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The following abstracts of oral and poster presentations represent those received by the Abstract Editor. Authors' affiliations are abbreviated as follows:

AFRL	Air Force Research Lab
CIFE	Centre International de Formation Européenne
CU	Covenant University
D-NUSMS	Duke-NUS Medical School
DU	Ducks Unlimited
GSU	Grambling State University
JSU	Jackson State University
LDWF	Louisiana Department of Wildlife and Fisheries
LSMSA	Louisiana School for Math, Science, and the Arts
LSU-A	Louisiana State University, Alexandria
LSU-BR	Louisiana State University, Baton Rouge
LTU	Louisiana Tech University
LU-NO	Loyola University, New Orleans
MSU	McNeese State University
NCBS	Nicholls Center for Bayou Studies
NSU	Nicholls State University
NWSUL	Northwestern State University of Louisiana
OET	Ocean Exploration Trust
OMBS	Ouachita Mountains Biological Station
PBRC	Pennington Biomedical Research Center
SLU	Southeastern Louisiana University
SU	Salisbury University
SIU	Southern Illinois University
SUAMC	Southern University and A&M College
SUAREC	Southern University Agricultural Research and Extension Center
SUNYG	State University of New York, Geneseo
TCSCRRM	Tulane Center for Stem Cell Research and Regenerative Medicine
TU	Tulane University
UB	University of Belgrade
UD	University of Dayton
ULL	University of Louisiana, Lafayette
ULM	University of Louisiana, Monroe
UK	University of Kentucky
USDAARS	United States Department of Agriculture, Agricultural Research Service
USUHS	Uniformed Services University of the Health Sciences
XUL	Xavier University of Louisiana

Division of Agriculture, Forestry, and Wildlife

Akinrinwoye, C. SUAMC. Y. Ghebrieyessus SUAREC. J. Namwamba, and Y. Twumasi. SUAMC. **The effects of urban trees and compost as soil amendment for Katrina-flooded Ninth Ward of New Orleans.**—A study was conducted at the Southern University Horticulture Farm in a greenhouse setting to evaluate the impact of trees on soils from New Orleans Lower Ninth Wards. A complete randomized design composed of three replications and three different treatments (3 sites, 4 distances from tree canopy and 3 soil amendments). Mustard green seeds were planted in pots and weekly heights, chlorophyll level and biomass was recorded. Significant difference in plant height was found among the four distances from the tree canopy drip line with the highest growth at close to the tree (28.8 cm) and with the lowest at unlimited distance from the tree (26.6 cm). Significant difference in plant height was found among the three soil amendments with compost amendment the highest (19.8 cm) and with the no amendment the lowest (17.2 cm). The study showed that trees could improve soil fertility of the study area and hence, could improve the livelihood of the residents.

Amenyo, F. SUAMC. Y. Ghebrieyessus. SUAREC., and Y. Twumasi. SUAMC. **Plant canopy cover evaluation and relationships of soil properties and erosion for the Southern University's Scott Bluff.**—Disturbance from human activities and other natural occurrences like rainfall along edges of waterbodies are increasingly aggravating erosion problems. There is a need to assess the increasing erosion at the Southern University Mississippi River Bank (Scott Bluff). A baseline research was conducted at the Southern University's Urban Forestry Department Farm to address the problem. The objectives of the research were; to compare two methods of plant canopy measurement (Canopeo and Grid method) and determine relationships between soil properties and soil erosion by raindrops. Pictures of canopy cover were taken, plant height, bulk density, soil moisture content and rain drop erosion was determined. Both Grid and Canopeo methods of canopy cover determination showed significant relationship with R2 of 79%. Fraction of canopy cover ranged from 0%- 85%. Plant height influenced soil erosion with R2 of 77%. Bulk density vs. erosion relationship gave only 33% R2.

Bhuma, U., A. Kamran, and N Zhu. SUAMC. **Conversion of urban wood waste to biofuel.**—Demand for ethanol in the U.S. was driven higher every year because of increased gasoline consumption and shortage of fossil fuels. Cellulosic feed stocks are non-food based feed stocks that include crop residues, wood residues, dedicated energy crops, and industrial and other wastes. These feed stocks are composed of cellulose, hemicellulose, and lignin. It's more challenging to release the sugars in these feed stocks for conversion to ethanol. Ligno-cellulosic waste materials can be processed to rupture cell walls and liberate sugars needed for ethanol production. Cellulose contains long chains of glucose molecules, and due to its structural composition, is comparatively more difficult to hydrolyze than starchy materials. Performance of three urban tree species namely *Quercus nigra*, *Triadica sebefere* and *Pinus elliottii* were used as feed stock for ethanol production. The main goal of this research was to increase fermentable sugars' yield through high-efficiency pretreatment technology and enzymatic hydrolysis. Pretreatment of lingo-cellulosic biomass with dilute H_2SO_4 has focused on wood materials. In a controlled environment enzymatic hydrolysis

was performed in a solid state laboratory bioreactor (labfors 5- infors AG) using Accelerase -1500 as the hydrolysis enzyme followed by fermentation with *Saccharomyces cerevisiae*. *Quercus nigra* recorded highest glucose levels at 48 hrs. showing 67.66 mg/dL while *Pinus elliottii* showed least glucose readings with 30 mg/dL at 48 hrs. Ethanol readings were recorded highest in *Quercus nigra* with 34.61 mg/dl and lowest in *Pinus elliottii* with 15.35 mg/dl.

Billeaudeaux, L., W. Storer, K. Crawford, and J. Guillory. MSU. **Yield and plant composition of forage sorghum produced for silage in SW Louisiana.**—Three varieties of sorghum [Dynagrow (Medium) 705F, (Tall) F73FS10, and (BMR) F72FS25BMR] were evaluated for their potential as a late season silage crop as part of a corn/sorghum/annual ryegrass crop rotation program. After harvesting of corn silage in August, the field was plowed, furrowed, and planted (d 0) on 76 cm rows at 4.5 kg/ha in early September. Atrazine (1 L/ha) and Parallel (1 L/ha) were applied pre-plant for weed control. Liquid urea ammonium nitrate (32% N, 33.6 kg/ha) was side-dressed. Two applications of insecticide were applied on d 14 and 30. On d 90, sorghum was cut, chopped, and bagged for ensilage. Silage yields were 7.1, 10.0, and 7.0 Mg/ha for Medium, Tall, and BMR, respectively. Crude protein percentages were 10.4, 7.0, and 7.4 for Medium, Tall, and BMR, respectively. Starch content was greatest in the Medium variety. Digestibility was greatest and lignin was least in the BMR variety.

Faulkner, J., and C. Corbat. LSU-A. **New technique for increased individual recognition of small mammals with camera trapping.**—Use of camera traps in scientific studies has increased rapidly in the last decade. Advantages of camera traps include that they are less labor intensive; they do not require restraint or handling of animals, thereby reducing stress to the animals; and they are cost effective. A disadvantage however, is lack of ability to recognize individual animals for most species. We tested two camera setups with individually marked Eastern Woodrats (*Neotoma floridana*). At each woodrat nest, one camera was mounted traditionally facing toward the nest parallel with the ground and a second camera was suspended on a tripod over the nest facing the ground. Cameras mounted traditionally took significantly more pictures than the cameras on tripods. However, a significantly greater proportion of the pictures taken by the cameras on tripods showed the marks on the woodrats. Tripod-mounted cameras resulted in increased efficiency in data collection.

Namwamba, J., Y. Twumasi, R. Okwemba. SUAMC. F. Namwamba. SU., and B. Osimbo. SLU. **Modeling of temporal trend of urban heat islands in Denham Springs and their corresponding environmental impact.**—Forests in cities and suburbs have been frequently eliminated to creation space for development, resulting in rising intensities of urban heat islands (UHI) within the neighborhoods whose forest stands were decimated. A large proportion of incident short-wave solar radiation to earth is used to evaporate water from leaves, through a process known as evapotranspiration while some is reflected away by leaves. Removal of vegetation from the earths' surface eliminates its cooling benefits, leading to heating of air closest to the surface energy transmitted by material or structural surfaces. Deaths from heat have been increasing, making this study significant. The spread of urban heat islands and ecological impacts in Denham Springs was studied with respect to time and corresponding models were developed. Application of GIS and remote sensing imagery was used to illustrate and bring out a clear picture of the trend of urban heat islands in the study area.

Nijoka, K., and C. Corbat. LSU-A. **Use of fluorescent powder to track snakes in a bottomland hardwood forest.**—The purpose of this study was to determine if fluorescent powder was effective in allowing researchers to delineate movements and microhabitat use of snakes in a bottomland hardwood forest. A total of 13 individual snakes of 6 different species were captured and powdered. Total length of trails followed per snake ranged from 6.9-97.1 m. Fluorescent powder worked well for tracking large-bodied snakes (>10g), but was not effective in tracking small snakes. Fluorescent powder also proved to be useful in examining microhabitat use by large-bodied snakes, and it is possible that snakes could be tracked for multiple days using powder tracking. However, issues to address in future studies include stray powder due to other animals walking through powder trails and incidental scatter while dusting animals.

Oubre, C., and R. Boopathy. NSU. **Biodegradation of phenol by a bacterium isolated from the termite hindgut.**—The subterranean Formosan termite *Coptotermes formosanus* is an insect pest in Louisiana that annually causes billions of dollars in damage. Some aspects of the microbiome of this termite, such as nitrogen fixation and methanogenesis, have been reported in literature, but more research is needed on factors affecting the termite microbial ecosystem. To our knowledge, the breakdown of phenolic compounds produced by lignin metabolism in the termite gut has never been reported. In this study, termites were collected from wood of red maple *Acer rubrum*, tupelo *Nyssa aquatica*, nuttal oak *Quercus texana*, and live oak *Quercus virginiana* and the guts were removed. Termite gut samples were inoculated in different media with various substrates including phenol, glucose, and acetate. A bacterium, *Acinetobacter tandoii*, that used phenol as the sole source of carbon for growth was isolated and identified. This bacterium converted phenol to acetate via the production of metabolites catechol, cis-cis muconic acid, succinic acid, and oxalo acetate. Metabolically, the bacterium used the Kreb's cycle to produce TCA cycle intermediates from phenol. The bacterium survived high concentrations of phenol up to 300 mg/L and degraded all the phenol. However, at higher concentrations greater than 300 mg/L, a longer lag phase was observed in the bacterium's growth curve. This bacterium could potentially be used in the bioremediation of phenol contaminated soil and water.

Street, D. SUAMC. **Assessing the urban forest effects and values using i-Tree ecosystem analysis for Zachary, Louisiana.**—Understanding an urban forest's structure, function and value can promote management decisions that will improve human health and environmental quality. An assessment of the vegetation structure, function, and value of the Zachary, Louisiana urban forest was conducted during 2018. Data from 260 field plots located throughout Zachary, Louisiana were analyzed using the i-Tree Eco model developed by the U.S. Forest Service, Northern Research Station. Number of trees: 44, 850 with a 27.0% tree cover. Most common species of trees were Water Oaks, Live Oaks, and Common Crape Myrtle. Pollution removal totaled 24.95 tons/year ($41.7 thousand/year). Carbon Storage 54.63 thousand tons (7.27 million) carbon Sequestration totaled 2.314 thousand tons ($308 thousand/year). Oxygen Production totaled 5.441 thousand tons/year. Avoided Runoff 1.844 million cubic feet/year ($123 thousand/year). Building energy savings estimated $76.800/year. Pollution removal by tree in Zachary, Louisiana was estimated using field data and recent available pollution and weather data available. Pollution removal was greatest for ozone. It is estimated that trees remove 24.95 tons of air pollution (ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), particular matter less than 2.5 microns (PM2.5), and sulfur dioxide (SO_2) per year with and associated value of $41.7 thousand).

Tate, J., and Y. Twumasi. SUAMC. **Mapping and analysis of environmental pollution in Louisiana using remote sensing and GIS.**—For decades, Louisiana has been facing a major issue regarding the emissions of toxic chemicals that may cause damage to air quality, pollute the water, and degrade the soil which has a massive impact on the sustainability of the ecosystem. In 2016, Louisiana ranked number five out of fifty releasing 147,000,000 pounds of toxins. In addition to the harm to the environment, air toxins such as chloroprene cause an outbreak of cancers to the bones, lungs, and cervix, and pollutants such as mercury, metals, and certain dioxins in the water cause impairments which threaten the living conditions of humans. The targeting of the numerous sights utilizing Geographic Informational Systems (GIS) and remote sensing techniques provides a spatial interpretation of the affected area and aid with proper mapping, assessment strategies, and policies. This study uses GIS and remote sensing techniques for mapping and analysis of environmental pollution in Louisiana.

Twumasi, Y. SUAMC. E. Merem, S. Welch. JSU. J. Namwamba, K. Abdollahi, R. Okwemba, F. Amenyo, O. Okwusi, and J. Tate. SUAMC. **A spatial study of the location of toxic sites and its impacts on ecosystem: the case of Louisiana.**—Chemical spills and hazardous waste sites pollution is a global concern. It is estimated that more than 500,000 humans have died and 10 million have suffered from chemical spills and hazardous waste sites pollution poisoning in the last 40 years globally. In the United States, chemical spills and hazardous waste sites are some of the major issues confronting both states and federal governments because of its health related issues. It is also observed that chemical spills contamination has taken the dimension of an epidemiological problem and poses a significant threat to the environment especially in Louisiana. Notwithstanding the gravity of the issue, very little has been done to track the problems with Geographic Information Systems (GIS) in Louisiana. However, GIS has found widespread appeal in mapping and analyzing chemical spills and hazardous waste sites pollution. The study therefore uses GIS to spatially geocode the affected toxic site areas in Louisiana.

Twumasi, Y. SUAMC. E. Merem, S. Welch. JSU. J. Namwamba, R. Okwemba, K. Abdollahi, O. Okwusi , and F. Amenyo. SUAMC. **Analyzing current transboundary water issues and hydro politics of the Horn of Africa region.**—Water resource access as an integral part of everyday life serves multiplicity of purposes from agriculture to the hydroelectric power needs. However, in the Horn of Africa region where major water sources for nations pass through international boundaries, limited access to water and lack of it can be a source of economic, political and ecological conflicts. Accordingly, in the last several years, the complexities and processes involved in transboundary water use under the ambit of hydropolitics in the Horn of Africa region, continue to stoke anxieties and tensions among nations. Given the high stakes, occasional responses to addressing hydrological stress can sometimes involve unilateral investment in the latest advances in technology to extract water, recourse to negotiated settlements and multilateral accords. This paper uses secondary data, mixscale techniques of GIS and descriptive statistics to analyze the trends of current state of water politics of the Horn of Africa.

Division of Biological Sciences

Botany Section

Homer, J. NSU. A. Pierce. DU. A Minor. SIU., and J Willis. NSU. **Habitat sustainability in a forested wetland used for wastewater treatment.**—The release of wastewater into natural wetlands has been shown to improve water quality of adjacent waterbodies, increase accretion rates through increased vegetation productivity, and generate financial savings. The city of Thibodaux, LA has been releasing treated municipal effluent into the Point au Chene swamp since 1992 at an average rate of 11,546 m^3 day effluent,14.44 mg/L/day total nitrogen, and 1.52 mg/L/day total phosphorous. Discharge of treated municipal effluent not only introduces nutrients, but also alters the hydrologic regime, both of which may affect habitat sustainability. Planted *T. distichum* growth, natural *T. distichum* regeneration, and leaf litter decomposition have been observed to be similar in treatment and reference sites. However, species composition of understory vegetation and established trees may be different in treatment wetlands. Continued monitoring of the Thibodaux assimilation wetland is needed to better determine the overall sustainability of vegetation.

Pierce, C., and R. Boopathy. NSU. **Effect of plant growth-promoting Rhizobacteria (PGPR) as biofertilizers on bean rhizospheric soil nutrient quality.**—Plant Growth Promoting Rhizobacteria (PGPRs) are bacteria that colonize the root system of plants and enhance plants' growth. This enhancement is attributed to the bacteria's participation in a symbiotic relationship with the plant in which the bacteria provides nutrients to the plant, and the plant provides a suitable environment for the bacteria to reside in the root nodule and in rhizospheric soil. Use of PGPRs as biofertilizers holds potential to have significant effects on plant growth and yield with fewer attributed environmental repercussions than the alternatives. In this study, we implement a method of isolating potential PGPRs and assessing their biofertilizer potential. This process could produce PGPRs that are specialized to the environment in which they are collected from and could therefore work more efficiently if implemented in that same environment.

Environmental Sciences Section

Hardy, Laurence. OMBS. **The Wallace Lake Biological Station in Louisiana.**—A new biological station, being developed in Louisiana, is on 600 acres of land on the southern edge of Wallace Lake, just south of Shreveport. The land has been leased to the Ouachita Mountains Biological Station and is available for research and educational activities by universities, colleges, schools, and any other groups with any interest in biology, the environment, or nature. At this time, the WLBS consists of land, a storage building, some trails, and no other facilities. However, a

modern educational science center for students of all ages is being planned. We have already had several groups visit the WLBS to survey the biota and explore the property. Several rare plants have been documented. Resident animals include most of the expected fauna, except bears and cougars. The habitat varies from the rolling hills of upland pine/oak forest to cypress swamp on the edge of Wallace Lake.

Okwusi, O., and Y. Twumasi. SUAMC. **The implementation of Environmental Impact Assessment (EIA) on sanitation in Lagos Mainland Nigeria.**—Sanitation plays a vital role in the environment that defines the degeneration of a society. In the last few decades, Lagos Mainland has been faced with a problematic situation on solid waste due to increased population. The city is a metropolitan area that originated on islands and expanded onto the Mainland west where solid wastes associated with paper and bottle is most occupied. In this paper Environmental Impact Assessment (EIA) will be utilized in Mainland Lagos to demonstrate to the community how the environment can be clean. Environmental bodies such as Lagos Waste Management Authority would cooperate with the current Environmental Impact Assessment to monitor and enforce the ability to manage solid waste products and disposal/treatment system. The implementation of the EIA would also be used to improve on the sanitation issues in Lagos in order to reduce the high rate of sickness and diseases in the city.

Phillips, T., and R. Boopathy. NSU. **Biodegradation of a common herbicide, Metribuzin, used in Louisiana.**—Metribuzin (4-amino-6-tert-butyl-3-(methylithio)-as-triazin-5(4H)-one) is a photosystem II inhibiting herbicide currently being used as a substitute for atrazine. Metribuzin is a triazinon class herbicide and known endocrine toxin like atrazine though approximately 1% as toxic. Biodegradation of metribuzin by bacteria from the soil of the USDA farm in Houma, LA, which has been exposed to atrazine for a few years, will be evaluated under aerobic and anaerobic conditions. Anaerobic conditions will include fermentative, nitrate reductive, sulfate reductive, and mixed reductive environments. Once a condition under which metribuzin is degraded is found, the bacteria from that triplicate will be streaked for isolation and identified using BioLog. The concentration of metribuzine will be analyzed by HPLC, while the byproducts of degradation will be evaluated by GC/MS.

Microbiology Section

Belding, C., and R. Boopathy. NSU. **Presence of antibiotic Resistant bacteria and antibiotic resistance genes in Louisiana's recreational waters.**—In the past few decades, the medical community has faced a rising problem in the spread of antibiotic-resistant bacteria (ARB) and the difficulty of treating related infections. The presence of these bacteria in high-traffic bodies of water, as well as the presence of the antibiotic resistance genes (ARG) floating freely in the water, pose the threat of antibiotic-resistant infections in individuals living and recreating in these areas of southeast Louisiana. Water samples from Chauvin, Louisiana and Port Fourchon, Louisiana were analyzed using chemical, microbial, and molecular methods to determine the presence of ARBs and ARGs. Significant numbers of ARBs were consistently found at both sites, and ARGs were found throughout testing. These numbers, as well as the chemical and coliform data, show

that these high-traffic recreational bodies of water may be putting wildlife and humans at risk for antibiotic-resistant infections.

Canter, H., K. Delino, C. Cart, and C. Struchtemeyer. MSU. **Monitoring levels of fecal indicator bacteria in water bodies impacted by aerobic sewer system effluent.**—Aerobic sewer systems are used to treat wastewater in many rural areas and often discharge effluent directly into ditches that rely on sunlight for disinfection. In many cases, these disposal ditches flow directly into major recreational water bodies. The goal of this work was to understand the environmental impacts of these systems by monitoring the microbial quality of effluent as well as ditches and a river that were directly impacted by aerobic sewer system effluent. These microbial quality studies consisted of the enumeration of Escherichia coli and fecal coliform bacteria in our samples. High concentrations of these bacteria were detected in all effluent samples, all ditch samples, and in river samples following heavy rain events. Our results seem to indicate that high concentrations of fecal bacteria are released by aerobic sewer systems. These microbes persist in disposal ditches and are then flushed into a nearby river during rain events.

KC, R., and C. Struchtemeyer. MSU. **The effectiveness of antibiotics and household chemicals against microbes in condensate from an attic air conditioning unit.**—Microorganisms are known to produce biofilms in the condensate lines of attic air conditioners. These microbes are often pathogenic and can cause clogs, which lead to overflows and failures of attic air conditioning units. In this study biofilms were collected from the condensate line of a residential attic air conditioning unit. Bleach, vinegar, and store bought air conditioner pan tablets were tested against whole biofilm samples and individual bacterial species from the biofilms. Biofilms were also examined for the presence of multidrug resistant bacteria. The results of this work indicated that at least one multidrug resistant bacterium was present in the biofilms. Bleach was most effective for treating individual species of biofilm bacteria, whereas store bought pan tablets most effectively controlled biofilms. Minimum inhibitory concentration (MIC) data was also obtained for bleach, vinegar, and pan tablets, which should help prevent future overflows and failures of attic air conditioning units.

Rutz, R. MSU. M. Pilligua. USUHS. W. Dees. MSU., and A. Jerse. USUHS. **Irradiation of iron depleted *Neisseria gonorrhoeae* cultures for use as a killed whole cell vaccine.**—*Neisseria gonorrhoeae* (Gc) is a gram-negative diplococcal bacterium that has grown increasingly resistant to antimicrobials throughout the last half-century. With 100 million new infections each year, a vaccine would benefit global health. To conduct vaccine research, an iron depleted growth model is needed because Gc is in iron depleted conditions during human infection. A common method of creating a killed whole cell vaccine is by radiation. Irradiating bacteria, however, also damages epitopes which are essential in vaccine mechanisms. MDP, a radio protective compound containing manganese and a decapeptide, is designed to protect epitopes during irradiation. In this study, we standardized a growth protocol for Gc in iron depleted conditions using Graver-Wade media. We then irradiated cells grown using this protocol with and without MDP and viewed protein ladders to determine if epitopes were preserved. We found that MDP was protective of NGO2139, an outer-membrane protein which is a strong vaccine candidate.

Stewart, V., and W. Dees. MSU. **A biometeorological analysis of three yellow fever outbreaks: 2011, 2012, and 2017.**—We reviewed yellow fever outbreaks occurring since 1996 from the

World Health Organization to assess the climatological effects on yellow fever virus transmission. Yellow fever is a mosquito-borne pathogen of the family Flaviviridae for which *Aedes spp*. are the primary vectors. For the duration of the outbreak and two weeks prior to initial cases, climate parameters were recorded including temperature, humidity, dew point, wind speed, barometric pressure, and precipitation. Each of the parameters were daily collections recorded by the National Oceanic and Atmospheric Administration. Of 83 outbreaks, three representative outbreaks were chosen for analysis: Minas Gerias, Brazil (2017); Greater Darfur, Sudan (2012); and Kedougou, Senegal (2011). Each parameter also was evaluated in these areas during non-outbreak periods to assess differences in climatological conditions affecting virus transmission. Understanding environmental conditions affecting virus transmission is necessary to prevent and control further yellow fever outbreaks.

Molecular and Biomedical Biology Section

Bradford, A., and Z. You. TU. **Prostate Cancer metastasis: Defining more metrics for prognosis.**—An underdiscussed factor of prostate cancer is the intraprostatic inflammation at the primary tumor site that is correlated with worsened patient prognoses, decrease in response to therapies, and higher PSA levels in prostate cancer patients. Based on our preliminary Cibersort analyses, the short-term focus of this project is to determine if the abundant CD4+ T cells and CD+8 T cells are activated at the primary tumor site when the chronic inflammatory phenotype is present. Current analyses involve defining immune cell profiles between primary prostate tumors and matched metastases via databases, such as the GSE. Thereafter, we are assessing the role of immune cells in prostate cancer development and progression at the primary site by using MPC3-luc cells and immune cells in an orthotopic mouse prostate cancer model. Laboratory aims for this work also include distinguishing other prostate cancer metrics and factors, like age, race, PSA, and body mass index.

Dokunmu, T. SUAMC. D. Enoma, O. Awani, and S. Okpara., CU. **Caffeine-artemisinin anti-cancer effects on DMBA-induced breast tumors in albino rats.**—Breast cancer is the most diagnosed cancer in women and causes high cancer-related deaths globally. Therapies aimed at preventing the risk of developing breast cancer are very important to reduce the high incidence of breast cancer. Our study investigated the effects of two natural bioactive compounds - artemisinin and caffeine on breast tumor development in female albino rats after single dose of 40mg/kg DMBA. The effects on DNA damage by comet assay and histology studies was carried out after 5 weeks oral administration of 25mg/kg caffeine (CAF), 4mg/kg artemisinin (ART) or 25+4mg/kg Caf-Art combination, compared to positive and negative controls. Caf-Art combination and Art alone showed less degree of DNA damage and higher protection against DNA damage compared to control groups, which had higher mortality rates. We conclude that artemisinin alone or in combination with caffeine has potential benefits to reduce the risk of developing breast tumors.

Dufour, B., G. Dumancas. LSU-A. S. Ghosh. D-NUSMS., and C. Bouchard. PBRC. **Prediction of cardiorespiratory fitness gains in response to a standardized dose of exercise via a genetic algorithm based predictive modeling.**—Cardiorespiratory fitness (CRF) is the ability of the

cardiovascular and respiratory systems to supply oxygen to the working muscle during sustained exercise. It is a strong predictor of the risk of premature death in adults. A genetic algorithm based machine-learning approach was utilized to rank and select the most important baseline behavioral, physiological, and metabolic factors contributing to CRF gains in participants of European descent (n=483). The optimum model (area under curve (AUC)=0.8279, specificity=0.9143, sensitivity=0.8140) captured seven variables that might be predictive of CRF gains. We validated our results in participants of African descent (n=259; AUC=0.8249, specificity=0.8646, and sensitivity=0.7201). Results of our study show the importance of these variables as likely predictors of CRF gains when adults are exposed to a standardized exercise program.

Francis, T., R. Hadley, S. Jones, and P. Kim. GSU. **Endoplasmic reticulum stress and endothelial dysfunction.**—African Americans (AA) experience higher rates of hypertension and cardiovascular disease compared to Caucasian Americans (CA). We show that primary aortic endothelial cells from an AA donor and CA donor respond differently when exposed to conditions that model a high-saturated fat diet. Cells from the AA donor exhibited decreased cell viability and increased expression of genes involved in inflammation and atherosclerosis compared to the CA donor. These preliminary results suggest that ethnic cardiovascular health disparity may involve genetic variability in cellular stress and endothelial function in response to saturated fat.

Grider, T., T. Austin, D. Nelson, and W. Dorsey. **The autophagy mechanism: A friendly response in PCP-treated mammalian cells and an enemy to cancer treatment.**—The autophagy mechanism plays an important role in the synthesis, degradation, and the recycling of cellular trash from old and damaged cell parts. This intracellular clearance event is a friend to mammalian cells because it maintains cellular homeostasis and promotes the manufacturing of energy from old lipid and protein molecules. On the other hand, autophagy helps cells to survive micro-environmental stress and to increase cellular growth and aggressiveness. Because of this pro-survival role, autophagy establishes cancer cells with an adaptation mechanism that causes them to thrive. Patients using anticancer therapies become resistant to treatment because the cancer cells are now in an optimal survival mode. Understanding the autophagy molecular mechanisms associated with the progression of cancer, can therefore be helpful in finding new therapeutic medicines. In this study, we hypothesized that pentachlorophenol (PCP), an organochlorine wood preservative, will cause an autophagy response in human airway A549 lung cells and TIB-73 mouse liver cells. Interestingly, we observed increased levels of Beclin-1 (regulator of autophagy), and ATG16 (essential for autophagosome formation), and Nrf2 (transcription factor responsible for restoring redox homeostasis) in PCP-exposed A549 cells in a concentration-dependent manner. An accumulation of LCB3, an autophagy marker, also confirmed the autophagy response in the PCP-treated human airway lung cells. In TIB-73 mouse liver cells, we observed an increase in p62/SQSTM1, indicating an autophagic influx as well as a decrease in LCB3. Overall, these findings provide evidence of autophagy responses in PCP-treated human airway A549 lung cells and TIB-73 mouse liver cells.

Guyton, T., and F. Ohene. GSU. **Analysis of bovine vitreous humor by a combination of size exclusion chromatography and capillary electrophoresis.**—Size exclusion chromatography (SEC) is a technique employed for the characterization of therapeutic proteins and it is a powerful technique for the qualitative and quantitative evaluation of aggregates. The main advantage of this approach is the mild mobile phase conditions that permit the characterization of proteins with

minimal impact on the conformational structure and local environment. Capillary Electrophoresis (CE) is the method applied to the separation of electrically charged particles in solution by passage of an electrical current through that solution. Proteins are polymers formed from alpha-amino carboxylic acids. Electrophoretic techniques have been widely used in the analysis of body fluids and chemicals, particularly proteins and DNA. Capillary electrophoresis provides highly efficient and expeditious separations. Both SEC and Capillary Electrophoresis, coupled with mass spectrometry-based analyses, have become predominant methods in the field of proteomics. The purpose of this study was to optimize size exclusion chromatography (SEC), capillary zone and capillary gel techniques for separation of proteins. These techniques were employed to demonstrate the potential application of both SEC and CE methods in the analysis of proteins in bovine vitreous humor sample. Vitreous humor is the largest structure of the eye and plays a fundamental role in our vision. Unfortunately, there are numerous factors, including genetic, biological, and environmental elements, as well as the aging process, that can promote or cause vitreous-related diseases of the eye. Analysis of soluble protein profiles in the vitreous humor may elucidate the pathogenesis of various retinopathies, such as posterior vitreous detachment. Protein and bovine vitreous humor samples were acquired for analysis using SEC and capillary electrophoresis. The bovine vitreous samples were homogenized and lyophilized. Both proteins and the bovine vitreous were then denatured and centrifuged before analysis and a comparison of both the SEC and CE data obtained were made.

Hartupee, C., C. Benett, and J. Newman. LTU. **Investigating protein interactions within the Mediator complex though ChIP and Co-IP.**—Human Adipose-Derived Stem Cells (hASCs) are multipotent stem cells with the potential to self-renew, differentiate, and suppress inflammation. The behavior of hASCs is determined by a dynamic range of regulatory elements, one of which is the kinase domain of the Mediator complex. The kinase domain is responsible for activating cell-type specific transcription factors and directing gene expression profiles. To study the role of individual subunits within the complex, we are using immunoprecipitation techniques that isolate specific proteins along with the proteins and genomic regions they interact with. Chromatin immunoprecipitation (ChIP) is a multi-step process that isolates and enhances the genomic regions upon which transcription factors and other proteins bind, and co-immuno-precipitation (Co-IP) studies the interaction of complex proteins with other regulatory proteins. By utilizing ChIP and Co-IP we can determine specific interactions within the kinase domain and better understand the role that this complex plays in stem-cell maintenance.

Ives, C., B. O'Donnell, and B. Bunnell. TCSCRRM. **Model of joint immunoregulation via stem cell-educated macrophages.**—Knee osteoarthritis (OA) is an immunological disease that compromises joint tissue homeostasis. Epidemiological data has implicated the adipogenic complications of diabetes in the increased incidence of OA in diabetic patients. However, the impaired immunomodulation by diabetic infrapatellar fat pads (IPFP) remains uncharacterized. Here, we model the arthritic IPFP via co-cultures of diabetic and non-diabetic adipose-derived stem cells (ASCs) and macrophages, effector cells of the innate immune system. In 2D, macrophages and ASCs separated by permeable membranes communicated exclusively via paracrine extracellular secretions. Subsequent experiments ensued within 3D methacrylated gelatin hydrogels, with properties akin to the in vivo microenvironment. In both models, non-diabetic ASCs modulate inflammation, reducing macrophage expression of pro-inflammatory cytokines and inciting immunosuppressant cytokine production in RT-qPCR. However, when

cultured with diabetic ASCs, macrophages maintain a pro-inflammatory profile. This suggests that the concerted manifestation of OA and diabetes is, in part, attributed to altered paracrine signaling within the IPFP.

Jones, S., R. Hadley, R. Xavier, T. Francis, and P. Kim. **Fluorescence turn-on sensor for measuring unfolded proteins during ER stress.**—Proper protein folding is essential and is therefore closely regulated by the cell. In response to cellular stress arising from unfolded proteins within the endoplasmic reticulum lumen, cells activate the Unfolded Protein Response (UPR). Chronic UPR activation has been implicated in human disease. Currently, techniques to monitor protein folding within cells are limited. To better understand the role of protein misfolding in saturated fat-induced UPR, we used a fluorescence turn-on molecule as a protein folding sensor. The molecule turns on fluorescence when bound to native transthyretin, a protein known to fold and assemble within the endoplasmic reticulum.

Liu, M., H. Logan, and J. Newman. LTU. **The role of Notch1 and Notch3 in hADSC adipogenesis.**—Human adipose-derived stem cells (hADSCs) are multipotent cells with great potential in regenerative medicine. Notch is a conserved contact-dependent signaling pathway that determines cell proliferation and differentiation. The pathway includes four membrane receptors, Notch1-4, and our goal is to explore the role of Notch1 and Notch3 in hADSC adipogenesis to understand how they work together to regulate cell state. We found that the loss of Notch3 promoted adipogenesis as demonstrated by increased lipid droplets and enhanced expression of adipose-related genes. In addition, we observed increased expression of Notch3 during adipogenesis. Expression of Notch1 also increased during adipogenesis but, unlike Notch3, appears to promote lipid accumulation. Immunofluorescence showed that Notch1 was enriched in adipocyte differentiated hADSCs while Notch3 was highly expressed in and only in adjacent hADSCs not undergoing adipogenesis to maintain cells at stem cells state. Our research provides new targets for directed differentiation in tissue regeneration.

Logan, H., M. Liu, and J. Newman. LTU. **Investigating the role of Notch 1 and Notch 3 in human adipose-derived stem cell self-renewal and adipogenesis.**—Human adipose-derived stem cells (hASCs) possess many characteristics that make them attractive tools for regenerative medicine, cell-based therapies, and biomedical research. Notch, a contact dependent cascade that modulates many important cellular processes including cellular differentiation, is comprised of four receptors (Notch 1-4) and five ligands of the Jagged/Delta like family. Irregularities of the Notch signaling pathway have been linked to a number of devastating developmental disorders and cancers. Notch3 specific siRNA has been used to show that the loss of Notch3 promotes adipogenesis and increases the level of activated Notch 1 in differentiated hASCs. Notch 1, a well-studied receptor in the Notch signaling cascade, is required for adipogenesis, as knockdown yields less lipid vesicle formation and lower expression of adipogenic markers. These results have prompted us to speculate that Notch1 and Notch3 have a contradictory relationship during adipogenesis, where Notch 3 inhibits and Notch1 promotes adipogenesis.

Miller, C., J. Cart, A. Bryan, and J. Newman. LTU. **Investigating expression levels of the Notch pathway in self-renewing hASCs.**—Human adipose-derived stem cells (hASCs) are used in regenerative medicine to treat connective tissue injuries and degenerative conditions. However, efficient use of these cells in the clinic requires additional studies. We are interested in

understanding the Notch singling pathway which is known to be involved in many cellular processes including self-renewal and differentiation of hASCs. We have investigated the expression levels of each Notch receptor and ligand by collecting RNA and protein samples from whole cell lysate. Notch3 is known to specifically regulate differentiation of hASCs, but the exact mechanism and relationship between other Notch receptors during self-renewal remains poorly understood. Under the influence of a Notch3 knockdown, Notch2 and Notch4 expression did not change significantly suggesting that Notch3 does not regulate these receptors during self-renewal. Studies such as these are necessary to understand how the Notch pathway operates under normal conditions and can be applied to pathology of disease.

Murphy, K., G. Tramonte, E. Bass, and J. Warren. MSU. **Examining the DNA-binding specificity of fungal-specific zinc cluster transcription factors.**—Invasive fungal infections (IFIs) are associated with high rates of morbidity and mortality and pose a serious health concern for severely immunocompromised patients. Fungal resistance to current drug therapies is largely due to the transcriptional upregulation of membrane associated efflux pumps. The fungal-specific zinc cluster (Zn2Cys6) family of transcription factors (TFs) are primarily responsible for the upregulation of these efflux pumps and thereby mediating pleiotropic drug resistance (PDR) in yeast. The aim of this study is to characterize the DNA-binding specificity of previously undescribed Zn2Cys6 TFs (CAT8, GAL4, LYS14, PUT3, UGA32, ZCF21, ZCF23, ZCF25, ZCF28) from *Candida albicans*. Additionally, DNA-binding specificity data will be used to predict genes and biological processes regulated by these TFs. Toward these aims, a cloning strategy involving genomic DNA PCR, Gateway-based cloning, in vitro protein expression, and protein-binding microarray analysis will be utilized. Future studies will expand this analysis to additional TFs and related species.

Pursell, I., H. Barnett, H. Vogel, M. Caldorera-Moore, and J. Newman. LTU. **Myogenic differentiation of adipose-derived stem cells.**—Volumetric muscle loss (VML) is characterized by muscle injury where the tissue is not able to regenerate naturally. Human adipose stem cells (hASCs) offer promise in cell-based regenerative therapies to treat muscle damage due to their self-renewing capabilities, their ability to differentiate into cells found in mesoderm tissues and the ease with which they can be harvested from patients. hASCs have the potential to differentiate towards a myogenic linage, however, there is currently no differentiation media that can yield more than 15% myogenic success. Here we focus on optimizing a myogenic differentiation media recipe for hASCs. Reverse transcription polymerase chain reaction and immunofluorescence demonstrated expression of myogenic marker expression in hASCs after exposure to various media recipes. From these assays we identified a media recipe that reproducibly induces myogenic differentiation. Currently we are testing different culture environments to continue working towards the creation of functional muscle tissue for clinical applications.

Smith, B., and L. Porter. NWSUL. **Characterizing the role of tick DSCAM in Gram-negative bacterial infection.**—*Amblyomma americanum*, also known as the lone star tick, transmits the human pathogens that cause STARI, ehrlichiosis, and tularemia, can transmit Heartland virus and is strongly implicated in transmitting Bourbon virus. Research on the cellular receptors in ticks that recognize and initiate a response to invading pathogens is incomplete. Studies in mosquitoes and *Drosophila* have identified the cellular receptor DSCAM as a protein capable of discriminating between different types of invading pathogens. The DSCAM protein is hyper-

variable, with thousands of possible variations due to the alternative splicing of exon cassettes. In this study, we identified a partial transcript for the DSCAM gene in *A. americanum*. As a first step in transcript profiling, we used RACE cDNA methods to resolve the constant regions of the transcript. We also used RNAi to validate this transcript as part of the tick immune response to Gram-negative bacterial infections. Identifying the specific molecules normally involved in a tick's immune response will help elucidate how this response differs during tick infection with human pathogens.

Straub, J., C. Hartupee, and J. Newman. LTU. **The role of Mediator subunit MED12 in adipogenesis**.—The Mediator Complex is a critical transcriptional cofactor in the regulation of cell-type specific gene expression. Our research focuses on how Mediator influences the differentiation of human adipose-derived stem cells (hASCs). We are focused on MED12, a Mediator kinase domain subunit that appears to have a significant role in maintaining cell state. We hypothesize that the loss of MED12 disrupts adipogenic differentiation in hASCs. We have performed siRNA-mediated knockdowns of MED12 in hASCs prior to inducing adipogenesis and observed reduced adipogenesis as demonstrated by cell morphology and lipid vesicle staining. We have optimized our sonication protocol for chromatin immunoprecipitation (ChIP) experiments and are currently investigating MED12 genomic occupancy to determine the direct gene targets of MED12 during adipogenesis. This research is important for elucidating the requirements for proper transcriptional regulation of clinically-relevant hASCs in order to aid in maximizing their application in the clinic and areas of regenerative medicine.

Stumpf, C., N. Sammons, and S. Bowers. LSU-A. **Using the novel dipstick DNA extraction technique in a biological barcoding lab.**—This laboratory exercise introduces students to DNA extraction, biological barcoding, and sequence analysis and reinforces the concept of the polymerase chain reaction (PCR). It takes advantage of the dipstick extraction technique that is cheap and fast and allows for DNA extraction and PCR setup on the same day in an 1:50 hr. Introductory Biology lab. Students determine whether local businesses actually use the fish that they advertise, or if cheaper fish are being passed off as the more expensive species in order to boost profits. Different species of fish are collected from local vendors, DNA from their tissues is extracted, and a region from the Cytochrome C Oxidase I gene is amplified. After PCR, results are sent off for sequencing. The following week, chromatograph results are uploaded to NCBI, they are compared to existing genomic datasets, and conclusions are discussed in class.

Vogel, H., I. Pursell, H. Barnett, J. Newman, and M. Caldorera-Moore. LTU. **Establishing and optimizing differentiation protocols of hASCs for myogenic applications.**—Human adipose stem cells (hASCs) are a multipotent stem cell with tremendous clinical potential. HASCs can be differentiated towards a myogenic lineage to create muscle tissue that will treat injuries where the tissue is not able to regenerate naturally. Currently, there is not a universally accepted media protocol for the myogenic differentiation of hASCs. Our research is focused on optimizing myogenic differentiation media to help advance the field of muscle regeneration and tissue engineering. Initially, two different types of myogenic media were investigated, and reverse transcriptase polymerase chain reaction (RT-PCR) was used to determine expression of myogenic gene markers desmin, myogenin, myf5, myf6, mhc, and myod. Immunofluorescence, using the anti-myosin antibody, has also been used to qualitatively evaluate myogenic differentiation. Through RT-PCR and immunofluorescence, we have identified a media recipe that appears to

enhance myogenic differentiation in hASCs and will be further explored to improve its differentiation potential.

Venigalla, S., C. Bennett, and J. Newman. LTU. **Role of MED12 in maintaining structural integrity of the Mediator complex in human adipose stem cells.**—MED12 is one of the four subunits that forms the kinase module of the Mediator complex, a coactivator which facilitates transcription of cell-type specific genes. Human Adipose stem cells(hASCs) can self-renew and are multipotent making them a potential source in tissue engineering and regenerative medicine. This research investigates the interactions of MED12 with other subunits in the Mediator complex and the impact that loss of MED12 has on subunit interactions throughout the complex. Co-Immunoprecipitation of MED12 followed by knockdown was performed and the results show that with the pull down of MED12, CDK8-CCNC also dissociates. We plan to continue investigating MED12 protein interactions and the role of MED12 in maintaining the structural integrity of the Mediator complex. This research provides insight into how the Mediator complex regulates cell state and gene expression profiles in hASCs and its impact of the structural deficiencies to cause disorders and suggest new therapeutic strategies.

Wagley, M., and Z. Radulovic. NWSUL. **Exploring tick and tick-borne diseases in northwestern Louisiana.**—According to the Center for Disease Control and Prevention, there are a total of 16 tick-borne diseases (TBD) in the United States, including well-documented and widely distributed (Lyme disease, babesiosis, anaplasmosis, Rocky Mountain spotted fever), as well as newly described emerging diseases (Heartland virus disease, southern tick-associates rash illness). Epidemiological data reveals the presence of several TBD in Louisiana. However, data on ticks and tick-borne pathogens (TBP) distribution is scarce and this research aims to collect this data in northwestern Louisiana. Hard ticks (Acari: Ixodidae) were collected throughout Natchitoches, Sabine, Vernon, Red River, and Caddo parishes during the period Fall 2017 – Spring 2019 by flagging vegetation and from infested animals. Sampled ticks were categorized by species, location, stadium, sex, and collection method. Three species were collected, including *Ixodes scapularis*, *Dermacentor variabilis*, and *Amblyomma americanum*. RNA is extracted from individual ticks and molecular detection of TBP using RT-PCR based techniques is ongoing.

Xavier, R., S. Jones, and P. Kim. GSU. **Using *Drosophila* as a model organism to study alcohol addiction.**—*Drosophila* has proven to be an effective model organism to study neurological diseases due to the evolutionary conservation of genes between *Drosophila* and humans. The limbic system also known as the brain's "reward system" is responsible for addiction. This area releases the neurotransmitter dopamine, which is responsible for creating pleasurable feelings. The brain's normal production of dopamine can be disrupted by drug addiction. *Drosophila* were placed on alcohol diets during their adult stage of development to encourage alcohol dependence. The genes involved in alcohol addiction will be analyzed in comparison to flies on a regular diet by qPCR.

Zoology Section

Beachy, C. SLU. M. Carter. LSMSA. R. Penn, J. Bynum, and M. Daniels. SLU. **Geographic variation in the larval life history of the Southern Two-lined Salamander,** *Eurycea cirrigera* **(Caudata, Plethodontidae) in Louisiana and Mississippi.**—The family Plethodontidae has more diversity in life cycle than the other eight families of salamanders combined. There are three basic variations of life cycle: metamorphic, paedomorphic and direct-developing. Those plethodontid species that are biphasic differ from most amphibians in that larval growth is very slow and the larval period is long (9-60 months). There are few studies of species that occupy the coastal plain of the southeastern United States. We collected monthly samples of larval *Eurycea cirrigera* from two localities in Washington Parish, Louisiana (Bogue Chitto State Park, Stubbs Creek) and Wilkinson County, Mississippi (Clark Creek) for a full year cycle to estimate larval density, growth rate, timing of hatching and of metamorphosis. At each locality hatching takes place in early summer month in and metamorphosis occurs in late summer. We estimate the larval period to be 24 months at Clark Creek and 36 months at BCSP and Stubbs Creek.

Bierbaum, E., C. Beachy, and R. Diaz. SLU. **Mesopodial and digit number skeletal variation in the elongated and limb reduced amphiuma salamanders.**—Within extant salamanders, the Family Amphiumidae presents a unique system to study the evolution and development of limbs due to their very elongated body as well as having reduced limb length and digit number in a graded fashion within the genus: *Amphiuma tridactylum* (Three-toed), *A. means* (Two-toed), and *A. pholeter* (One-toed). Ancestrally, salamanders have lost digit 5 in the forelimb, yet retain the pentadactyl pattern in the hind limb. Within the genus *Amphiuma*, the forelimb has lost digit 4 while the hindlimb has lost digits 5 and 4 with subsequent reduction within the genus toward a total of 3, 2 and 1 digits per autopodium. Our preliminary data show variation in digit number within each species, and has led us to examine mesopodial skeletal variation to provide insight on which digits were lost. Ultimately, the mesopodial skeleton should provide support for the homology of the retained digits.

Cannon, C., and C. Beachy. SLU. **Environmental factors impacting alternative life-history pathways in a facultative paedomorphic salamander (***Notophthalmus viridescens louisianaensis***).**—The central newt (*Notophthalmus viridescens louisianaensis*) has a complex life-history with the potential to express alternate life-history pathways: typical dimorphic and facultative paedomorphic life-histories. This intraspecific heterochrony has the potential to have broad implications from evolutionary biology to community ecology. It has been demonstrated that environmental factors, (e.g. density and larval growth rate) can affect the life-history pathway expressed by the Central Newt. However, a few things are still not fully understood about facultative paedomorphosis of the Central Newt: (1) environmental factors that contribute to the expression of alternate life histories (e.g. food abundances, growth, temperature, density); (2) potential sex-specific bias to the expression of alternate life-history pathways. Using food and temperature laboratory experiments I will test the hypothesis that certain environmental factors (food abundances, growth rate, temperature, and density) can impact the rates of paedomorphosis and that paedomorphosis in the Central Newt has a sex bias.

Faria, V., A. Hale. MSU. R. Maxwell, and S. Kinney. LDWF. **Preliminary histologic findings from an investigation of American eel (*Anguilla rostrata*) populations in Louisiana.**—The American eel (*Anguilla rostrata*) is commonly found in Louisiana waterways, however very little is known about their life history, population abundance, or best practice sampling techniques. The Louisiana Department of Wildlife and Fisheries (LDWF) has undertaken a pilot project to increase knowledge about location and abundance of these elusive eels. One identified project limitation is that for eels under 400 mm it is not possible to determine sex without histologic evaluation. To assist LDWF in this endeavor, MSU has been processing eel gonad samples from all sampling locations and size categories to aid in sex determination. Over 100 eel samples have been analyzed to date. The histologic data compliments morphometric, location, and ageing data collected by LDWF to build an initial understanding of the status of American eels in Louisiana.

Fullbirght, M., and B. Moon. ULL. **Bite forces of map turtles (genus *Graptemys*).**—Bite force is an important measure of performance that directly relates to an organism's fitness. The forces produced by the jaw muscles limit the prey-base, and therefore the nutrition available to the individual. We are studying bite performance in map turtles (*Graptemys* species). The males of all species are considered microcephalic (i.e., have small heads), whereas females may be microcephalic, mesocephalic, or megacephalic (having profoundly large heads). The differences in head size are thought to relate to dietary differences, with megacephalic females being capable of durophagy, and microcephalic individuals being limited to feeding on softer prey items. Our preliminary results show that microcephalic individuals generate forces comparable to many turtles that are dietary generalists, whereas megacephalic individuals are capable of producing much higher forces, commensurate with those of snapping turtles. These results support the hypothesis that megacephalic turtles can exploit hard prey that most other species of turtles cannot consume.

Hebert, C., and G. LaFleur. NSU. **Comparing species number of frogs in freshwater and brackish habitats of the Barataria-Terrebonne Estuary.**—In In 2005 our lab began participating in the La Amphibian Monitoring Program running routes in Terrebonne and Lafourche Parishes. We compared Chocataw, a fresh water swamp, with Montegut and Falgout Canal Road, both brackish water marshes. Based on our data, we can conclude that some frog species only consistently call in our freshwater site, including the Cajun Chorus Frog (*Pseudacris fouquettei*) and Bird Voiced Tree Frog (*Hyla avivoca*). We have also documented some frogs which tolerate brackish water in our brackish water sites, including the American Bull Frog (*Lithobates catesbeianus*), Pig Frog (*Lithobates grylio*), Southern Leopard Frog (*Lithobates sphenocephalus*), Green Tree Frog (*Hyla cinerea*), and Cricket Frog (*Acris crepitans*). The number of species found in our fresh water site, 8.7+/- 1.65 was significantly different than that found at our brackish water sites with 6.1 +/- 1.536 at Falgout Canal and 4.125 +/- 1.9 at Montegut.

Hillard, C., D. Penning, and B. Moon. ULL. **Strike while the snake is hot: Temperature dependency in ratsnake strike performance.**—Temperature plays an important role in the physiological performance of ectotherms. However, some organisms use elastic recoil mechanisms that allow them to circumvent temperature dependence. Previous work hypothesized that viperid snakes use elastic recoil mechanisms in their striking behaviors. This study tested the hypothesis that temperature affects the strike performance of the western ratsnake (*Pantherophis obsoletus*). We tested 15 snakes at 5 ecologically-relevant temperatures (15–35°C) and recorded

3–5 defensive strikes of each snake using a high-speed camera (250 fps) and Tracker 4.87 software. We analyzed four peak performance values: strike distance (m), strike duration (s), strike velocity (ms^{-1}), and strike acceleration (ms^{-2}). We found that changes in temperature significantly affected strike performance in ratsnakes with reduced strike performance at lower temperatures and the highest performance at 30°C. This significant, although moderate, temperature dependence indicates that elastic recoil is not a major component in snake strike performance.

Martello, A., B. Lambert, C. Johnston, J. Cutler, and C. Stumpf. LSU-A. **Comparison of Three DNA Extraction Methods for Biological Barcoding.**—The novel dipstick DNA extraction method was tested for its reliability and usability for Biological Barcoding in comparison to a commercial kit and to a simplified ethanol precipitation method using crayfish gill tissue. Following DNA extraction, the mitochondrial COI-gene was amplified in a PCR-reaction using a standard set of universal invertebrate primers. All three extraction techniques resulted in successful amplifications, with the commercial kit yielding the largest amounts of DNA judging from visual gel inspection. With the dipstick method, PCR immediately follows the very brief DNA extraction technique. We suggest that the dipstick method is an affordable, efficient, and reliable DNA extraction method uniquely suited for Biological Barcoding that results in reliable and reproducible downstream applications such as sequencing. Additional tests on fish using specific fish COI-primers confirmed these findings. Due to the few steps involved, this technique is also highly recommended for High school and University Biology courses.

Moberly, I., and B. Moon. ULL. **Nature's funambulist: Functional role of setae in arboreal locomotion in chameleons.**—Arboreal habitats present some of the greatest challenges to movement, as they contain complex arrangements of perches with various diameters, inclines, and spacing. Due to the risk of falling, maintaining stability is of primary importance in arboreal locomotion. Chameleons are largely arboreal specialists and possess diverse characteristics that enable them to move smoothly through their complex environments. For example, their zygodactylous feet and prehensile tails have friction-enhancing microstructure (setae) on the substrate-contacting surfaces, allowing for effective gripping. This research examines the importance of subdigital setae during locomotion in Oustalet's chameleons (*Furcifer oustaleti*). To explore the functional significance of setae in arboreal locomotion, I measured the locomotor movements of chameleons before and after interfering with the setae. I recorded the chameleons moving across perches of different diameters, hardness, and inclines to assess the conditions in which setae provide the most benefit in maintaining stability.

Soorya, S., C. Guidry, and R. Nathaniel. NSU. **Quantification of collagen in skin tissue for analysis via hydroxyproline assay.**—Collagen is an important structural protein in skin tissue. Collagen can be assessed and quantified by the detection of the amino acid, hydroxyproline, which is found almost exclusively in connective tissue. Collagen quantification is used as a pathological marker in various conditions including tumor growth, arthritis, chronic ulceration and diabetes. The amount of hydroxyproline in collagen is estimated at 12.5%. This study was performed to assess collagen in fish skin. Homogenized crude skin extracts were hydrolyzed by autoclaving. The hydrolysate was oxidized by chloramine-T and the resulting product was detected colorimetrically using Ehrlich's aldehyde reagent. Quantifying hydroxyproline from various skin samples shows differing amounts of collagen content in the tissues. Our results confirm the present

of collagen in skin. It is probable that the variation in quantification is correlated to the thickness of the samples tested.

Tsaliki, M., H. Meyer, and K. Jackson. MSU. **Morphological and molecular analysis of *Echiniscus virginicus*.**—Tardigrades or water bears are microscopic animals that live in marine and freshwater habitats; terrestrial species are famous for their resistance to environmental change. *Echiniscus virginicus* was described in 1962 from lichens and mosses in Virginia. Since then it has been widely reported from mainland USA, Hawaii, Galápagos Islands, Central America, and South America. We assessed morphological variation among specimens from 7 mainland and Hawaiian sites, and genetic variation among animals from Virginia, Rhode Island, Georgia and Maine. PCA analysis showed that the greatest morphological variation was between animals from Louisiana and Georgia. The COI gene was sequenced from 14 animals. All animals were identical over a 560bp region. Genetic diversity in the COI gene was compared between *E. virginicus* and 12 other *Echiniscus* species; P-distances ranged from 15-20%. These results underscore the importance of considering both morphological and genetic data when studying *Echiniscus* species.

Division of Physical Sciences

Chemistry Section

Araki, Z., and B. Wicker. SLU. **Synthesis of 2,2'-bipyridine via phosphorus extrusion.**—We used the diphenyl-bis(2-pyridiyl)phosphonium (Dipyphos) bromide salt in an attempt to synthesize 2,2'-bipyridine by phosphorus extrusion. Conditions of temperature, time, solvent, Lewis acid and nucleophile of the reaction were varied to examine their effects on the yield of 2,2'-bipyridine. Proton and phosphorus NMR were used to determine the formation of products while HPLC was used to find the yield of 2,2'-bipyridine. Cobalt(II) chloride hexahydrate offered the most success at 20% yield of the Lewis acids while bulkier nucleophiles like triethylamine at 25% yield also indicated some success. We believe that this reaction follows a nucleophilic attack on the phosphonium cation, which creates a five-coordinate intermediate. The intermediate will then extrude 2,2'-bipyridine if both pyridyl rings are in the equatorial position. The formation of 2-pyridiyldiphenyl phosphine oxide appears to accompany the synthesis pathway.

Belgard, A. and B. Wicker. SLU. **Insights into 2,2-bipyridine formation via phosphorus extrusion.**—2,2'-bipryidine derivatives were synthesized via phosphorus extrusion from a phosphonium salt. This talk will discuss the use of HPLC to analyze the extrusion reaction and how variations on Lewis acid, nucleophile, and reaction conditions affect the overall yield of bipyridines. A mechanism of extrusion will also be discussed.

Edwards, A., and B. Wicker. SLU. **Synthesis of phosphonium salts for use with 2,2'-bipyridine synthesis.**—The salt diphenyl-bis-(2-pyridyl)phosphonium bromide, [Dipyphos]Br, was seen to generate 2,2'-bipyridine via a proposed phosphorus extrusion mechanism. Herein we report the synthesis and characterization of several derivatives of [Dipyphos]+ salts, as well as their effects on bipyridine formation.

Folse, S., and M. Cole. LTU. **Chemical adulteration of sugars and sweeteners as a threat to U.S. homeland security.**—In 2018, the United States (U.S.) imported 3.3 million tons of sugar products making it the 2nd largest importer of sugar products in the world. Yet, only 0.02% of the sugar imported was tested by a Customs and Border Protection (CBP) laboratory for duty tax and quality control. This demonstrates a tremendous vulnerability to the security of imported foods, especially sweeteners as they comprise of ~55% pharmaceutical and 64% grocery products. Moreover, none of these measurements evaluate whether dangerous chemical adulterants are present in the imported sugar and presents a threat to homeland security, through our food and agricultural industry. In this work, we aim to explore the capabilities of common analytical instrumentation – GC-FID, UV-vis absorbance spectroscopy, and FT-IR- in detecting and quantifying simulated chemical adulterants in factory raw sugars.

Gallo, A., A. Nguyen, C. Weber, and M. Ackel. ULL. **Extraction and characterization of** *Baccharis halimifolia* **and propolis from Southwest Louisiana.**—Louisiana has a long tradition

of using plants for medicines as practiced by the local traiteurs. Our initial research focused on the chemical composition of *Baccharis halimifolia* (groundsel bush, GB) and on propolis, made from native GB resin. The genus *Baccharis* exhibits may pharmacological effects including antioxidant properties against oxidative stress, anti-rheumatic, antifungal, anti-inflammatory, and lowering blood glucose levels. Propolis is generally known as the "bee glue", which is a generic name that refers to the resinous substance accumulated by the bees from different types of plants, in this GB. The collection of *Baccharis* and propolis along with the extraction procedures used will be discussed. The chemical composition of propolis was carried out using GC-MS and a number of different compounds were isolated and identified. Flavonoids in addition to cinnamate esters, alcohols amines and hydrocarbons were present. The extracts will be tested for pharmacological activity at the Pennington Biomedical Research Center.

Junk, T., W. Smith, D. Franklin, K. Goutierrez. ULL. F. Fronczek. LSU-BR. **Novel Te, N heterocycles: potential precursors to supramolecular frameworks.**—Heterocyclic organo-tellurium compounds have a pronounced tendency to self-assemble to supramolecular frameworks ranging from molecular wires to ribbons and rings. In the past, this work centered around 1,3-telluradiazoles, which are highly sensitive to hydrolysis. Our work focusses on the synthesis of highly stable 1,3-tellurazoles, which are known to also be capable of supramolecular self-assembly, as well as on the preparation of previously unreported six-membered Te, N heterocycles. Initial structural characterizations following the preparation of various 1,3-tellurazoles indicate that the nature of substituents in position 2 determines whether they form dimers, or whether they assemble into supramolecular ribbons or chains.

Lou, L., and H. Yan. ULL. **Investigating surfaces of mesoporous ceria with VT-DRIFTS.**—The water-gas shift reaction (WGSR) is a very important reaction industrially. It is used to adjust the H2 content in syngas (consists of CO and H2) and is an important part of an ammonia or a hydrogen plant. Low-temperature (LT) catalysts are of great interest because WGSR is an exothermic reaction and the equilibrium constant decreases with increasing temperature. To investigate the reaction mechanism, and compare that to model catalysts, Various Temperature-Diffuse Reflectance Infrared Spectroscopy (VT-DRIFTS) has been applied for in-situ monitoring the evolution of intermediates, reactants, and products of the water on mesoporous ceria supports as a function of temperature, as a first step. The results will provide fundamental understandings for reaction mechanism of LT-WGSR on mesoporous ceria based catalysts, and bridging the material gap in model and industrial catalysts.

Marlow, M. NSU. **Red edge effects of ANS in mixed composition carbohydrate glasses.**—Red edge effects of 1-anilinonaphthalene-8-sulfonate (ANS) in mixed composition carbohydrate glasses was investigated. ANS was embedded in glucose and glucose/maltose glasses. Glasses were also prepared with polyacrylic acid polymer (PAA). PAA has been used in previous investigations as an additive to increase the rigidity of the glass matrix. Significant changes to the ANS emission maximum were observed between glasses with no PAA and those with PAA added. Furthermore, glasses were prepared with a change in solvent composition which results in a loss of the ANS red shift in glasses with no PAA present. Consideration of the matrix effects on the perturbation of the ANS electronic structure were considered in this work.

Moss, D., E. Abney, M. Spivey, and B. Burkes. GSU. **Analysis of peptide binding agents via molecular modeling.**—The brain's dopamine pathway and its alteration has been implicated in the etiology of several disorders. The treatment of attention deficit hyperactivity disorder (ADHD) seem to have an effect on dopamine released in the brain of individuals with the disorder. Previous research has demonstrated that different amounts of dopamine, which is related to positive reinforcement-based learning and behavior, are released in the brains of people treated for ADHD, compared with those untreated for this disorder. The physiological roles of Monoamine Oxidases (MAOs) are related to the nature of their substrates. A substrate of MAO B is dopamine. This study investigates the positive effect that ADHD drugs have on the dopamine system via modeling interactions of small molecules and MAO B. Natural compounds may provide the same positive effect. Peptide binders to MAO will be studied to simulate the action of substrates of MAO B.

Murru, S., P. Basnet, and I. Chauvin. ULM. **Synthesis and biological evaluation of chalcones, flavonols and pyrazoles.**—Heterocycles have been frequently found as a key structural unit in a wide variety of drugs, most vitamins, many natural products, biomolecules, and biologically active compounds. Flavonols found to possess a wide range of health benefits which includes antioxidant potential and reduced risk of vascular disease. We will present the synthesis of Chalcones, and their conversion to Flavonols as well as Pyrazole compounds. We will also discuss the biological screening results of the synthesized compounds.

Murru, S., and R. Bista. ULL. **Synthesis and evaluation of heterocyclic compounds for antigiardial activity.**—Nitrogen heterocycles are the central structures for the chemistry of life that offers wide variety of reaction types in biological systems. We have developed new microwave assisted synthesis methods to access a series of biologically relevant nitrogen heterocycles, substituted isoxazoles, and pyrazoles with different substitution patterns. All the synthesized heterocycles tested for the antigiardial activities and the results indicated that they possess good inhibition effect against the tested organisms. We will present the synthetic approaches and the results of antigiardial activity screening.

Jimenez-Antenucci, P., and B. Wicker. SLU. **Novel synthesis of tetradentate NacNac ligand variants.**—A synthetic route of novel tetradentate NacNac ligands in the field of organometallic chemistry was viewed in this project. The direction of this project took an emphasis towards finding a potential industrial use for the proposed NacNac, also noted as β-diketiminate, Ligands which are often expressed to be involved in catalytic processes. With the synthesis of these novel NacNac ligands, it is planned to for the project members of the Wicker Lab to study the chemistry of the ligand variants synthesized with different pendant arm variants. Overall, using the synthesized variants bind with a specific metal and propose different chemistry and analyze their binding properties. It has been stated that NacNac ligands can stabilize most elements of the periodic table to form main group, transition-metal, lanthanide, and actinide complexes. First row transition metals potential choices due to their abundance in nature and very inexpensive. Modification of the carbonyl substituents of the backbone of the monoanionic acac to N-R groups allows for different variants varying in bonding and steric effects. Commercially available reagents were accessed and used for the reaction conditions published in the field. In order to make our novel ligands, acetylacetone, also known as 2,4-pentadione and amine containing varying groups must be prepared in order to proceed the synthesis of our proposed ligands. Synthesized products will be confirmed through Nuclear Magnetic Resonance and mass spectrometry.

Komati, R., J. Miller. NSU. K Riley., and J. Sridhar. XUL. **Development of novel ligands to liver X receptor by using scaffold hopping approach.**—The liver X receptor (LXR) is a ligand-activated receptor protein that is involved with metabolic processes and is responsible for maintaining cholesterol levels in the blood and in cells. This nuclear receptor has become the subject of intense investigation in the last few years because of its potential to serve as a target in efforts to lower cholesterol levels and to starve cancer cells of cholesterol, thus killing (or slowing the growth of) these cancer cells. We have been involved in research aiming to identify novel LXR ligands that bind to the receptor very strongly. We have carried out computational investigations in order to identify new ligands with strong potential to bind LXR. The main computational tools we have used are protein-ligand docking, scaffold replacement studies. To date, we have identified three ligands, along with several methylated derivatives, that show strong potential for LXR binding. We are currently in the process of determining the synthetic route that can be followed in order to synthesize these molecules. Once this has been determined, we will synthesize these ligands and do bioassay studies in order to determine how well these ligands bind to LXR.

Ogunkoya, Y. SUAMC. **Lectin cytochemistry of avian gastrointestinal tract.**—The avian gastrointestinal tract was characterized using lectin cytochemistry *Concanavalia* agglutinin (Con A) and *Arachis hypogea* agglutinin, Peanut agglutinin (PNA). The apical cell boundaries of surface epithelial cells of proventriculus, ventriculus, the duct and glandular neck cells of the proventriculus, the intestinal brush borders were stained by Con A and PNA. The intracytoplasmic granules of the duct and glandular neck cells of the proventriculus, chief cells of the ventriculus, the goblet cells of the ileum, colon and cloaca were stained by PNA. Gastro-intestinal endocrine cells and the parietal cells of the avian gut were not stained by either lectin. The cytochemical results indicated that those cells stained by the two lectins have both α-D-mannose or α-D-glucose and β-galactose- (1,3)-N-acetyl-galactosamine residues in their membranes. Those stained by either of the two lectins had either of the two sugars as components of their cell membrane and their granules. Goblet cells were heterologous. The duct and glandular neck cells of the proventriculus, the chief cells of the ventriculus, the goblet cells of the ileum, colon, cloaca, and the chief had similar intracytoplasmic granules.

Pokharel, U., J. Bergeron. NSU. J. Selegue. UK. **Extension of π-conjugation of ferrocene to benz[f]inenyl.**—Various methodologies to extend the π-conjugation of cyclopentadinide (Cp−) of ferrocene to benz[f]indenide have been explored. Starting from ferrocene, "ferroceneanthrone" was synthesized in multi-gram scale in a three-step reaction sequence. Under aerobic workup, attempts of reductive aromatization of ferroceneanthrone gave decomposition products resulted either from oxidation or radical coupling at α-position of the ferrocenyl moiety. The benz[f]indenide complex was, however, synthesized in the form of silyl enol ether in situ by enolization of ferroceneanthrone using strong non-nucleophilic bases followed by the treatment with TMSCl under inert reaction conditions. Formation of the product was evidenced by the isolation of adducts from the [4+2] cycloaddition between benz[f]indenyl ligand and dienophiles like N-phenylmaleimide or dimethylacetylenedicarboxylate (DMAD). All new compounds were fully characterized by spectroscopic methods and some of them analyzed with single-crystal X-ray crystallography are reported.

Thomas, A., T. Walls., and P. Chanda. SLU. **Diastereoselective boron-mediated aldol reactions of substituted phenylacetates.**—The diastereo- and enantioselective aldol reaction of carbonyl

compounds has been widely used to prepare β-hydroxy-α-alkyl/aryl carbonyl motif in the stereoselective synthesis of medicinally important organic compounds. Stereo-controlled aldol reactions of esters such as acetates, propionates, trifluoropropionates, and phenylacetates are well investigated. However, a systematic study of aldol reactions on substituted phenylacetates remains unexplored. Therefore, we report the progress towards the development of boron-mediated diastereoselective aldol reactions of substituted phenylacetates.

Wayment, D., and N. Mayon. NSU. **Analysis of metribuzin and its degradation products in sonicated aqueous solutions using HPLC and GC/MS.**—Methods for quantifying metribuzin aqueous solution using High-Performance Liquid Chromatography (HPLC) and Gas Chromatography Mass Spectrometry (GCMS) were developed and validated. Spike recoveries ranged from 98% - 112%. The HPLC method, using a C18 column, was used to analyze for metribuzin and the metabolites diketometribuzin (DK) and deaminated diketo-metribuzin (DADK) in aqueous solutions. A 7.6 ppm aqueous solution of metribuzin was sonicated under argon for six hours, to determine if sonication of the herbicide would cause degradation into metabolites like similar compounds. The concentration of metribuzin decreased to 2.9 ppm, along with the formation of DK, DADK and other metabolites.

Wayment, D., and C. Picou. NSU. **Application of gold nanoparticles as surface-enhanced Raman scattering (SERS) substrates for detection of environmental contaminants.**— Detecting trace amounts of contaminants in the environment remain a challenge with current analytical methods. Instrumental analysis methods such as HPLC and GC-MS require complex setups and experienced technicians to perform accurate measurements. Raman spectroscopy has many benefits over other analytical techniques, such as speed, cost, size, and simplicity. However, by itself Raman spectroscopy lacks the ability to see analytes at trace concentrations. Surface-Enhanced Raman scattering (SERS) substrates can be used to enhance the Raman spectra of analytes, with previous studies achieving detection three orders of magnitude below previous limits. This study focused on bromobenzene because of its similarity to other environmental contaminants and unique spectra. Gold nanoparticles of multiple sizes were synthesized for use as SERS substrates. SERS spectra were taken using gold nanoparticles in liquid and solid state.

Wayment, D., M. Soorya. NSU. C. Adams., and P. White. USDAARS. **Determination of sorgoleone in Southeastern Louisiana sugarcane soils.**—Sorgoleone is an allelopathic compound that is produced in Sorghum bicolor roots that has been found to suppress weed growth. The purpose of this study is to determine the levels of sorgoleone in sorghum cultivated soil samples. In this study, sorgoleone was extracted from sorghum soil samples with methanol or acetonitrile and analyzed by HPLC. A sorgoleone standard was prepared by extraction of crude exudate from sorghum bicolor roots. The crude exudate was then purified by TLC and characterized by FTIR, H1 NMR and HPLC. In order to validate the analytical method, a spike recovery experiment was carried out by spiking sugarcane soil samples with sorgoleone standard. Results of the spike recoveries and sorghum soil analysis will be presented. The HPLC method utilized a C18 column.

Computer Science Section

Alamleh, H., A. Alqahtani, and J. Gourd. LTU. **Wireless authentication using variable transmission power.**—The last decade has witnessed an increase in adopting wireless systems. These systems allow two devices to communicate wirelessly using radio frequencies. In most cases, authentication is done remotely by transmitting secret keys. Some examples of these systems include wireless locks and passive keyless entry systems. These systems have become more common in the past few years with the development of wireless technologies. Today, most of the wireless devices allow controlling antenna transmission power to optimize the connection and minimize interference. In this paper, we explore the possibility of modulating the transmission power of a device's antenna for use in user authentication. Furthermore, we implement and test a prototype system using IEEE802.11 (Wi-Fi) access points. Finally, we discuss potential applications of the proposed system.

Anumandla, K., and M. Salam. SUAMC. **Development of android application for school bus tracking.**—School bus tracking system is an application that helps parents and guardians to track the location of the bus. Although in many schools, prior information about the bus timings is sent to the parents, there is no system that provides live tracking of their children's bus route. Parents face problems of long waiting in the bus stop in different weather conditions or could not receive their children on time having any idea of the delay or prior arrival of the bus. This application helps in solving the above problem by notifying parents about the live tracking of the bus arrival and departure timings. Parents can view the current location of the bus on the map.

Dandu, R., and M. Salam. SUAMC. **Web based data visualization using Python.**—The applications of wireless sensor networks increased tremendously to cumulate the real-time data for a specific job. Gathering the real-time data and storing it in the database will make it a tedious job for the user to look up to the database whenever needed. This research describes displaying the real-time data on the web, allowing the user to monitor the web instead of the database. Data visualization is an approach where the data is pictorially represented to convey the information precisely. In this research, we have used Python's graphing library Plotly and Dash framework to import the data from the database. Plotly is used to display quality graphs online whereas Dash helps us create a local host in the system, which continuously visualizes the information from the database on the web.

Drozdenko, B., and C. Perez. LTU. **BCIC: Budget Cluster for Image Classification.**—Image classification has become a much easier problem thanks to the advent of deep learning. However, many of the top-performing neural network models have relatively large memory footprints and long compute times, even at prediction time. To address these problems, researchers have used sets of expensive, optimized hardware arranged to split up parallel sections of the network. We propose that performance can increase using less expensive hardware. In this research, we propose a Budget Cluster for Image Classification (BCIC), which is a cluster of Raspberry Pis, managed by a central server, to implement a pre-trained image classification neural network. The software tools BCIC uses include the .NET Core as well as the Flask (communication) and TensorFlow (machine learning) Python libraries. Our results show that with BCIC, there was an observed decrease in processing time with 6 RPis, 1 for management, and 5 for TensorFlow processing.

Matthew, S. and B. Drozdenko. LTU. **Determining sea state from buoy-based multi-camera image feed.**—The IoT revolution has enabled the presence of billions of microprocessors with Internet access, allowing for the capturing of sensor data and video camera feed, for later post-processing on a central server. In the Gulf of Mexico, the National Oceanographic and Atmospheric Association (NOAA) has difficulty identifying the presence of choppy waters and potential security breaches, due to the vast expanses of water that need to be monitored. In this research, we identify image processing techniques to use on buoy-based cameras in the gulf, demonstrating the advantages of edge processing for early identification of sea state on the Beaufort scale. Our experimental setup uses images captured from NOAA SCOOP buoy cameras positioned at 60° intervals. Our results demonstrate the effectiveness of making sea state estimates at the edge, comparing against wind speed and wave height, thereby allowing smaller datasets to be sent shoreside to the National Data Buoy Center.

Nkonghoataw, R., F. Ayeni, and O. Olanrewaju. SUAMC. **Design of a cloud-supported socialized healthcare framework for overcoming barriers to healthcare access and delivery.**—Socialized healthcare system is essentially a social networking platform that connects consumers and government regulatory bodies with current and accurate health information and services. It encapsulates joining of data sources from multiple hospital information systems, national disease repositories and millions of primary health care organizations. The advent of social networks and their global reach, particularly among audiences has played a significant role in making web services more acceptable today. This has brought about the need to make web application accessible via internet enabled devices. This study investigated the significance of socialized healthcare system in achieving universal health coverage as proposed by the World Health Organization. It also presented an architectural framework as well as implementation of a cloud-supported socialized healthcare system. To achieve this, the core functionalities of the repository were modelled using Unified Modelling Language (UML). In addition to this, the system was deployed on an Apache web server leveraging on open source framework-wordpress. Furthermore, the core functionalities of the system were tested on several devices and evaluated based on survey and functionalities of closely related systems. Finally, the usability of the system was evaluated by identifying the usability attributes, designing a questionnaire based on those attributes and then analyzing the results with SPSS software. A reliability test was also carried out on the questionnaire. The comparison evaluation results showed that the socialized healthcare system provided real time information and support to healthcare stakeholders in the health care industry.

Okunoye, A., N. Razaviarab, and Y. Banadki. SUAMC. **Deep learning enables fully automated analysis of microscopy images.**—Automating the tedious task of cell detection, classification, and counting in microscopy images would greatly benefit biological research as the approach reduces the possibility of subjective errors associated with semi-manual or manual methods by biologists saving their times to better use for understanding, designing, and performing a new series of experiments. In this research, we employed deep convolutional neural network (DCNN) to develop an automated method for analyzing the complex high-content microscopy data that outperforms conventional cell segmentation, classification, and counting techniques, resulting in a tremendous improvement in the detection of complex cell morphologies. Quantifying multiple cell surface markers, transcription factors and cytokine profiles are time-consuming, resource intensive, require large numbers of cells and multiple markers. Developing a visual reasoning

algorithm to mask and count specific kinds of cells would greatly accelerate the pace of biological research and reduce the need for humans to interpret microscopy data altogether.

Razaviarab, N., E. Khosravi., and Y. Banadaki. SUAMC. **Detecting defects in 3D printing process using machine learning and transfer learning approach.**—Additive manufacturing (AM) is a crucial component of smart manufacturing systems that disrupts traditional supply chains. However, the parts built using the state-of-the-art powder-bed 3D printers have noticeable unpredictable mechanical properties. In this research, we employed machine learning approach through a Deep Convolutional Neural Network (DCNN) to automatically detect the defects in printing the layers, thereby turning metal 3D printers into essentially their own inspectors. We use transfer learning approach based on Inception-v3 model in Tensorflow framework to retrain our data set consisting of only 150 image samples. Our proposed DCNN model achieves a classification accuracy rate of 98.31% that will generate a precise feedback signal for a smart 3D printer to recognize any issues with the build itself and make proper adjustments and corrections without operator intervention. This enhances the quality of AM process, leading to manufacturing better parts with fewer quality hiccups, limiting waste of time and materials.

Seetala, K. LTU. and Y. Reddy. GSU. **Image classification using TensorFlow.**—Deep learning (DL) is a process that consists of a set of methods which classifies the raw data into meaningful information fed into the machine. DL performs classification tasks directly from sound, text, and images. One of the famous algorithms for classification of images in DL is convolutional neural networks (CNN). In this research, we tested DL model for image recognition using TensorFlow from Dockers software. We received 99% accurate to identify the test image. The system configuration used for this research includes Ubuntu 16.04, Python 2.7, TensorFlow 1.9, and Google image set [1].

Shrestha, S. and B. Drozdenko. LTU. **Smart City development using IoT devices and cloud computing.**—Increased energy consumption and carbon dioxide levels have led to climate change, whose effects are apparent in the gaseous concentrations within the air, rapidly changing weather conditions, and declining quality of agriculture. These effects are evident in the state of Louisiana, where agricultural concerns are paramount and natural disasters including flooding are consistently of concern. We propose a Smart Cities framework (SCF) to mitigate the effects of climate change using Internet of Things and the Cloud, building a prototype on Louisiana Tech University campus. SCF combines sensor nodes, using low-power microprocessors, with the Cloud, on which higher processing power and larger storage capability are available, to envision an informative and reliable web dashboard which visualizes the information collected from sensor data. Our results show that SCF can monitor the environmental parameters and provide situational awareness to the users in an intuitive fashion.

Smith, G., E. Khosoravi, and Y. Banadaki. SUAMC. **Machine learning for social mobile applications development.**—Machine learning (ML) is an integral part of Artificial Intelligence, taking many technologies to the next level of advancement. ML enables machines or systems to predict the consequence, make a decision and recommend the best next steps. In mobile application development, everyone wants a personalized user experience as per their individual needs, thereby ML can bridge the individualization gap. In this paper, we will study important ML algorithms and their impacts on social mobile applications focusing on music mobile recommender systems.

We will investigate how ML techniques such as Bayesian and decision tree algorithms are being used by many high technology companies such as Google, Twitter, and Netflix, and how these algorithms can advance the design phases of our senior project. This study provides us with a solid understanding of recommender systems to enable a personalized user experience in a music mobile application.

Spedale, A., and B. Drozdenko. LTU. **Using Zigbee to extend the range of smart devices in inventory management networks.**—The Internet of things (IoT) has allowed for new innovations in data collection for environmental monitoring, home automation, and warehouse inventory management. Some of the benefits it provides to the field of inventory management are paperless inventory checks, clarity of stock levels, and time saved from automating data entry. However, the nature of warehouses often prohibits wired networking connections or the propagation of WiFi signals due to sheet metal or thick walls, large spaces, and other factors. In this research, we demonstrate the effectiveness of the ZigBee protocols to extend the wireless range of remote devices. By creating an ad-hoc network of smart devices, inventory data including units per container, weight, and uprightness can be forwarded to centralized gateway that publishes a JSON object to a cloud server. Our results show that these utilities allow for inventory management information to be communicated in real time and with minimal power overhead.

Earth Sciences Section

Adesina, F., and G. Blanchard. SLU. **Design and construction of an autonomous groundwater salinity monitor for marsh research.**—We have designed and built an autonomous groundwater salinity data collecting system for deployment at Southeastern Louisiana University's Turtle Cove Environmental Research Station. A chain of 4 such monitors will be used to study the temporal and spatial evolution of groundwater salinity in the marsh. The goal is to construct a physical model of salinity flux that will aid in remediation efforts. We are currently engaged in field trials to validate the data obtained by these instruments against manual measurements of groundwater salinity. We present our instrumental design and our initial observations.

Materials Science and Engineering Section

Baptiste, J., D. Henderson, N. Seetala. GSU. C. Wilson, W. Clover, B. Redford, K. Madhavi, H. Wen, and S. Guo. LTU. **Magnetization of aqueous plasma synthesized samarium cobalt nano particles.**—$SmCo_5$ nanoparticles were synthesized using aqueous plasma techniques to make strong magnets using additive manufacturing. Dry hydrogen gas was flown at 400°C for 5 hrs. over the nano-powders to reduce oxidation. The magnetization properties of the reduced powders were compared to commercially obtained micron size $SmCo_5$ powders. The magnetization of the reduced powder is higher than commercial powder but with lower coercivity which may be

because of the super paramagnetic nature at nano-size. The commercial powder was used to optimize parameters to make solid samples using arc melt and laser melt techniques. The magnetization of the arc melted particles increased drastically. Also, laser processed melt at 50-watts showed an increase in magnetization, while the 75-watts melt showed little to no change. Unfortunately, the coercivities of both laser-melted and arc-melted samples decreased significantly. This may have been because of oxidation during the melting process and evaporation of some Sm.

Burrell, R. and N. Seetala. GSU. **Spark plasma sintering of ultra-high temperature ceramic powders: micron-size and nano-size ZrB_2+SiC.**—ZrB_2+SiC ceramic composites are useful for application in hypersonic vehicles. Uniform distribution of SiC with high densification and low grain growth are important factors for high temperature oxidation prevention. The spark plasma sintering (SPS) consolidation of the micron-size and nano-size ZrB_2+SiC powders was performed at 32 MPa and 2,000°C. The SEM observations showed reduction in granular size and SiC segregation in nano-size powder composites compared to micron-size powder composites. The flexure strength of the SPS consolidated micron-size powder composites is 54 MPa while it increased to 415 MPa for nano-size powder composites. The micro-hardness increased from 1528 VHN for micron-size powder composites to 1952 VHN for nano-size powder composites.

Henderson, D., J. JnoBaptiste, N. Seetala. GSU. H. Wen, and S. Guo. LSU-BR. **The magnetic performance of FePt/Cu nanoparticles after heat treatment.**—The magnetic performance of FePt/Cu following heat treatment was studied to obtain phase transformation required for high magnetic storage media. The samples were made by mixing FePt and Cu nanoparticles with hexane and depositing on to a Cu substrate. The samples were annealed in a vacuum furnace at 600°C (1 hour) or heated by laser at 40-80 W at a speed of 1 m/s. The coercivity at both laser powers did not show any significant change while the furnace annealing at 600 °C brought the desired magnetic phase transformation, with an increase in coercivity from 200 Gauss to 1350 Gauss. Final XRD studies confirm that no structural changes occurred after laser heat treatment and the FePt nanoparticles evaporated during laser heat treatment. The results conclude that FePt nanoparticles may not be processed by laser heat treatment due to risk of high loss of nanoparticles.

Kharashi, K., and E. Murray. LTU. **The role of frequency on impedancemetric gas sensing.**—Advancements in diesel engine technology and emissions regulations in various countries are driving the need for gas sensors that are capable of greater sensitivity, selectivity, and accuracy in order to monitor lower level of pollution. The frequency-based impedance metric method is a novel and promising approach for measuring gas sensitivity with high accuracy, particularly for low gas concentrations. Yttria-doped zirconia (YSZ) is commonly used as the electrolyte for nitrogen oxides (NO_x) exhaust gas sensors, due to the chemical stability, temperature tolerance, and high ionic conductivity. Yet, there is limited knowledge regarding the mechanisms governing relationship between applied sensors operating frequency and the electrochemical response of the sensor. It is necessary to acquire such understanding in order to design and develop next generation gas sensors that are reliable and have a rapid response time. Thus, research is needed to distinguish frequency dependent behavior that influences sensor sensitivity, selectivity, accuracy, and durability.

Ledet, G., C. Baxter. LTU. J. Gojanovic. UB. S. Zivanovic. LTU. **Optical properties of semiconducting polymer-fullerene thin-film and temperature influence.**—Thin films of conjugated polymer:fullerene blend are known for their use in solar cells. In this study, we fabricated poly(3-hexylthiophene-2,5-diyl): indene-C60 bisadduct (P3HT:ICBA) thin films on quartz substrates by spin-coating. We measured optical transmittance and reflectance spectra with a spectral reflectometer for wavelengths in the range from 380nm to 1050 nm at room temperature. With FILMeasure software we calculated the refractive index, absorption coefficient, and thickness of the thin film. We used the Bridge Lorentzian-3 Term Model in FILMeasure. We organized the collected data from FILMeasure with our specially written Python scripts and analyzed the data in Excel. We also investigated the influence of thin-film temperature on its optical properties for temperatures from 15°C to 70°C. We noticed the increase of the optical transmittance with the temperature increase in all tested samples, which might be due to the change in the crystal structure of the thin film.

Robinson, A. LTU. T. Ismael. TU. P. Derosa. LTU. *Ab initio* **oxidation of CrCoFeNi high entropy alloys.**—High entropy alloys have been highlighted in recent studies due to their high corrosion resistance, however oxidation has proven to be an issue with these alloys. At elevated temperatures required for Selective Laser Melting, the oxidation is only magnified. The focus of this study is to understand the role of each metal in the oxidation of a CrCoFeNi high entropy alloy. Chromium oxide formation was found to be most favorable and is likely to be formed, while Ni seems to passivate oxidation. Gaining a better understanding of how these alloys oxidize may assist in the design of more resistant alloys for Selective Laser Melting.

Math and Statistics Section

LeBlanc, C., H. Elsaadawy, K. Houte, and J. Slezak. LTU. **Nested sensor array extension factors required to match the peak sidelobe height of a uniform linear array.**—Nested sensor arrays (NSAs) are non-uniform linear arrays (NULAs) that reduce the total number of sensors used for a given aperture and retain the same resolution of a uniform linear array (ULA). The peak sidelobe (PSL) height fails to fall below the acceptable standard of -13dB associated with ULAs. The basic NSA can be extended by a factor to improve the PSL height. Coprime sensor arrays, a related NULA design, have established sensor extension factors that have been found to appropriately reduce the PSL height. For NSAs, such an extension factor has not been established. This research finds the parameters required to extend an NSA to adequately reduce the PSLs. Considering various array apertures, certain configurations successfully use a distinctly small aperture but require a higher percentage of those to be active. To verify our results, we construct a sixty-four sensor microphone array with which we test the optimal configurations.

Thompson, B., and B. Dembele. GSU. **HIV: The impact on African Americans in Tennessee.**—HIV presents as a prevalent health issue in the United States. As of 2016, The Center for Disease Control (CDC) reports that approximately 1.1 million people live with the viral infection. However, subsets of the data illuminate that HIV tremendously affects certain groups at disproportional rates. Weak state legislature and the inability to receive medication are some of

many contributing factors that cause these disproportional rates. In this research project, I am exploring those rates and factors. More specifically, I am utilizing mathematical tools such as dynamical systems to investigate the spread of HIV amongst African Americans in Tennessee. By the end of my investigation, I will hopefully present effective solutions to decrease the spread of the deadly virus.

Physics Section

Norris, E., P. Derosa. LTU. G. Marcus. SUNYG. **The efficient simulation of light transmission through liquid suspensions and aerosol.**—Aerosol particles play an important role in the absorption and scattering of light in sea water. As visible light travels through the media, its interaction with the suspended particles is dominated by Mie scattering, a scattering process characterized by light scattering by particles that are about the size of the incident wavelength. A computer model that can account for Mie interaction while tracking light through a media, can help understand this process. The primary purpose of this work is to design an efficient method for simulating light transmission through media. This work involves the development of a Monte Carlo algorithm to simulate the transport process and the calculation of Mie scattering efficiencies for both spherical particles.

Saint-Jean, D., and P. Derosa. LTU. **Dynamics of a charge carrier driven by an alternating field in materials with impurities and traps.**—The solution of the equation of motion for a free charged particle in an oscillatory field is simple, however, in real materials (even conductors), charge carriers suffer collisions that alter their velocity. An accepted model (Drude's Model) is that these carriers will give out all of their momentum in each collision effectively resetting their speed to zero. Mathematically, this implies that the initial conditions are re-set every time the carrier collides which can happen randomly, at any time in their cycle. In addition, the carrier may fall into a trap that will hold the particle for a finite amount of time before it is able to escape. This work will focus on the development of a model that provides the position and velocity of a charge carrier at all times with randomly occurring collisions and traps represented as time penalties. The carrier drift velocity and current density are also evaluated.

Sharifi, S. LSU-BR. Y. Banadaki. SUAMC. G. Veronis, and J. Dowling. LSU-BR. **A novel graphene photonic nanostructure for controlling the selectivity, tunability, and switchability of thermal emission at infrared frequencies.**—Graphene is a two-dimensional material that attracts enormous interest for different applications. In this paper, we present a graphene-based aperiodic multi-layer structure for an infrared thermal emitter, focusing on the selectivity, tunability, and switchability of the light with different angles of light incidence. We optimized the structure with 32 layers of graphene for the perfect emission of 100% at $\lambda = 3.34\mu m$ and the chemical potential of $\mu=0eV$ for normal light incidence. Our results show that the angular change from 0 to 90 degrees shifts spectral ranges towards shorter wavelength for both $\mu= 0eV$, and 1eV. The perfect emission decreases to ~75% when the light angle changes to 50 degrees and eventually no emission can be achieved at 90 degrees. While the black-body thermal emission is broadband

and isotropic radiation, the narrowband wavelength selective detectors with switchable intensity enables the device applications in photovoltaics, photodetectors and chemical sensing.

Stroud, A. LTU. C. Muratore. UD. R. Berry. AFRL. P. Derosa. LTU. **Biomolecular interactions at 2D material interfaces.**—Understanding interface interactions between organic and inorganic materials is of vital importance in the fields of medicine, engineering, and printing. Surface-binding peptides are increasingly being used to functionalize nanostructure interfaces for biosensing, drug delivery, and 3D-printing applications. In this study, classical molecular dynamics calculations were used to identify the structural characteristics of peptide sequences that selectively mediate the binding of graphene and molybdenum disulfide (MoS2) to amorphous silica (SiO2). The binding affinity of the polypeptides, HSSYWYAFNNKT (P1) and HLLQPTQNPFRN (HLL), toward each surface were investigated by calculating binding enthalpies, tracking amino acid residue positions, and evaluating interaction energies between each peptide and surface. By understanding how each residue of a polypeptide interacts with a given surface, new sequences can be formulated for targeted binding towards a specific material, target analyte, or act as a mediator between multiple 2D materials.

Yang, H., and K. Muswere. GSU. **Study of laser induced damage on the GaAs surface.**—Due to the increased integration, annealing surface layers of modern semiconducting devices becomes more important because the underlying structures are typically sensitive to thermal damages. The annealing is typically done by a short laser pulses that has energy lower than damage threshold. However, our recent results suggest that there is some structural damage during laser annealing even though the laser intensity used was lower than the damage threshold. We present the study of laser induced damages on GaAs using the positron annihilation lifetime spectroscopy for the structural modification and scanning electron microscopy for the modification of surface morphology.

Division of Science Education

Higher Education Section

Weiss, L. LTU., and B. Wee. TU. **The Grand Challenges of the 21st century and Grand Challenge Scholars Program.**—The National Academy of Science's Grand Challenges are 14 of the most critical challenges facing engineers and society of the 21st Century. These span topics ranging from cyber security to infrastructure, access to health care and clean water. Louisiana Tech University and Tulane University are proud to have active Grand Challenge Scholars Programs (GCSPs) on campus. These introduce rising engineers and scientists to these challenges, foster hands-on research opportunities, and greater awareness of the World's complex issues that govern real solutions to the Challenges. In this session, we will overview these Grand Challenges and hear from students in the programs that detail their involvement and accomplishments at the university level. We will also be taking time to answer questions about the GCSP at these in-state universities.

Lo, G. NSU. A. Chevalier, G. Dumancas. LSU-A. X. Jiang, R. Komati, D. Wayment. NSU. N. Ponder. NSU. H. Barnett, S. Cruse. ULM. Y. Dou. NSU. A. Nguyen. LSU-A. H. Verma. NSU. J. Allen. LSU-A., and U. Pokharel. NSU. **Moodle assessments for chemistry: A symposium and workshop.**—The escalating cost of college education has led to widespread support for the development of Open Educational Resources (OERs) such as textbooks that are available for free or at low cost. Chemistry faculty from Nicholls State University, Louisiana State University of Alexandria, and University of Louisiana Monroe are collaborating on developing a Moodle question bank for the entire undergraduate Chemistry curriculum for distribution as an OER. This symposium will include presentations (on pedagogical rationale, implementation strategies, and impact) followed by a 2-hour hands-on workshop. Workshop participants are asked to bring laptops. Please bring traditional pen-and-paper tests that you want to port to Moodle. Non-Chemistry participants are welcome. Presentations will include: Improving Pre-Class/Lab Preparation, Replacing Traditional Lecture with an All-Problem-Solving Session, Maximizing Homework Impact on Student Learning, and an Excel Tool to Facilitate Authoring and Build-up of Question Bank, Grading Low-Stakes Assessments, Minimizing Cheating in High-Stakes Tests.

K – 12 Section

Hale, A. MSU. **Using informal education to increase community engagement in STEM.**—Science communication is an important part of the scientific process, though many higher education professionals find it difficult or too time-consuming to participate in meaningful community outreach. By partnering with community organizations and building relationships with K-12 STEM teachers, higher education professionals can leverage existing resources and

maximize their time and impact in their communities. Using available STEM learning resources from Ocean Exploration Trust, and partnering with a high need (Title-1) elementary school we have increased STEM interest, engagement, and career pathway awareness in local students. Part of our model is to work with the same group of students in the fall and spring semesters and across the third and fourth grades. This will allow us to "prime" the students in the fall with an introduction to the material and then have them engage in an engineering activity in the spring. We find that this model increases the impact of the STEM enrichment on the students.

Hale, A., A. Ogea. MSU. M. Cook. OET. **Designing a teachers' workshop to facilitate implementation of NGSS aligned STEM content.**—The challenge of implementing the newly approved K-12 Next Generation Science Standards (NGSS) in the 2018-19 academic year is partially due to the lack of teacher time for planning and preparation, availability of resources, and discomfort within the various science content areas. To address some of the implementation challenges, as well as provide continuing education to our community teachers and future educators, the McNeese Department of Biology, the McNeese Burton College of Education, and the non-profit Ocean Exploration Trust designed and administered a STEM education workshop in the fall of 2018 for elementary grade teachers and candidates. Attendees rotated through three modules focusing on biology, STEM career pathways/team-building, and engineering. Attendees were introduced to resources available for their use that include aligned standard-aligned activities and assessments, and novel ways to incorporate STEM activities into their curricula. A survey was administered to gauge effectiveness and usefulness of the workshop.

Division of Sciences and Humanities

Doucet, J. NSU. **Variants of unknown significants: A fourth reading of science poetry.**— Despite the long literary relationship between poetry and science, little of what Aristotle recognized as "the language of all higher learning and thought¨ survives either as functional or even memorable writing. However, what we recognized as separate cultures in the 21st century is well demonstrated by relatively recent examples of poets using scientific diction (Chaucer, Donne, Poe, Hardy, Auden, Wilbur) and, though less frequently, scientists writing in poetic forms (Maxwell, Oppenheimer, Huxley), not to mention the casual use of terms like "DNA" and "electrons" in popular communication. In revival of the tradition, this presentation is a fourth installment of original poetry on modern scientific topics. The poems are written in formalist structures with concise, epigrammatic narrative emulating the nature of nature of scientific writing. Subjects of readings will be selected from human-parasite interactions, human genetic anthropology, dark fluid, Neanderthal medical practices, diagnoses of the Mona Lisa, and "lost" Einsteinian theory.

Gautreaux, G., and J. Doucet. NSU. **Forensic analysis of poison records from an historic Louisiana pharmacy.**—The J.J. Ayo Pharmacy was an historical business that served the early-20th century cypress mill town of Bowie in Lafourche Parish. We conducted a descriptive exploratory study of the pharmacy's Poison Records Book, a dispensary ledger of contemporaneous chemicals over the course of 11 years (1909-1920). Over 800 entries of ledger data were transcribed into a spreadsheet and sorted for analysis. Chemicals and their spectrum of uses were inferred from explicit intentions recorded as well as historical and modern literature. Ledgered chemicals included phenolics, binary acids, strychnine, and iodine compounds. Common applications of these poisons were disinfection, medical treatment of animals, and elimination of wild nuisance animals. Legal reasons for maintaining such a distinct dispensing ledger coincide with establishment of historical predecessors of today's FDA. Such forensic analysis of dispensed poisons provides historical perspectives not only on historical communities, environment, and culture but also the evolution of poison chemical characterization.

Giguette, R., and A. Alexander. NSU. **An event-driven model of free will.**—Computers are event-driven – programmed to react to specific events in predetermined ways. Human thought is also largely event-driven. Left alone, the mind wanders on "auto-pilot," responding instinctively to stimuli, collecting inputs and forming memories. We can, however, temporarily counter our "programming" by focusing on events of our choosing, turning our attention to a particular task such as studying for an exam. During these spans we control not only what we think, but more importantly, what we remember (and learn). The ability to fight our event-driven nature appears to be a pre-requisite of Free Will, and a uniquely human trait that has yet to be mimicked by AI.

LaFleur, G. NCBS. **Migration of La communities in response to coastal land loss.**—The CPRA estimates that Terrebonne Parish will lose 41 % of land over the next 50 years. Recently, HUD awarded the LA OCD $48.3 million to support the resettlement of the community of Isle de Jean Charles, which includes members of the United Houma Nation, members of the IDJC band of the Biloxi-Chitimacha-Choctaw, and other residents that are not associated with a Native American

group. In 2016, 49% of people surveyed (n = 99) reported that they were in favor of resettling, whereas 28% reported no desire to move. In 2018 the LA OCD purchased 515 acres near Schriever to begin construction of a new community, however Albert Naquin, Chief of the IDJC band of the BCC recommended that his tribe refuse the plan. Some islanders hesitate to leave if they will be required to surrender their current property on IDJC. Meanwhile, land loss and sea level rise continue.

Nguyen, O., and E. Dupuis. LU-NO. **The relation between attitudes toward sexual street harassment against women and ambivalent sexism.**—Ambivalent sexism is a personality trait that encompasses hostile and benevolent prejudices that lead to negative treatment against women. The purpose of this study is to examine the effect of ambivalent sexism on attitudes regarding sexual street harassment against women. Ambivalent sexism (including the two subscales of benevolent and hostile sexism) was assessed in 50 (8 male and 42 female) participants. Participants then watched one street harassment video, followed by an attitude questionnaire that determines their attitude toward the events and people in the video. It is hypothesized that hostile sexism will predict attitudes toward sexual street harassment. Additionally, we hypothesized that men will have more positive attitudes toward street harassment. We found that hostile sexism was significantly positively correlated with and predictive of victim responsibility. In addition, hostile sexism was positively correlated with being male. The correlation between victim responsibility and benevolent sexism was not statistically significant.

Woodry, R., K. Yurgil, and T. Lam. LU-NO. **Evidence for a hierarchy of prediction errors: Visual mismatch negativity (vMMN) in response to deviance and omission.**—The brain uses top-down processing of global and local patterns to make predictions of bottom-up sensory information. Electroencephalography (EEG) has been used to detect a mismatch negativity (MMN) to violations of predictions in auditory oddball and omission paradigms, however little is known about this signature in the visual modality. We recorded EEG from 20 young adults while they viewed sequences of stimuli (shapes or faces) that followed trajectories around the screen. Stimuli were presented in three different blocks: XX (75% followed the trajectory, 15% deviated, 10% omitted), XY (75% deviated, 15% followed, 10% omitted), and XO (100% omissions). Consistent with visual hierarchical models, XY omissions elicited larger vMMNs than XX ($p < .05$) due to higher-order prediction. Additionally, shorter latencies were elicited by faces vs. shapes ($p < .05$), suggesting a priority for facial predictive processing.

Division of Social Sciences

Mbah, R. SUAMC., and D. Wasm. CIFE. **Financial inclusion: Assessing account ownership in Central Africa.**—Access to the basic form of banking service is still absent in most developing nations. The World Bank's vision called 'Universal Financial Access 2020' seems to be far-fetched as per the figures from the Global Findex Database Report. More so, there continue to exist inequality in the possession of bank accounts in developing countries. The most remarkable inequalities being income and gender, despite the contributions of economists like Prof. Muhammad Yunus, founder of the Grameen Bank Model of financial inclusion. Hence, the purpose of this study is to assess the trend of financial inclusion through account ownership within Central African countries. This research will use the case-study approach to analyze raw data from the World Bank Global Findex Database. Both descriptive and statistical instruments will be used to analyze the data, such as regression and correlation. Conclusions, as well as policy recommendations will be drawn from the findings.

Militello, N., and K. Yurgil. LU-NO. **The effects of background music on verbal and spatial task performance.**—Background music is a common component of academic studying for many students. Previous research has yielded inconsistent results about the effects of music on academic performance. The purpose of this study was to investigate the effects of music genre (rap, classical) and presence of vocals (vocals, no vocals) on task performance (verbal, spatial). Fifty-six undergraduate students were recruited, randomly assigned to one of four musical conditions, and completed two sessions: the first involving encoding new information in the musical conditions and the second involving testing without music roughly 72 hrs. later. Participants were tested on verbal and spatial recognition tasks. Two 2 x 2 between-groups ANOVAs were used to analyze the effects of type of music (rap, classical) and presence of vocals (vocals, no vocals) on verbal and spatial memory. There were no significant effects of different types of music or presence of lyrics on verbal and spatial task performance.

Mohiuddin, F., and C. Nichols. LU-NO. **Physician ethnicity and personality affecting patients' judgments of physicians.**—The research investigated biases patients could have regarding their expectations of service and outcomes with their physicians. A 3 (South Asian, White, African American) x 2 (Extroverted, Introverted) within-subject experimental design was used where participants completed an online survey after viewing each of six brief online profiles of doctors in their city differing in race and personality. The survey consisted of six questions per physician about topics such as perceived thoroughness and competence. Also, due to the opioid epidemic currently afflicting the United States, the survey asked how likely each physician would be to prescribe such medication. Analyses indicated that African American physicians regardless of personality were preferred over their South Asian and White counterparts in questions regarding showing care and explaining directions sufficiently. Regarding opioid prescriptions, physician ethnicity did not influence responses, but extroverted physicians were seen as more likely than introverts to prescribe such medications.

Nguyen, Q., and Y. Yurgil. LU-NO. **Effect of locus of control and risk-taking on back-up plans.**—Back-up plans may alleviate uncertainty in decision making, however, research suggests

backup plans may harm goal achievement. This study examines how individual factors, such as locus of control and risk-taking behavior, affect the use and efficacy of back-up plans. Forty undergraduates from Loyola University will complete the Rotter's Locus of Control Scale, the RT-18 Risk Taking Questionnaire, and a working memory task (OSpan). Participants are informed that a high OSpan score will permit participants to leave the study early; those with lower scores must complete an additional memory recall task. Prior to completing OSpan, participants are given an optional activity (back-up plan) that may help achieve a higher OSpan score. We hypothesize that those with an internal locus of control and/or low risk-taking tendencies will be more likely to engage in the back-up plan. Second, we predict that perceived effort spent on the back-up plan will decrease OSpan performance.

Nkonghoataw, R., F. Ayeni, and O. Olanrewaju. SUAMC. **Green supply chain management in Louisiana: Challenges and prospect.**—Green supply chain management is the infusion of environmental components into product delivery, supplier service, producers to end consumers through material flow, cash flow and information flow. Green supply chain management has proven to outperform traditional supply chain management which focuses on service delivery, total quality management and best cost. At the heart of the green supply chain management in Louisiana based manufacturing industries is the rising cost of production which ranges from product selection, process, business partner selection, logistics design, packaging material, and information technology. Our main observation shows that customers are yet to experience the "green" factor in the supply chain management industry. This paper reviews literature on the environmental impact, challenges and prospect of green supply chain in Louisiana. A preliminary survey will also be carried out. The research findings will be extremely important for manufacturing firms in building environmentally friendly products.

Figueroa, B., and E. Zucker. LU-NO. **Competency levels and gender in the media and its impact on self-efficacy in female college students.**—Self-esteem cam be influenced by the media via upward and downward social comparison, but research on media's impact on self-efficacy is limited. This study will investigate whether gender and perceived competency level of a broadcast news report has an impact on listener's self-efficacy. Using a pre-test/post-test design, 100 female Loyola University undergraduate students will be given an online general self-efficacy scale, and in a follow-up laboratory session, will listen to a recording of a news report varied by gender of broadcaster (male, female) and portrayed competence (high, low). The self-efficacy scale will then be re-administered along with questions about the news report to document attention to it. Changes in self-efficacy scores will be compared using analysis of variance. It is hypothesized that participants' self-efficacy levels will remain the same or increase with a low competent broadcaster, but will decrease with a high competent broadcaster, particularly in the same gender conditions.

Yari, F. SUAMC. **New media and democracy.**—This paper discusses how the internet and rise of social media has changed the terms of free speech debate worldwide. Bad information, propaganda, and disinformation are put out deliberately to affect political outcomes. The traditional free speech defense has been the marketplace of ideas: if there is bad information, the solution is not to censor it, but to put out good information, that will eventually counter the bad. In the internet age, thousands of bots and trolls can amplify bad messages without anyone knowing. Among developed democracies, the American First Amendment stance on free speech has always been exceptional, putting few if any limits on political expression. How do governments regulate

the information consumed by the masses on new media for democracy? This study is explanatory and the main search engines used will be EBSCO, Google scholar, Sage, iseek-Education, research gate.

Yehya, R. SUAMC. **Louisiana's low academic rankings and the role of Louisiana Academy of Science in their improvement.**—According to the recent available data for all American states, and in comparison with other states, Louisiana ranks at bottom or near bottom in core academic areas, such as math, science and reading. The purpose of this paper is to examine Louisiana's Pre-College Educational Status, its national rankings in comparison with other states, and then to make some suggestions about the role or roles that the Louisiana Academy of Science could play for elevating the rankings of Louisiana in the basic areas of math, science and reading. The suggestions include: (1) Starting an online discussion in which all LAS members could participate; (2) debating this issue by LAS Council; (3) offering a research grant focusing on its causes and possible remedies; and (4) having a national discussion or debate, preferably a televised one, in which Louisiana's top education leaders would participate. Keynote Address.

Yehya, R. SUAMC. **Persisting challenges racing higher education in the United States and their consequences.**—The American institution of higher education, developed and grown over the last century, played a major role in the advancement of the United States' strength and international standing in most significant areas, including economic, financial, scientific, technology, medicine, military, etc. The higher-education institution could be credited also for most of the very significant scientific findings, including unparalleled economic growth and the education of millions of students over the years, which has resulted in a well-trained workforce, higher productivity, and the improvement of the standards of living and quality of life for all Americans. In recent years, however, in spite of all of these significant, historical, positive and social functions and achievements, the institution of higher education has been facing serious persistent challenges, including decreasing public funding, increasing cost, increasing international competitiveness, and inequity or unequal educational accessibility to all. The purpose of this writing is to shed light briefly on those challenges and their consequences.

Topical Section: Cyber Security
and Information Assurance

Antoine, K., and Y. Reddy. GSU. **Social engineering attacks and prevention.**—Social engineering is a technique used by criminals and cyber-crooks to trick users into revealing confidential information. The data obtained is then used to gain access to systems and carry out actions to the detriment of the person or organization whose data has been revealed. Some of the common techniques used are phishing, spear phishing, vishing, pretexting, baiting, tailgating and quid pro quo. In this presentation we will discuss social engineering life cycle including deceiving the victims (to engaging the target, spinning a story, taking the control of the internet) obtaining the information over a period of time (expanding foothold, executing the attack, and disrupting business or/and siphoning data), and closing the interaction (removing all traces of malware, covering tracks, and bringing the charade to a natural end). Finally, we conclude social engineering prevention.

Ayeni, F., A. Lawson, and V. Mbarika. SUAMC. **Implementing blended learning in cyber-security training and education: Evidence from historically black college and university and minority serving institutions.**—Science, Technology, Engineering and Mathematics plays a vital role in today's technology driven economy. The integration of technology into the learning process has become Germaine in modern times; this is due to the high influence of technology in the society at large. An understanding of technological factors ought to assist in ensuring effective use of organization facilities. Despite the numerous benefits of STEM and STEM learning, the United States of America are far behind their counterparts in the G7 most especially within the people of color demographic institutions like the Historically Black Colleges and Universities and Minority Serving Institutions. With little or no qualified domestic workers, United States Businesses, higher education institutions and corporations are beginning to higher more engineers, scientists and skilled workers from foreign countries. At the heart of this challenge is the poor enrollment and retention rate of African Americans and minorities in Information Technology based programs at HBCUs and little or no training for Cybersecurity (Americas Newest Warfront) which currently has 3% of African Americans represented. From literature, this is due to poor learning and teaching styles. This study investigates these challenges and proposes a blended learning implementation for Cybersecurity training and education for African Americans and Minorities drawing experiences from the Cognitive Theory of Multimedia Learning, Problem Based Learning and Communities of Practice. A conceptual framework will be developed to explain predictors of cybersecurity training and education in minority serving institutions using Southern University and A & M College, Baton Rouge as a case study. The study will make use of regression analysis, correlation coefficient and descriptive statistics to examine the pattern of inter-correlation among the constructs as well as the level of significance. Cross-sectional Survey research method of respondents who will be undergraduate students from the college of business and college of science and engineering. Seven research questions, objectives and hypotheses are put forward. These centered around major constructs (factors). The geographical scope of the study was limited

to undergraduate students and professors of the selected colleges from which samples will be drawn through the purposive sampling technique.

Ojajuni, P. SUAMC. **DDoS attack mitigation for internet of things (IoT).**—Internet of Things (IoT) allows many heterogeneous physical objects to be connected together via the internet to collect, provide/store, and exchange data with higher level of accessibility, integrity, availability, scalability, confidentiality, and interoperability for offering various applications, such as environmental monitoring, infrastructure management, healthcare service, and home and office automation. The growth of Internet of Things has led to the generation of large amounts of data, which requires large computing resources, storage space and communication bandwidth. Cisco projected that the data produced by humans, machines and physical objects will reach 500 zettabytes by 2019 and by the year 2020, 50 billion devices will be connected. Security and privacy issues are inevitable challenges that must be solved in the development of Internet of Things. Cybersecurity is the inevitable problem that must be solved in the development of Internet of Things. IoT networks are expected to provide reliable and secure service to end users. The following are a few major security and privacy issues that should be address as IoT continues to develop: Trust, Authentication, Securing communication in Internet of Things, End user privacy-Identity privacy, Data privacy, Location privacy, Malicious Attack- Man-in-the-middle attack, Denial-of-service attack, eavesdropping, Sybil attack, node capture attack. A distributed denial of service (DDoS) attack can make web services unavailable triggering many additional issues. A distributed denial of service DDoS attack on web service can cause a site outage, ruin your brand reputation, disrupt your revenue intake, and compromise sensitive data. A DDoS attack on an IoT device can disrupt the device service by exhausting the device resources, such as sockets, CPU, memory, disk or database bandwidth. Several DDoS attacks have raised concerns on the security of Internet of things. In 2016 the largest DDoS attack that disrupted the internet was recorded. In October 2016, the DDoS attack on Dyn DNS which peaked at 1.2 TBps caused major Internet platforms and services to be unavailable to end users in Europe and North America. In February, the DDoS attack on Github which peaked at 1.35TBps was recorded at the largest DDoS attack in history. With the advancement of IoT, more IoT devices will be connected to the internet therefore putting IoT devices at a greater risk of security vulnerabilities. In this paper a framework is proposed to mitigate malicious attack at all level of computing in internet of things using Software defined Networks (SDN). Software Defined Network (SDN) provides networking programming ability and centralized management of IoT devices.

Niana, C., and Y. Reddy. GSU. **DIGiD – Digital ID application.**—DIGid is a mobile application that consolidates different forms of personal identification. Using blockchain technology, the app extracts card details and generates a barcode that can be scanned and used at different locations where IDs are required (work offices, schools, gym etc.). Every time a new ID is added to a user's digital wallet, the barcode is updated and re-encrypted making it virtually unhackable. Our app is designed to protect its users against identity theft, as well as offer the ease and convenience that comes with having just one digital ID with all their necessary and critical information. What makes DIGiD unique is that the application is built using blockchain technology – a decentralized encoded ledger that is virtually un-hackable. Blockchain protects against attempts to steal ID information from the app. The risk of a physical ID card being lost, copied or stolen and later used in fraudulent activity is significantly reduced through the use of the DIGiD app. Even if the user's phone is lost, the DIGiD can be disabled remotely, ensuring that the information is protected. Currently, our team has successfully coded the most critical function of the application, which is

the blockchain algorithm for storing and encrypting the data. We have also created a prototype of the app and are working on improving the aesthetic and functionalities therein. Once complete, we will return to our recently surveyed test users for feedback on the ease and usability on the app. This feedback will use to develop it further.

Thomas, Dominique. GSU. **Cyberbullying and its impact on students.**—Cyberbullying is truly a dangerously growing threat to online security of users from a social perspective. Protecting users from different viruses and other technical problems are easy compared to protecting users from others. Reducing cyberbullying is a fight in which we must stand together as a society. Throughout this research, it has shown that many students have received some type of bullying; in some form and not report it. It will focus on tackling the problem at hand, directly online, at the scene of the crime. In this project, we analyzed different datasets and developed a web map application.

White, G., and Y. Reddy. GSU. **Secure Messaging App.**—In these times, it is getting harder and harder to be more secure with anything connected to the internet. Every single bit of information you send can now be seen or intercepted. To overcome this, the development of an app that makes secure messaging a reality in this day and age is needed. The Secure Messaging App (SMA) that was developed encrypts messages sent inside it and sends it to the messaging app. Then to view the decrypted version, the recipient will need the SMA and the password that was used to encrypt it. So, the app does encrypt and decrypt messages using it.

Acknowledgement