boronic acids. We found that Pd(OAc)2 catalyzed arylation of 8-quinolineboronic acid with triphenylphosphine to afford a compound with a new (sp2)-(sp2)C bond. Various parameters of this transformation were tested, and the optimal conditions were determined. Other arylboronic acids were also successfully reacted with three different triarylphosphines to furnish compounds with a new (sp2)-(sp2)C bond.

16  Aliza Verma  Higher Education  Multicultural Undergraduate Research Program

This program design is a part of the M.S. in Higher Education's scholarly project. The proposed undergraduate research program addresses UND's institutional need for an office of undergraduate research by examining NESSE, FESSE, and other applicable data. The program design incorporates an extensive group literature review regarding student sense of belonging, a benchmarking report comparing institutional and community data from UND's aspirational peers, and lastly the program design itself. Undergraduate is a High-Impact Practice (HIP) which has data-backed claims of improving overall student success in college. The program design that I am formulating focuses on racially underrepresented populations - who are shown to benefit the most from HIPs. The program also discusses UND's institutional priorities and where an Office of Undergraduate research could thrive on campus, not only encouraging and facilitating student participation but offering protections and standards as well.

102  Christina Walker  English  Intergenerational Trauma and Literature: Narrative Memory and Art Spiegelman's Maus

Through his graphic memoir Maus, Art Spiegelman processes the intergenerational trauma of his father, Vladek, who survived the Holocaust. By telling the story to his son, Vladek's fragmented memory becomes cohesive when Spiegelman translates it into a narrative. Not only does this help Spiegelman understand what happened but also helps Vladek work through the trauma of his wife's death by suicide. His wife, Anja, is only known to Spiegelman through his father's remembering, and so by placing her in the narrative memory, he gives her a voice in the story. The graphic memoir not only provides an outlet for expressions of intergenerational trauma but also manages to preserve something otherwise incomprehensible to outsiders. Christina Walker wrote this research paper as course work in the first year of her Masters in English.

142  Claire Wolters  Nursing  Using Omega 3 supplements to treat attention-deficit/hyperactivity disorder (ADHD) in children and adolescents
Using Omega 3 supplements to treat attention-deficit/hyperactivity disorder (ADHD) in children and adolescents:

The number of children being diagnosed with ADHD has been increasing in the United States (U.S.) (National Institute of Mental Health, 2017). Many children and families are looking for alternatives to standard psychotropic medications prescribed for ADHD. This may be due to side effects, lack of results, or personal preference. The purpose of this literature review is to determine whether or not the use of omega 3 supplements is a beneficial intervention for improving ADHD symptoms among children and adolescents. Current recommendations in the U.S. for children with ADHD six years and older is to treat with behavioral therapy as well as a psychotropic medication (CDC, 2019). Recommendations for children under the age of six is just behavioral therapy (CDC, 2019). Not all patients respond to the typical pharmacotherapies prescribed for ADHD (Chang, Su, Mondelli, & Pariante, 2018). There is evidence supporting the use of omega 3 supplements to treat ADHD symptoms.

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<th>15</th>
<th>Yingfen Wu</th>
<th>Chemistry</th>
<th>PEI-coated Fe3+ Quantum Dots for Ultrasensitive Detection of H2O2 and Glucose</th>
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Fe(III) ion graphene quantum dots (GQDs-Fe) were successfully synthesized with the help of hydrophilic polyethylenimine (PEI) under 200 °C for 15 h to detect H2O2 and glucose. Dynamic light scattering (DLS) was used to measure the size distribution and zeta potential. UV/Vis absorption spectra was recorded by a spectrophotometer; fluorescence intensity was measured by spectrofluorophotometer. Additionally, the quantum yield was calculated with the results of these two characterizations. The transmission electron microscopic (TEM) image, X-ray diffraction (XRD) measurements, Fourier transform infrared (FTIR) spectra, and chemical compositions of the samples was also analyzed for characterization. The reaction between GQDs with H2O2 and glucose was supervised by the change of fluorescence intensity. The GQDs showed a significant decrease in fluorescence with the reduction of H2O2. Because of the specific catalytic effect of glucose oxidase for the oxidation of glucose and the formation of H2O2, the detection of glucose would be turned out. Under the high performance of Fe(III) oxidization, the newly synthesized GQDs show high potential for its application in H2O2 and glucose detection.

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<th>37</th>
<th>Yuanheng Xiong</th>
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The particle size distributions (PSDs) described the relationship between size and abundance of particles. The PSDs in the ocean have been measured for decades but were mainly limited for particles > 1 µm and only a few studies reported particles < 0.2 µm. The measurement of particles between 0.2 and 1 µm is lacking. We utilized a particle size analyzer called ViewSizer to track the Brownian motion and estimate the PSDs of submicron particles. We calibrated the instrument using polystyrene size-standard beads from 100 nm to 900 nm, with a mean error of 5% for the peak sizes and < 57% for the concentrations. We collected seawater samples at various depths from surface to 3000 m during two cruises in North Pacific and measured the samples onboard with the ViewSizer. The concentrations of submicron particles vary from 3—10^5 to 2—10^7 /ml in our study.

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<th>10</th>
<th>Yeqian Xu</th>
<th>Earth System Science &amp; Policy</th>
<th>Could Road Ditch be an Economic Habitat?</th>
</tr>
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</table>

Bees play a virtual role in pollination, which brings an essential benefit to ecosystem services valued by human society. In this project, we apply the road ditches and CRP lands images by fieldwork in-person to analyze the flowering percentage by using Deep Convolutional Neural Networks (DCNN). The final results are expected to compare other public-funded pollinator conservation programs with the feasibility of road ditch serving as pollinator habitat by evaluating the economic value.

|----|-------------|-----------------------------|--------------------------------------------|
Long-term snowfall change offers insight for understanding climate change and managing water resources, especially at regional scales where topography plays an important role in shaping regional water availability. In this study, we examined the changes of annual snowfall using observations from 1961 to 2017 in central North America. There is general, yet distinct, difference in the snowfall trend demarcated approximately along the 105°W. To its east, which is dominated by plains, snowfall had overall increased except in a limited area south of 42°N. To the west of 105°W which is dominated by Rocky Mountains, there was a wide spread of decreasing trend with only two pockets of area at elevation > 2000 m exhibiting increasing trends. Multiple regression analysis showed that, snowfall trends significantly correlated with elevation in the mountain region and with temperature in the plains region, suggesting different mechanisms potentially shaping snowfall trends in the two regions.

Carbon fiber is a carbon-based material with the advantages of high surface area, high tensile strength, high chemical resistance, low density, and high stiffness along the carbon fiber. These advantages build carbon fiber a very promising role as a substrate (e.g., an electron collector) in energy storage devices which can highly increase the gravimetric energy density. For the same reason, carbon fiber could be the key component assembling a flexible energy storage device for wearable electronics. However, carbon fiber is not a very good electrical conductor compared with aluminum or copper electron collector and will increase the internal resistance and lower the output voltage. This work focuses on improving the electrical conductivity of Carbon Fiber Mat (CFM, 50 — 20mm) by depositing a thin layer of pure metal on the surface. Several Metal/CFM composites were synthesized. The best one shows an electrical conductivity one hundred times improvement.