Virginia State University

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Abstracts

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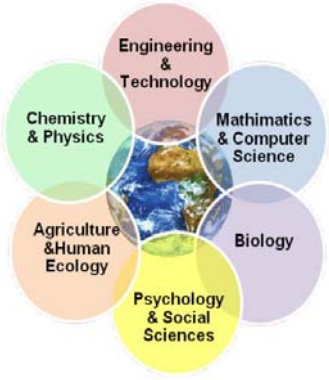

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ORAL

AGRICULTURE

PINEMAP Undergraduate Fellowship: Education Aim

Ahnaia White

Virginia State University

This paper will focus on developing modules on Forestry Management and Climate Change Impacts by the student author, during her Internship in the PINEMAP Undergraduate Summer Program (2014), at the University of Florida. The modules were developed to educate high school students and teachers on the relevance of forests, forest management, and climate impacts. The module website (http://sfrc.ufl.edu/extension/ee/climate) provides online access to the activities and includes supplemental materials and resources. The modules can be used by teachers to teach life, agricultural and environmental sciences. The activities such as the Project Learning Tree Conceptual Framework help the educators in science curriculum by integrating climate change, forest ecosystems, the carbon cycle, pine tree genetics, modeling, and life cycle assessments. The modules will provide information on the southeastern region of the United States and includes 14 different activities geared towards environmental education that can be used in all different subjects. These modules can also be used by 4-H youth in different counties of Florida and around the area. The module website (http://sfrc.ufl.edu/extension/ee/climate) provides online access to the activities and includes supplemental materials and resources with tools such as audio-visual tours of the activities, quizzes that gauge content comprehension prior to teaching each lesson, videos, and interactive tools that provide background information for each activity. The evaluation includes students' comprehension by qualitative and qualitative assessment through the pre- and post- tests.

Student(s): Ahnaia White, Virginia State University, Social Work, Sophomore

Mentor(s): Dr. Shobha Sriharan, Virginia State University, Department of Agriculture, Professor

The Effect of Organic vs. Conventional Management on the Marketable Yield and Berry Quality in Virginia High-Tunnel Strawberry Production

Malcolm Galloway

Virginia State University

The present study aims to compare vegetative growth, fruit quality and marketable yield of strawberry (Fragaria x ananassa Duchesesne) grown in high tunnel greenhouses in central Virginia. Experimental variables include cropping system (organic vs. conventional), planting date, cultivar type ('Chandler', 'Albion', and 'Festival'), intentional manipulation of the environment (raising and lowering high-tunnel sides), weekly pruning and removal of flowers in the fall, and fertilizer applications and timing. Different springtime production methods and their effect on marketable fruit quality and marketable yield have been investigated. Data systematically taken from multiple plots, with multiple repetitions (4 plants per plot, 2 plots per variety in both high tunnels) indicates the following trends: While the Chandler variety, which is the strawberry "industry standard," yielded highest by weight (lbs/plot) on average in our yield data, the overall Chandler marketable yield and berry quality was generally lower than the other two varieties (Albion and Festival). This research showed that the Albion and Festival varieties had some positive attributes superior berry quality, size, uniformity, and most importantly – flavor and brix levels, but yielded lower than the Chandler variety, which produced the highest yields out on any of the varieties. The influence of a two-week staggered planting date was also examined in this study. Future research during the 2015 production season is already underway.

Student(s): Malcolm Galloway, Virginia State University, Agriculture/Plant and Soil Science, Senior

Mentor(s): Dr. Reza Raffie, Virginia State University, Agricultural Research Station, Associate Professor

Using Seedling Transplants for Faster Establishment of Native Warm-Season Forage Grasses

Christos Galanopoulos

Virginia State University

Native warm-season grasses (NWSG) of North America *Andropogon gerardii* (big bluestem), *Tripsacum dactyloides* (eastern gamagrass), *Sorghastrum nutans* (indiangrass) and *Panicum virgatum* (switchgrass), are gaining popularity for improving summer forage production and habitat for grassland birds. They are fast-growing, high yielding, and drought tolerant, but hard to establish due to poor germination and severe weed competition. As an alternative approach, 6-week old seedlings raised in a high-tunnel were transplanted onto clean seedbeds in early June, spaced 30 and 45 cm within and between rows, respectively. In the same summer, control plots were seeded ≤ 2 cm deep for comparison. Plants were allowed undisturbed growth in the establishment year, but tall-growing broadleaf weeds were chopped down with a hoe as needed. Early in the following spring, dead standing biomass was mowed down. The first spring growth was harvested by machine to determine early season forage yield. Mature regrowth heights, and visual ground cover estimates were recorded in later summer. Data were analyzed by computer to compare the two establishment methods for each or the four NWSG species as a randomized complete block design. Generally, plants heights were greater in transplanted than seeded plots, except for indiangrass. Proportions of ground covered by NWSG were greater in transplanted than seeded plots, which also suffered greater annual weed challenges. Data indicate that using seedling transplants to establish NWSG stands may ensure greater success within year. More work on strategies for supporting faster growth and suppress broad leaf weeds during establishment is needed.

Student(s): Christos Galanopoulos, Virginia State University, Agriculture, Junior

Mentor(s): Dr. Vitalis Temu, Virginia State University, Department of Agriculture, Associate Professor

BIOLOGY

Agonistic Displays in the "Non-displaying" Slevin's Bunchgrass Lizard, *Sceloporus slevini*

Victoria Brunson

Virginia State University

Behavioral displays are universally used by animals to communicate territorial ownership and keep encounters between individuals from escalating into aggressive interactions. Slevin's bunchgrass lizard, *Sceloporus slevini*, is a small secretive lizard restricted to bunchgrass habitats in Southeastern Arizona and New Mexico. Previous research indicates agonistic behaviors exhibited by other Sceloporus species have not been observed *S. slevini* (Purdue and Carpenter 1972, Newlin 1976). We tested the hypothesis that Slevin's bunchgrass lizard exhibits reduced displays of agonistic behaviors by staging encounters between two male lizards. Males were collected from July- August 2014 at two study sites in Arizona. Nineteen males were used in laboratory filmed trials. Filming took place in a 2m diameter "kiddie pool" with a natural substrate. Videos were analyzed with Microsoft Moviemaker, and data was quantified by type and frequency of behaviors. Males displayed seven different behaviors. Six were associated with agonistic territorial displays. Therefore our hypothesis, that males lack agonistic behaviors, was not supported. Male *S. slevini* display a suite of agonistic behaviors similar to that of other territorial species of Sceloporus. Future research would involve testing males with a range of ventral color marking to determine levels of dominance. Purdue J. R. and C. C. Carpenter C. 1971. A comparative study of the body movements of displaying males of the lizard genus Sceloporus (Iguanidae).

Student(s): Victoria Brunson, Virginia State University, Biology, Senior

Mentor(s): Dr. Christian D'Orgeix, Virginia State University, Department of Biology, Associate Professor

Microglia: A Possible Therapeutic Target for Alzheimer's Disease

Kelley Butler

Howard University

Alzheimer's disease (AD) is a common form of dementia characterized by impaired cognitive function and memory loss. The pathological hallmarks of AD include neurofibrillary tangles and amyloid-beta (Aβ) plaques. Microglia are the central nervous system's resident phagocytes that develop in utero. They naturally exist in an inactive, 'ramified', state evenly distributed through the healthy brain. In AD, microglia aggregate in areas where plaque burden is highest and they transition to an activated, 'deramified' state characterized by outstretched dendrites and the release of macrophage-colony stimulating factors and chemokines. We selected aged (16-25 yr-old) Chlorocebus sabeus vervets as models for AD because they develop Aβ plaques and dementia-like symptoms similar to those seen in human AD patients. Subjects were monitored for changes in cognitive function using the CANTAB cognitive testing battery. In our study, we utilize a free-floating immunohistochemistry staining method to avoid tissue damage while illuminating microglial aggregates in 50μm sections. First, we perform a methanol peroxidase quench to promote endogenous peroxidase activity and permeabilize cell membranes. Anti-Iba-1, a marker for activated microglia, is used followed by secondary antibody and ABC incubation. Iba-1 positive cells are then visualized by diaminobenzadine. Sections are mounted on gelatinized slides, dehydrated in graded ethanols and cleared with xylenes. Quantitative analysis of immunostaining in the hippocampus and cortex will be performed using a MicroBrightField StereoInvestigator analysis system. We're concerned with these structures because they are vital in memory formation and spatial recognition. Possible correlations between cognitive function and deterioration and microglial burden can then be drawn.

Student(s): Kelley Butler, Howard University, Biology, Senior

Mentor(s): Dr. Mark Burke, Howard University, Department of Physiology and Biophysics, Assistant Professor

The Effects of Picolinic Acid on LPS- induced Neuroinflammation

Amissa Sei

Hampton University

Major depressive disorder (MDD) is a mental disease that affects about 6.7% of the population age 18 and older, and is also one of the leading causes of suicide in that age group. Most patients do not respond well to current treatments that use serotonin-dependent drugs so research for another type of treatment is really needed. The research conducted was in pursuit of understanding neuroinflammation of the brain (which leads to depression) and what therapy can be combative towards this. MDD has similar characteristics with sickness behavior and it has been deduced that imbalances in metabolites of the Kynurenine Pathway may also lead to this disorder. We studied the effects of a stress stimulus (LPS: lipopolysaccharide) in vitro to see whether picolinic acid (PIC) would ultimately save the cells from the stress response. To do so, we measured the cytokine expression levels that were secreted by the cells into the environment as well as assayed the proliferation of the cells. We found that prolonged exposure to PIC may cause cell death and that the LPS did not generate a good stress stimulus to the cells. From this, we concluded that the LPS may have been degraded which explains why the stress response was not seen. Future directions would be to redo the experiment with freshly made LPS, and to study the cellular signaling pathways associated with cytokine expression to see if there could possibly be another way to inhibit neuroinflammation with those pathways.

Student(s): Amissa Sei, Hampton University, Biology, Senior

Mentor(s): Dr. Michelle Penn-Marshall, Hampton University, Department of Biology, Chair

Dr. Lena Brundin, Hampton University, Department of Biology

Tough Love: Tadpole Deposition Behavior in *Ameerega trivittata*, the Three-striped Poison-Arrow Frog

Victoria Klimkowski

Virginia State University

One hundred and twenty-eight years ago parental transport of tadpoles from their terrestrial hatching site to a water source for further development was first documented in poison-arrow frogs. However, the parents' signal for tadpoles to detach from their backs is unknown, despite possessing a signal for them to attach. We test the hypothesis that males have evolved a signal to communicate when the tadpoles should detach from their backs. Paternal transport and tadpole deposition in *Ameerega trivittata* was videotaped from May-June 2014 at Brownsburg Nature Park, Suriname, South America. We quantified male-tadpole dislodging behavior and subsequent tadpole behavior. Males (n=21) transported 1-32 tadpoles and forcibly removed tadpoles from their backs using their rear limbs. Male rear limb scraping efficiency was 3.8% per attempt with no evidence of males exhibiting a tadpole deposition signal. Our hypothesis was not supported. Scraping behavior is more energetically expensive and time consuming than using a deposition signal. Additionally, transport time exposes males to predation. It may also decrease a male's fitness through leaving his territory undefended for a longer period of time while transporting tadpoles, resulting in lost mating opportunities. Future research will examine if congeners or species with female tadpole transport have evolved a deposition signal.

Student(s): Victoria Klimkowski, Virginia State University, Biology, Sophomore

Mentor(s): Dr. Christian D'Orgeix, Virginia State University, Department of Biology, Associate Professor

CHEMISTRY

Optimization of an Undergraduate Sol-Gel Experiment that Explores the Interface between Materials and Transition Metal Chemistry

Nicholas Pfab, Ryan Stiltoner and Michael Thompson

Virginia State University

This research examines a previously accepted, yet unpublished, Journal of Chemical Education article for the use in a senior undergraduate level laboratory. Reproducibility issues and the inability to complete the experiment within a three-hour lab period caused the article to be withdrawn. The goal of the experiment was to introduce materials chemistry to students using the sol-gel process while also demonstrating some aspects of transition metal chemistry. The sol-gel process involves hydrolysis and condensation of alkyl orthoester precursors (monomers) forming a polymer network which can encapsulate additives called dopants. The transition metal dopants, in this case, exhibit color change which corresponds to symmetry changes when chemically bonded with the surface groups of the material. The following procedure will highlight the steps needed for undergraduate students to consistently conduct this sol-gel experiment within the given time constraints and meeting the educational outcomes.

Student(s): Nicholas Pfab, Virginia State University, Chemistry, Senior
Ryan Stiltoner, Virginia State University, Chemistry, Senior
Michael Thompson, Virginia State University, Chemistry, Senior

Mentor(s): Dr. Colleen Taylor, Virginia State University, Department of Chemistry and Physics, Professor

Preparation and FTIR Characterization of Starch Nanocrystals

Effina Jackson

Virginia State University

Nanocrystals research has been an area of significant interest lately, due to the wide variety of potential applications in pharmaceutical, agricultural and biomedical fields. This study investigated the use of Fourier Transform Infrared (FTIR) spectroscopy as one of tools to characterize the starch nanocrystals (raw barley plant, native starch, and synthesized starch. Starch nanocrystals were prepared by acid hydrolysis of native starch: starch powder was mixed with 2.87 mol/L sulfuric acid solution. The suspension was placed at 45°C hydrolyzed for 7 days under stirring, then washed successively by deionized water and centrifugation until neutrality. An ultrasonic treatment was then employed to ensure better dispersion of starch nanocrystals. The nanocrystals were measured for their IR spectra by using conventional KBr pellet and ATR respectively. The spectral bands showed the absorption which attributed to stretching of the C-OH and C-O-C bonds in the structure.

Student(s): Effina Jackson, Virginia State University, Biology, Sophomore

Mentor(s): Dr. Tongwen Wang, Virginia State University, Department of Chemistry and Physics, Associate Professor

ENGINEERING AND TECHNOLOGY

Autonomous Robotic Design

David Johnson and Luiz Albuquerque

Virginia State University

The research project aims at designing and constructing an autonomous robot to perform pre-defined tasks that are required by the Institute of Electrical and Electronic Engineers (IEEE) for the South East Conference Hardware Competition. The design goal is to build a one foot by one foot autonomous line follower robot with capabilities of playing four different games. The games consist of Simon Carabiner, Etch-A-Sketch, Rubik cube, and a Deck of Cards. In addition to the design goal, the team working, work breakdown, and project management were considered for measuring the overall success of the project. . To achieve the design objectives, the robot is structured on a four axes base. The two back axes are fitted with rubber wheels, and the front axes consist of steel balls mounted at the bottom for providing ability to navigate smoothly. A robot arm with two gripers is used to play the Etch-A-Sketch, Rubik cube, and the Deck of Cards. For the Simon Carabiner a different mechanism was designed with NX8.5 PLM software and a rapid prototyping machine. The design includes five solenoids for stroking the game and four light sensors for detecting the reaction of the Simon Carabiner. These sensors detect light from the game and sends signals to the solenoids to press the corresponding colors. Apon completion of the project this robot aims to successfully complete the required objectives in a timely manner but hopes to also propel the team to victory.

Student(s): David Johnson, Virginia State University, Computer Engineering, Senior

Luiz Albuquerque, Virginia State University, Computer Engineering, Senior

Mentor(s): Dr. Ali Ansari, Virginia State University, Department of Engineering, Professor

Flight Vision: Turbulence Detection

Brandon Megna and Herbert Byrd

Virginia State University

The National Aeronautics and Space Administration Langley Research Center (NASA LaRC) is investigating the performance and safety of commercial aircraft using scintillometer, and lidar monitoring and detection. NASA desires to understand how the commercial environment affects the optical power margin of the scintillometer detector and reflector, and associated connectors and cables. This project supports NASA's Flight Vision program. The objective of this project is to design, prototype, and simulate a system that detects and measures turbulence, and returns results in an effort to improve safety. Turbulence magnitude, velocity, and dissipation rates will be displayed. The system will interact with the pilot and comptroller using sensors, light emitting diodes (LEDs), and noise recognition software, enabling the pilot to safely predict wake vortices' dissipation on a runway. The prototype will utilize an ultrasonic, infrared sensor and an Arduino motherboard. The resulting system is expected to have high quality audio; be easy to use; and withstand rapidly changing climate. Various methods and strategies will be incorporated in order to help complete NASA's Flight Vision. The information obtained within the troposphere via scintillometer and lidar data detection and analyses will be capable of reducing cost and maintenance in aircraft development, and greatly improve flight safety.

Student(s): Brandon Megna, Virginia State University, Computer Engineering, Senior

Herbert Bryd, Virginia State University, Computer Engineering, Senior

Mentor(s): Dr. Pamela Leigh-Mack, Virginia State University, Department of Engineering, Professor

Dr. Ali Ansari, Virginia State University, Department of Engineering, Professor

Dr. Narashima Prasad, NASA Langley Research Center (LaRC)

Infrared Security System

Aditya Nepali, Markus Johnson and Chloe Crawford

Virginia State University

There is an unrecognized problem that exists in security systems in today's society. Regular security systems only utilize regular cameras and only notify the user when the window or door is breached. There is a need for an advanced warning security system, with infrared cameras. Such a system will notify the user as well as warn the intruder before a costly incident. In this project, the goal is to make the homeowners feel safe and protected in their house. Through the use of infrared cameras, laser sensors, and other forms of technology, this can be done. Current security systems do an okay job, but the advanced warning security system will advance the technology thereof and will allow the homeowners to know if an intruder is approaching a lot sooner than usual. We are hopeful that by implementing such advanced warning system the rate of the crime will drop.

Student(s): Aditya Nepali, Virginia State University, Computer Engineering, Senior
Markus Johnson, Virginia State University, Computer Engineering, Senior
Chloe Crawford, Virginia State University, Computer Engineering, Senior

Mentor(s): Dr. Ehsan Sheybani, Virginia State University, Department of Engineering, Associate Professor

Integrating ArcGIS and Erdas Imaging in Addressing Security Concerns of Small and Medium-Sized Airports in Virginia

Jamie Owen, Toyin Ogunniyi, Deshon Whitehead and Laren Robinson

Virginia State University

Airports and its associated infrastructure are vital national resources. They play a major role in moving people and goods across regional, national, and international boundaries. However, major challenges ranging from technical design, runway safety, security, human capacity building, and operations currently hamper the operational efficiency and security of the airports. This paper addresses security concerns of small and medium-sized airports in Virginia which may be seen as soft targets by domestic and foreign terrorists. Not only will passenger security be addressed in this paper, airport access and perimeter security issues will also be addressed. Requisite technologies to anticipate and mitigate any concerns in a proactive fashion will be proposed. An assessment of current airport technologies and design layouts will be carried out. ArcGIS and Erdas Imagine will be integrated in the study. The next big catastrophe must be avoided and this requires various airport management and stakeholders taking a proactive stance on mitigating any unforeseen challenges. The authors will propose improved methods for detecting dangerous and foreign objects, incoming and outgoing ground passenger vehicular traffic design as well as innovative ways to improve baggage handling, including solutions to address human factors issues utilizing signal detection principles.

Student(s): Jamie Owen, Virginia State University, Information Logistics Technology, Senior

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Deshon Whitehead, Virginia State University, Information Logistics Technology, Senior

Laren Robinson, Virginia State University, Information Logistics Technology, Senior

Mentor(s): Dr. Benedict M. Uzochukwu, Virginia State University, Department of Technology

Ms. Darlette Meekins, Virginia State University, Department of Agriculture, Instructor

Magnetic Levitation Automation

Kaaba White and Kehinde Washington

Virginia State University

The purpose of this design is to enhance the functionality of the Magnetic Levitation trains (Maglev) systems by incorporating feedback from the trains. Maglev is a completely new way of transportation that will join the ship, the wheel, and the airplane as a mainstream in moving goods and people. The software that will be developed is for real time computer simulation of the Kelvin Electrons Magnetic Levitation (KEML) which is widely used in transportation education of middle and high school students. Virginia State University (VSU) has been utilizing this system for the past seventeen years to introduce the concept of magnetic trains to high school students in the VSU National Summer Transportation Institute (NSTI). The Kelvin Electronics Magnetic Levitation system enhances the knowledge of magnetic levitation as demonstrated by a self-propelled magnetic vehicle utilizing a propulsion sub-system which directly ties to transportation. This incorporates knowledge of transportation by the development, design, modeling, and testing of a self-constructed vehicle. The objective of this project is to design and develop a sensor system which gathers data and automatically calculates displacement, velocity, acceleration, and friction of vehicles, all in real time. This ensures more accurate results as well as demonstrating the application of mathematics and physics in the form of the calculated measurements. The objective is achieved by incorporating a sensor that records a train's movement while traveling along a single track, as well as developing software that simulates the vehicle's movement in real time. Integration of this design with Kelvin Track will allow for crucial data analytics such as comparing trains speeds, and calculating and graphing velocity, acceleration, and friction along the track. Although there is only one physical track, data analytics will allow for simulating a four train track simultaneously in order to compare different train displacements at the same time. This is just one statistic that can be examined. Having the entire process to now be computerized and reconstructed will help mold and better develop construction of the designs of the trains for future develop while moving along the track. Gathering this vital data will also make this project more interactive and exciting for users.

Student(s): Kaaba White, Virginia State University, Computer Engineering, Senior

Kehinde Washington, Virginia State University, Computer Engineering, Senior

Mentor(s): Dr. Ali Ansari, Virginia State University, Department of Engineering, Professor

Protection Against Gun Violence

Candice Brown, Nedkwon Broadnax and Aaron King

Virginia State University

Gun crimes in America are on a rise. There are innocent lives that are taken every day to a gun crime. This is a major problem in the world. We care about this because it deals with people's lives. Lives that range from all ages, and people all over the world, these are lives that matter. Gun violence is a serious problem that needs to be addressed and corrected to the best of one's ability as soon as possible. The device that will be created has a few approaches that can help the solution. When a crime such as a shooting goes unreported the person who is assaulted may not able to get the necessary guidance they need to handle the problem appropriately. These situations can lead to the offenders to getting away with the crime and the resources of the police to be misused. Engineers have proposed a concept that is innovative and it could potentially save lives. The Protection Against Gun Violence, PAGV, will consist of technology that accurately detects gun shots, accurately show the location of the gun shot and alert the proper authorities. The team hopes to the best of their ability to decrease this issue.

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Nedkwon Broadnax, Virginia State University, Computer Engineering, Senior

Aaron King, Virginia State University, Computer Engineering, Senior

Mentor(s): Dr. Eshan Sheybani, Virginia State University, Department of Engineering, Associate Professor

Signal Processing with Universal Software Radio Peripheral

Brandon Harrington

Virginia State University

The Universal Software Radio Peripheral (USRP) is slowly becoming a very popular piece of hardware in different universities and research labs across the world. It is inexpensive, which attracts a lot of attention, along with its variety of applications and capabilities. The USRP connects to a host-computer through a high speed USB or Gigabit Ethernet interface. Another reason for the increasing popularity of the USRP is its ability to respond to multiple programming software such as GNU Radio, Matlab/Simulink, and LabView. There are a broad range of capabilities of the USRP one of which includes receiving GPS signals. Each GPS satellite transmits data on two frequencies, L1 (1575.42 Mhz) and L2 (1227.60 MHz). We will focus on the L1 band that transmits at 1575.42 Mhz. The main objective is to engage in signal analysis with the carrier signal of the L1 band. This task proved to be challenging but not impossible. The carrier signal is essentially exactly what it sounds like. Its purpose is to carry information modulated on to it; in this case the navigation message from the GPS satellite along with other codes that are irrelevant to use at this point. After receiving the signal via USRP and with a simple extraction of the carrier signal, we were able to recorded the signal and reconstruct it using its In-phase/Quadrature(IQ) data. With just the carrier signal one is able to do multiple things. One can modulate his/her own information onto the signal and transmit it through the USRP. Further analysis on the characteristics of the signal can be done. For example, one can compare the strength of a direct to the strength of an indirect signal. In theory, one can determine the characteristics of the surrounding area when using both the direct and indirect carrier signal. The possibilities are endless.

Student(s): Brandon Harrington, Virginia State University, Computer Engineering, Junior

Mentor(s): Dr. Eshan Sheybani, Virginia State University, Department of Engineering, Associate Professor

Treasure Application Protection System (T.A.P.S.)

Britton Bean, Michael Bryant and Nicole Jefferson

Virginia State University

The Treasure Application Protection System (T.A.P.S) is an entry management system that uses biometric radio frequency identification to allow access to restricted areas and monitor the foot traffic in and out of any area, class room, or lab. Biometric radio frequency identification (RFID) offers the security of a two-step verification system for entry making entry difficult for intruders. Biometric RFID has the advantage not only to act as a lock mechanism it also has the ability to be used to track movements throughout the building in real-time. This project will develop a security system that will update the century old lock and key approach to home security. It is a home security with a 21st century twist, RFID chips. Using the framework of the home security system and integrating RFID technology we will create a product that allows the users to craft its own keys in the form of RFID chips. The home security system would be upgraded with an RFID interrogator and writer giving the system the ability to read RFID tags into the system and giving the consumer the power to assign the accessibility of each key card. With these simple upgrades we have completely redefined the way people can interact with their home security system. The first step of the verification requires an RFID enabled card to be placed in front of the reader, after which a biometric fingerprint scanner will verify the identity of the user and either allow or deny access while simultaneously recording the successful or failed attempt for access in a central location. By exchanging the keys with RFID interrogators and combining the system with modern-day home security systems, we will come out with a new security system product.

Student(s): Britton Bean, Virginia State University, Computer Engineering, Senior

Michael Bryant, Virginia State University, Mechanical Engineering Technology, Senior

Nicole Jefferson, Virginia State University, Mechanical Engineering Technology, Senior

Mentor(s): Mr. Joe Dollete, Virginia State University, Department of Technology, Instructor

The Role of Subchondral Bone in the Progression of Load-Induced Osteoarthritis

Kendra Jones

Howard University

Osteoarthritis (OA) is a disease that causes deterioration of cartilage in the joints. This debilitating disease affects over 26 million people in the US alone. Clinical evidence indicates that OA affects both cartilage and bone; however, the exact role of bone in the progression of the disease is unknown. This study aimed to understand the role of bone remodeling in the initiation and progression of osteoarthritis using a non-invasive loading model. We hypothesized that inhibiting bone remodeling, would prevent cartilage changes contributing to the development of OA. To develop OA, the left tibias of 26-week old male mice were subjected to cyclical 9N loading over 1, 2 and 6 weeks using a non-invasive joint compression model. Right limbs served as internal controls. Mice were treated either with alendronate, a bisphosphonate known to slow bone remodeling, or a vehicle drug as a control. After euthanasia, left and right tibiae were retrieved and scanned using MicroCT. Groups were compared using a multi-factor, repeated-measures ANOVA. Results demonstrated that at 6 weeks, bone volume fraction was not different between loaded and control limbs in both alendronate- and vehicle-treated groups. However, loading increased trabecular thickness in both treatment groups, and reduced tissue mineral density after six weeks. These results confirm that alendronate inhibited bone remodeling, as indicated with the lack of change in bone volume fraction with loading. Further analyses will focus on examining cartilage changes in this experiment to determine the role of bone remodeling on the progression of OA.

Student(s): Kendra Jones, Howard University, Mechanical Engineering, Senior

Olufunmilayo Adebayo, Cornell University, Biomedical Engineering, PhD student

Frank C. Ko, Cornell University, Biomedical Engineering, PhD Student

Mentor(s): Dr. Shawn Abernathy, Howard University, Department of Engineering, Assistant Professor

Dr. Marjolein C.H. van der Meulen, Cornell University

The Sun-Mow

Evan Dirksen, T. K. Skipper and A'Donnis Wheeler

Virginia State University

Over the years there has been consistent destruction to the ozone layer due to emissions from motorized tools. Gas mowing for one hour is equivalent to a one hundred mile car ride, and contributes to five percent of the nation's air pollution. The ozone provides protection from the sun's powerful UV rays. There is a certain safety limit in the measurement of ozone within the atmosphere. The measurement is in ppm (parts per million) which is the air volume used to measure the concentration levels. This project is to update a common machine into a new useful tool that eliminates one of the factors that aid in the destruction of the coveted ozone layer. The Sun-Mow will be created by reconfiguring the motor contained within an electric mower to charge and run utilizing solar energy stored in a solar panel manually connected to the mower. Solar energy use promotes a safer environment by eliminating the emission of chemicals into the atmosphere. Yearly, over 17 million gallons of gasoline are spilled while fueling gas mowers; ultimately wasting money and resources. The spillage seeps into groundwater and any leftover evaporates, polluting air and destroying the ozone. This project will serve as a better alternative to the gas mower in terms of performance output and environmental safety. This mower will also outmatch a standard electric mower because the user's range will not be limited by a cord used to power the machine.

Student(s): Evan Dirksen, Virginia State University, Computer Engineering, Senior

T. K. Skipper, Virginia State University, Computer Engineering, Senior

A'Donnis Wheeler, Virginia State University, Computer Engineering, Senior

Mentor(s): Dr. Singli Garcia, Virginia State University, Department of Engineering, Associate Professor

MATHEMATICS

Determining the Impact of Infection from Improper Burial Procedures during the Current Ebola Outbreak

Miranda Haviland, Amanda Reeder and Taliya Gunawansa

Norfolk State University

The unprecedented Ebola epidemic occurring in West Africa has victimized more than 8,000 people in the three most infected countries: Liberia, Sierra Leone, and Guinea [1]. Ebola Virus Disease (EVD), formerly known as Ebola hemorrhagic fever, is a severe, often fatal, illness in humans without a known cure or prevention [2]. For human to human infection to occur, the virus spreads through direct contact with blood, body fluids, improper disposal of healthcare equipment, or inadequate timely burial procedures [3]. This SEIDR model investigates the impact of the infectiousness of the dead individuals to burial time. The disease epidemic threshold value, R0, was determined using the Next Generation Operator (NGO). The secondary infections are influenced by the parameters related to the infectious and dead classes based on this threshold value. It was observed there was a reducing factor effecting the contribution from the dead class. Different combinations of parameter values were used to produce simulations to reflect different conditions of the outbreak.

Student(s): Miranda Haviland, Norfolk State University, Applied Mathematics, Sophomore

Amanda Reeder, Norfolk State University, Applied Mathematics, Applied Mathematics, Junior

Taliya Gunawansa, Norfolk State University, Optical Engineering, Junior

Mentor(s): Dr. Aprilla Lanz, Norfolk State University, Department of Mathematics, Associate Professor

Long Term Behavior of Three Species in a Food Chain Model

Imani Wood

Virginia State University

In previous studies, scientists have interpreted that a two-species predator prey model can only approach an equilibrium or a limit cycle. It has been suggested that chaotic behavior could be much more common in natural systems where species interact, most likely in food chains containing three or more species. In our project, we focused on the long term behavior of a three-species food chain model containing a generalist predator, specialist predator, and a prey. Such a food chain system can be used to model the interactions among Arctic polar bear, Arctic seal, and Arctic cod. The food chain model is built based on Lotka-Volterra scheme and Leslie-Gower scheme. The generalist predator typically preys on the specialist predator and the prey, while the specialist predator only eats the prey. The food chain was analyzed numerically and theoretically using a range of different parameters to determine the steady equilibrium, limit cycles, and chaos. The experimental parameters were the strength of competition among the prey, the birth rate of the prey, and the growth rate of the generalist predator. We apply the Routh-Hurwitz criteria to study the linear stability of equilibrium solutions. In our chosen three-species food chain model, each steady equilibrium represents a different biological case: 1) all species are extinct resulting in no evidence of the species coexisting; 2) only the prey existing concludes in a coexistence when the birthrate of the prey does not exceed the set value for the competition rate among the Arctic Cod population; 3) the prey and the specialist existing in the absence of the generalist predator results in no coexistence when the competition rate amongst the Arctic Cod population is set to 0.5; However, at 0.05 coexistence occurs 4) all species are present which leaves only a small region of stability. We proved the existence of some stable region of the coexistence equilibrium. We also numerically found limit cycles and chaos for some special parameters. In future studies, there will be a continuation in investigating the bounds outside the linear stability of the three-species food chain model.

Student(s): Imani Wood, Virginia State University, Chemistry, Senior

Mentor(s): Dr. Dawit Haile, Virginia State University, Department of Engineering, Professor

Dr. Zhifu Xie, Virginia State University, Department of Engineering, Associate Professor

HEALTH DISPARITY

Age vs. the Frequency of Dental Visits

Matthew Brown

Virginia State University

In my research I wanted to see the contrast in frequency of doctor visits vs. age. Seeing local physician or family doctor is probably one of the best ways to manage your health to see what's going on with your body and to see that you are healthy. With people getting sick and some even dying, there needs to be more resources available for people. Preventive health behaviors are crucial for older adults' wellbeing. The way I collected my data was through the Virginia State University Cares health day. I had access to almost all of the patients and asked about medical history and pattern of visits. Routine health check-ups appear to be taken up inequitably, with gender, age, socio-demographic status and ethnicity all associated with differential service use. I found that it doesn't matter how old you are. Yes middle-aged people tend to make more frequent trips to the doctor, but some young adults and older aged people still eventually find a way to make it to the doctor.

Student(s): Matthew Brown, Virginia State University, Biology, Senior

Mentor(s): Dr. Glenn Harris, Virginia State University, Department of Biology, Associate Professor

POSTER

AGRICULTURE

Antibiotic Resistant Bacteria in Agricultural Soils: Quantities of Antibiotic Resistance Genes in Soils Impacted by Dairy Manure Inputs

Crystal Smitherman

Hampton University

Antibiotic usage by the dairy industry is known to result in high levels of antibiotic resistance in the animal. However, little is known about how this resistance is transferred to agricultural soils via manure inputs or how the function of soil microbial communities might be affected. Exposure of soil microorganisms to these antibiotics or antibiotic resistance genes (ARGs) can decrease microbial growth and increase demands for maintenance, possibly leading to changes in the soil microbial community and how these communities regulate carbon, nitrogen, and phosphorous cycling. The goal of this research was to determine if increased exposure to dairy manure inputs results in increased prevalence of ARGs in soil microbial communities. Paired soil samples from eleven different dairy research farms that compared high and low dairy manure inputs were analyzed for concentrations of ARGs. Specifically, quantitative PCR was used to quantify copies of ARGs for resistance to tetracycline (tetO and tetW), erythromycin (ermB), and cephalosporin (ampC), as well as total numbers of bacteria and fungi. Little change is expected in tetO, tetW, or ermB because tetracycline resistance is naturally abundant, while erythromycin is not naturally abundant, nor is it used regularly in the dairy industry. In contrast, cephalosporin is not naturally abundant but is commonly used therapeutically in the dairy industry, so the greatest difference in ARG concentrations is expected for ampC.

Student(s): Crystal Smitherman, Hampton University, Biological Science, Senior

Mentor(s): Dr. Brian Badgley, Virginia Tech, Crop and Soil Environmental
Michael Strickland, Virginia Tech, Crop and Soil Environmental

Monitoring of Water Quality at Watersheds in Virginia and Mapping the Sites with ArcGIS

Mina Williams

Virginia State University

Watersheds are important for the health of the aquatic organisms and beneficial predators. As a student researcher, I conducted studies on the water quality monitoring at various watershed locations at Appomattox River, in Chesterfield County, Virginia. I measured various water quality parameters in fall, 2014. I collected water samples (3) from each site in 500ml plastic bottles. Turbidity was measured on-site from the sample, while the rest was transported back to the Laboratory at Virginia State University for further tests. Dissolved oxygen was measured on-site by submerging a DO probe into the river at three points. Water and air temperature were also measured on-site at 3 points. The water quality analysis was done with the HACH water quality test kit. The 3 replicate measurements for each site on a given day were averaged and the standard error was calculated. Dissolved oxygen levels were consistent between sites. Turbidity levels were consistently higher at City Point than the rest of the sites for most of the study period. The pH measurements showed no appreciable differences between sites. Water hardness showed some variability. Salinity was also low at the Sutherland site. There was no significant difference in ammonia levels between the sites or over time. Using ArcGIS, I mapped the river and surrounding topography to link the data from the water testing sites.

Student(s): Mina Williams, Virginia State University, Agriculture, Junior

Mentor(s): Dr. Shobha Sriharan, Virginia State University, Department of Agriculture, Professor

Dr. Sarah Witiak, Virginia State University, Department of Biology, Assistant Professor

Overview of Water Quality Trends and Presence of *E. coli* in Virginia Rivers

Adrienne Harden

Virginia State University

This paper presents water quality data from the James River and selected streams in Virginia. It includes observations on the presence of harmful bacteria *(Escherichia coli)*. Every year the Department of Environmental Quality (DEQ) Water Division releases its annual monitoring plan (MonPlan) to the public. The MonPlan contains detailed information on DEQ's monitoring activities including the station locations, specific conditions, frequency of monitoring and costs. This research focuses on the report on water quality data from monitoring stations maintained by DEQ. DEQ personnel collect water samples from stream centers, generally using a bridge or boat and following the EPA protocol. DEQ's staff performs monthly water quality monitoring at many locations across the Commonwealth. The water quality monitoring indications on dissolved oxygen (DO), biochemical oxygen demand (BOD), pH, temperature, salinity, nitrogen, and phosphorus are generated annually and kept in a computer database. The review of data collected at the DEQ stations showed variations in DO, BOD, and pH indicate water quality improvement at many locations. In addition, trends in BOD decline represent water-quality improvement. The increasing levels of Nitrogen at some locations are interpreted as deteriorating water quality. The declining pH trends were observed in few stations. The increasing pH trends were observed at locations with acid-mine drainage treatment. The analysis of water at the James River indicated that the *E. coli* did not exceed the safety limit of 235 colonies/100mL during the summer months.

Student(s): Adrienne Harden, Virginia State University, Agriculture, Junior

Mentor(s): Dr. Shobha Sriharan, Virginia State University, Department of Agriculture, Professor

Dr. Paula Insera, Virginia State University, Department of Agriculture, Associate Professor

Water Quality Monitoring at Lake Chesdin, Appomattox River, and City Point in Hopewell

Latia Jackson

Virginia State University

The Department of Environmental Quality (DEQ) Water Division of Commonwealth of Virginia makes available to the public its annual monitoring plan (MonPlan). The MonPlan summarizes the water quality monitoring activities conducted during each calendar year, from 1 January to 31 December. As part of my training in the USDA NIFA Grant, "Establishing 1890s Land Grant Universities Water Center", I participated in the water quality monitoring program. The water quality monitoring was conducted on the following parameters: turbidity, dissolved oxygen, water temperature, using the HACH water quality test kit. The 3 replicate measurements for each site on a given day were averaged and the standard error was calculated. The study sites were at different locations which spanned from Appomattox River to Lake Chesdin (source of drinking water), Sutherland (just below the dam), and City Point in Hopewell where the Appomattox meets the James River. To link the data on water quality monitoring from the water testing sites, data were mapped with the study areas using the Global Positioning System (GPS) and Geographic Information System (GIS). The results showed that the water temperature increased steadily through the summer. The pH values were the same. Dissolved oxygen levels and turbidity levels were consistently higher at City Point than the rest of the sites. The study sites and water quality monitoring locations were mapped with ArcGIS.

Student(s): Latia Jackson, Virginia State University, Agriculture/Environmental Science, Junior

Mentor(s): Dr. Shobha Sriharan, Virginia State University, Department of Agriculture, Professor

Dr. Sarah Witiak, Virginia State University, Department of Biology, Assistant Professor

BIOLOGY

Cell Adhesion Molecules and Oocyte Development

Joshua Burton

Hampton University

The biological success of an organism can be characterized by its ability to produce viable offspring. The development of female gametes through the process of oogenesis is imperative for reproduction, especially since the oocyte pool is established at birth. As many as 6.7 million American women suffer from infertility, and are affected by reproductive disorders like premature ovarian failure. It is hypothesized that cell adhesion molecules such as E-Cadherin and N-Cadherin play a role during oocyte development, and their aberrant expression is linked to reproductive disorders associated with abnormal oogenesis. The proposed model is that these molecules help to hold oocytes together in cysts, in addition to allowing them to bind to granulosa cells to form primordial follicles. If this model is correct, the down regulation of the cadherins may contribute to an increase in oocyte loss which will adversely affect fertility. Immunocytochemistry and confocal microscopy were used to confirm that both E-Cadherin and N-Cadherin are expressed in the fetal and neonatal mouse ovary. E-Cadherin appears to be primarily expressed in the oocytes while N-Cadherin appears to be expressed both in the oocytes and also in the surrounding granulosa cells. This suggests that N-Cadherin is important for forming the primordial follicle. Western blots were also used to quantify protein expression levels in the fetal and neonatal ovary, during the period when cyst breakdown is most substantial. Future work will seek to specifically ascertain the function of both cadherins by blocking them in organ culture.

Student(s): Joshua Burton, Hampton University, Biology, Senior

Mentor(s): Dr. Melissa Pepling, Syracuse University, Department of Biology, Associate Professor

Cytotoxicity in Mammalian Cell Culture Treated With Antibiotic Nocathiacin

Shalanda Grier

Hampton University

The rise in antimalarial drug resistance continues to gain much attention as it proves to be a serious threat to public health. The decrease in efficiency of malarial drugs needs to be addressed to further combat the disease. An increase in the development of antimalarial drugs can aid in the deficiency of drugs presently available. In the previous study we tested the antimalarial effect of antibiotic nocathiacin in in vitro culture with Plasmodium falciparum. Nocathiacin BMS461996 inhibits growth with mean IC50 of 45.80 nM for P. falciparum 3D7 (CQ susceptible), 80.68 nM for P. falciparum Dd2 strain (accelerated resistance to multiple drugs) and 90.01 nM for P. falciparum K1 strain (resistant to CQ, pyrimethamine and sulfadoxine). It is critical to investigate potential cytotoxic effects in mammalian cell cultures for the continued development of nocathiacin. The cytotoxicity of BMS 461996 will be evaluated in in vitro culture using the colorimetric assay MTT. For our control we will also evaluate the cytotoxic effect of no drugs, Chloroquine, Artemisia, and Advil. Through this experiment we plane to determine the highest concentrations that will initiate cytotoxicity if any. We expect there will be no cytotoxicity present in the mammalian cell cultures when treated with water soluble nocathiacin BMS461996 up to the concentrations of 100μM.

Student(s): Shalanda Grier, Hampton University, Biology, Senior

Mentor(s): Dr. Indu Sharma, Hampton University, College of Biological Sciences, Assistant Professor

Does Turbidity and Temperature have an Effect on the Reproduction of *E. Coli*?

Anqunett Tolliver and Jazmin Coleman

Virginia State University

Turbidity is a degree of the cloudiness in water. Higher turbidity levels are often associated with higher levels rain causing suspension. It is also used to specify water quality and filtration effectiveness. I determined how turbidity and temperature affects the reproduction of *E. Coli*. Water samples were collected from the Appomattox River/James River every week and temperature measurements of the air and water were also made. Results showed that high levels of turbidity lead to high levels of *E. Coli* colonies. Whereas low levels of turbidity lead to little or no *E. Coli* colony-forming units. Bacteria count and air temperature had an r statistic of 0.207 and a p-value of 0.623, bacteria and water temperature had an r statistic = 0.184, (P) = 0.663 causing it to be a significant correlation *P*.

Student(s): Anqunett Tolliver, Virginia State University, Biology, Senior

Jazmin Coleman, Virginia State University, Biology, Senior

Mentor(s): Dr. Glenn Harris, Virginia State University, Department of Biology, Associate Professor

Dr. Xianfa Xie, Virginia State University, Department of Biology, Associate Professor

Dr. Sarah Witiak, Virginia State University, Department of Biology, Associate Professor

Evaluation of Phenolic-linked Bioactive Functionality of Juneberry and Winter-Hardy Grape for Type 2 Diabetes and Hypertension Management

Stephanie Dunton

Virginia State University

Plant phenolics (bioactives) are secondary metabolites with high antioxidant properties, which help plant to counter abiotic and biotic stresses. Same phenolic compounds also have potential to counter oxidative stress-linked diseases in humans when consumed as diet. The aim of this study is to evaluate the significance of phenolic-linked bioactive functionalities of Juneberry *(Amelanchier alnifolia*) and Winter-Hardy Grape *(Vitis riparia)* for its potential role to manage early stages of type 2 diabetes and hypertension. Phenolic-linked anti-hyperglycemic and anti-hypertension potential of water and ethanolic extraction of Juneberry and Winter-Hardy Grape were investigated through different in vitro assays. The assays utilized were total soluble phenolic content, antioxidant activity by 2,2-Diphenyl-1-picrylhydrazyl (DPPH) radical inhibition, α-amylase inhibitory activity, α-glucosidase inhibitory activity, and inhibition of Angiotensin I – Converting Enzyme (ACE). The experiment was repeated twice with three replications and data was recorded and analyzed in detail. Total soluble phenolics and total antioxidant activity were high both in Juneberry and Winter-Hardy Grape leading to the further evaluation of α-Amylase, α-Glucosidase, and ACE Inhibition to determine which fruit, and what form of extraction has high inhibitory activity and has potential to be used for better management of early stages of type 2 diabetes and associated cardiovascular complications, such as hypertension.

Student(s): Stephanie Dunton, Virginia State University, Biology, Senior

Mentor(s): Dr. Bryan Sayre, Virginia State University, Department of Biology, Associate Professor

Dr. Kalidas Shetty, North Dakota State University, Department of Plant Sciences

Dr. Dipayan Sarkar, North Dakota State University, Department of Plant Sciences

Goat Genome

Rowan Allen

Virginia State University

The main purpose of the goat genomic project was to understand and provide a general perspective of the advancement of goat genetics that can impact the economy. The goat is an important agricultural species due in part to its ability to adapt to many diverse environments around the world. Last semester in our Investigation and Research class with Dr. Sayre, we had the opportunity to take part in this on-going experiment. Over six months of tedious work and long hours were spent by Dr. Sayre and students to visualize and plan a successful experimental design. As a class we came together and collected supplies and assigned roles to each other. The roles ranged from dissector, to photographer, collectors and nitrogen tank dippers. The collection process itself needed participants to collect over 55 samples with replicates from different tissues with a very strict time frame. In just over one hour the team had all of the samples frozen and prepared for the next phase. The samples will undergo RNA-Seq analysis, a technique that will allow measurement of gene activation and expression in different tissues. This will help us interpret the functional elements of the genome and reveal the molecular constituents of cells and tissues. This may also contribute to a better understanding the development of disease resistance in this important agricultural species. These results will provide fundamental information for advancing the goat genome project.

Student(s): Rowan Allen, Virginia State University, Biology, Senior

Mentor(s): Dr. Brain Sayre, Virginia State University, Department of Biology, Associate Professor

Hyperglycemia Associated with Protease Inhibitors in an Urban HIV-Infected Minority Patient Population

Kirsten Lassiter and Geneva Roache'

Virginia State University

Hyperglycemia and new-onset diabetes mellitus have been reported to occur in HIV-infected patients treated with protease inhibitors. For patients with diabetes, the additional diagnosis of HIV increases the challenge of self-care management. HIV infection is characterized by an immunodeficient state caused by active replication of the virus. The use of protease inhibitors has revolutionized the treatment of HIV infection Inhibitors of this viral protease can be used to fight HIV infection. By blocking the ability of the protease to cleave the viral polypeptide into functional enzymes, protease inhibitors interfere with continued infection. The main objective is to determine the effect of protease inhibitor therapy on serum glucose in a predominantly minority patient population. The results concluded one hundred seventeen patients, not previously known to be diabetic received protease inhibitors; seven of those (6%) of the patients developed symptomatic diabetes mellitus. The mean random glucose values for patients who did not develop diabetes were higher during therapy than prior to initiation of protease inhibitors. In conclusion, urban minority HIV-infected patients receiving combination antiretroviral therapy including a protease inhibitor may be at increased risk for the development of hyperglycemia and diabetes mellitus.

Student(s): Kirsten Lassiter, Virginia State University, Biology, Senior

Geneva Roache', Virginia State University, Biology, Senior

Mentor(s): Dr. Glenn Harris, Virginia State University, Department of Biology, Associate Professor

Identification of Virulence Factors in Vibrio Species Isolates from the 2009 Bermuda Fish Die-off

Jordan Bluford

Norfolk State University

The Vibrio isolates recovered from the 2009 Bermuda fish die-off may have contributed to the pathology of the event. To confirm this, polymerase chain reaction was conducted on each of the isolates using primers designed for three virulence factors previously identified to be present in the Vibrio genus. These products were then confirmed using gel electrophoresis. To further confirm the potential pathogenicity of the isolates, hemolysis testing was conducted on sheep's blood agar. A majority of the isolates possessed at least one of the three virulence factors with 67% having vhh, a hemolysin gene, 67% having vcrD, a calcium response gene in a Type III secretion system, and 0% having hhl, a Vibrio cholerae-like hemolysin gene. All of the isolates were hemolytic, with 92% being alpha hemolytic and 8% beta hemolytic. The results suggest that the isolates most likely contributed to the die-off event, but other factors may have played a role as well. In future work the isolates will be analyzed for the presence of a bacteriophage that has been documented to convert commensal bacteria into pathogenic strains.

Student(s): Jordan Bluford, Norfolk State University, Biology, Junior

Mentor(s): Dr. Ashley N. Haines, Norfolk State University, Department of Biology, Assistant Professor

Identifying the Presence of Plasmodium Species in Ethiopian Anopheles Mosquitoes

Ennessa Curry

Howard University

The female Anopheles mosquito is the blood-feeding insect that transmits Plasmodium parasites, the pathogens that cause malaria. The central hypothesis is that the mosquito midgut microbiota influences the ability of Anopheles to transmit Plasmodium. The current work contributes to testing the hypothesis that Anopheles that contain Plasmodium have different microbiota than non-carriers. The DNA extracted from the salivary glands and abdomens of 112 Anopheles mosquitoes will be screened for the presence of Plasmodium by nested polymerase chain reaction (PCR). The initial PCR will detect the presence of Plasmodium parasites. PCR products from samples that are positive for Plasmodium will then undergo additional rounds of PCR that will detect the DNA of *P. falciparum* or *P.vivax*. The presence of bands of expected sizes will indicate the presence of the Plasmodium species. PCR controls will include DNA extracted from cultures of the Plasmodium species and a water control. Although there are no results to report, we expect that 0.3-3.0% of our samples will be positive for Plasmodium based on published results (Animut, et al.). Future directions: During summer 2015, additional Anopheles mosquito samples will be collected in order to increase the probability of collecting insects with the Plasmodium parasite.

Student(s): Ennessa Curry, Howard University, Biology, Junior

Mentor(s): Dr. Courtney Robinson, Howard University, Department of Biology, Assistant Professor

Immature Neuron Population in the Amygdala of Cognitively Declining Monkeys: an Alzheimer's Study

Honoree' Brewton

Howard University

Alzheimer's disease, a form of dementia, causes problems with memory, thinking, and behavior. Although memory loss is not a direct cause of Alzheimer's, in normal aging, the brain experiences declines in memory abilities. The amygdala is critically involved as an indicator of implicit memory. It is well known that there is amygdaloidal neuron loss with Alzheimer's. The immature neuronal population in the amygdala will be differentially affected based on the cognitive status. Aging monkeys (n=34) were housed in their naturalistic environment at the Behavioural Science Foundation, St. Kitts, and were tested every six months using a CANTAB (Cambridge Neuropsychological Test Automated Battery) touch-screen cognitive test commencing at the age of 15 years. Based on their performance, these monkeys were classified into one of three categories: a slow, steady decline in cognitive performance (Group 1); a rapid, persistent decline in cognitive performance (Group 2); and normal cognitive performance (control). Following the death of these subjects, their brains were removed, preserved in formalin, and shipped to the United States. Immature neurons were identified through immunostaining with doublecortin (DCX), a putative marker for immature neurons. We report here a significant reduction in immature neurons in the amygdala only in the subjects that displayed rapid cognitive decline. The aim of this project is to investigate the differential expression of neurogenesis in the amygdala of these three groups. These data indicate that immature neurons may play a role in implicit memory deficits in aging and dementia.

Student(s): Honoree' Brewton, Howard University, Psychology, Junior

Mentor(s): Dr. Mark Burke, Howard University, Department of Physiology and Biophysics, Assistant Professor

Dr. Roberta Palmour, McGill University, Department of Psychiatry, Assistant Professor

Dr. Frank Ervin, McGill University, Department of Psychiatry, Assistant Professor

Light and Temperature's Effect on Macro-Invertebrates Population along the Appomattox James River

Thorn Raton, Devin Mosley and Madison Turner

Virginia State University

Macroinvertebrates live in territories such as streams, rivers, wetlands and lakes due to their survival resource requirement. Measuring the concentration of invertebrates is a way that gives scientist an indication on water quality. The higher macroinvertebrate community density in a body of water can provide an approximation of the waters health over time. They are also a significant energy source for animals such as fish and birds. Macroinvertebrates have extremely vital niches due to their influence of on the survival for other organisms within their ecosystems. In the experiment two abiotic factors were tested, light and temperature, to investigate there influence on the population of macro-invertebrates within the Appomattox River. Over four weeks, a collection of four hundred individuals was collected and identified at different wave lengths of light and the temperature of the water was record. Each condition varied in the concentration of macroinvertabrates. Identifying the specific macroinvertebrates, their location, and the environmental condition at different regions of the river allowed a prediction about the pollution level within the Appomattox River. Knowing the areas where pollution appears to have a greatest effect on macroinvertebrates can identify these areas for those wishing to clean up the river.

Student(s): Thorn Raton, Virginia State University, Biology, Senior

Devin Mosley, Virginia State University, Biology, Senior

Madison Turner, Virginia State University, Biology, Senior

Mentor(s): Dr. Paul Kaseloo, Virginia State University, Department of Biology, Associate Professor

Dr. Xianfa Xie, Virginia State University, Department of Biology, Associate Professor

Dr. Sarah Witiak, Virginia State University, Department of Biology, Associate Professor

Prevalence of Salmonella on Chicken

Cineya Thomas, Tamara Harold and Kyra-Starr Gray

Virginia State University

Commercially prepared chicken was obtained from local grocery stores and tested for the presence of *Salmonella enterica*, a rod-shaped gram negative bacterium which can cause enteric fever(typhoid) and acute gastroenteritis both causing infection and abdominal pain. This bacterium is responsible for more than half of the medically diagnosed cases of food borne illnesses each year. The possibility of cross contamination during processing via the manufacturer has been questioned in previous research. Each chicken leg was swabbed on the skin front and back with a cotton swab; which was saturated with saline water prior to the swabbing for sterilization purposes. This process was repeated for three weeks to determine the prevalence of Salmonella on the surface of processed chicken skin. In the sample size of 164 pieces of chicken, results revealed that 12% of the total sample produced signs of Salmonella growth indicating that cross contamination can occur.

Student(s): Cineya Thomas, Virginia State University, Biology, Senior
Tamara Harold, Virginia State University, Biology, Senior
Kyra-Starr Gray, Virginia State University, Biology, Senior

Mentor(s): Dr. Hua Shen, Virginia State University, Department of Biology, Associate Professor

Reduction of Immature Neurons in the Amygdala of Pediatric SIV-Infection

Amanda Holmes

Howard University

Pediatric HIV infection remains a global health crisis with an estimated 1,500 children under the age of 15 years becoming infected with HIV-1 each day in the developing world. Children are much more susceptible to HIV-1 neurological impairments than adults. A major obstacle in pediatric HIV research is sample access. The proposed studies take advantage of ongoing pediatric SIV pathogenesis and vaccine studies to test the hypothesis that pediatric SIV infection reduces immature neurons in the amygdala. Newborn rhesus macaques (*Macaca mulatta*) that received oral inoculation with a repeated-exposure of SIVmac251 (n=4) or vehicle (control n=4) were recruited for this study. After a 6-18 week survival time, the animals were sacrificed and the brains prepared for quantitative histopathological analysis. We report here a significant reduction in immature neurons in the amygdala in perinatal SIV infected monkeys. We have previously reported significant loss of hippocampal pyramidal and immature neurons that may contribute to the rapid neurocognitive decline associated with pediatric HIV infection. Data presented here suggest that pediatric SIV infection may also impair amygdala functioning as indicated by the loss of immature neurons.

Student(s): Amanda Holmes, Howard University, Psychology, Senior

Mentor(s): Dr. Mark Burke, Howard University, Department of Physiology and Biophysics, Assistant Professor

Salmonella Isolation with the Use of Poultry Products

Aliya Abramson

Virginia State University

Salmonellosis is an infection caused by the bacterium Salmonella . Salmonella germs have been known to cause illness for over a century. Discovered by an American scientist, Theobald Smith, approximately 42,000 cases of Salmonellosis are reported in the United States, not including milder cases that are not reported. There are many strains of the Salmonella bacteria but the two most common forms are Salmonella serotype *Typhimunun* and Salmonella serotype *Enteritidis*. It is estimated that approximately 400 persons die each year with acute salmonellosis. Persons infected will experience, diarrhea, fever, and abdominal cramps 12-72 hours after being infected, which will usually last 4-7 days. According to the CDC, as of, August 5, 2014, 42 states confirmed Salmonella outbreaks in their state, with Virginia having 8 outbreaks. The purpose of this study is to detect whether or not there is Salmonella on the surface of chicken skin purchased locally from retail stores. As a class we compiled 164 samples over a three week period. We were instructed to each pick three different stores of our choice to buy chicken from, and as a class we tested a total of four different stores; Martins, Wal-Mart, Food Lion and Save-a-lot, testing seven different food processors: Natures Promise, Purdue, Holly Farms, Harvest Land, Save-a-lot, Crescent Foods and Young Chicken. We found 15 samples showed Salmonella growth: Natures Promise, Purdue, Holly Farms and Crescent Foods. About 3% of Holly Farms products experienced more evidence of Salmonella than any other processor. Other than Salmonella growth, we also noticed some plates turned yellow which is an indication of *E. coli*, as well as other bacteria. Since we were only testing Salmonella, we couldn't conclusively test for growth of other bacteria. Salmonella was present in 10% of the packages sampled and consumers need to be aware of this and the need for proper preparation and handling of foods to prevent infections.

Student(s): Aliya Abramson, Virginia State University, Biology, Senior

Mentor(s): Dr. Hua Shen, Virginia State University, Department of Biology, Associate Professor

Dr. Glen Harris, Virginia State University, Department of Biology, Associate Professor

Sequence and Genome Mapping of Domestic Goat *(Capra hircus)*

Jessica Lyons, Najah Vann and Cecily Vivas

Virginia State University

The domesticated goat *(Capra hircus)* is an internationally ideal species for whole genome mapping because of its adaptability to varying environments. The goat plays key roles agriculturally and economically for much of the world and especially in developing countries. With a growing industry within the United States, a comprehension of the genome may lead to a better understanding of these genes related to agriculturally important characteristics. Whole-genome mapping is used to annotate and compare genome assembly. We collected approximately 60 tissues from the goat to perform such analysis. The team consisted of a faculty sponsor, veterinarians, student directors, sample collectors, sample runners, tube runners, sample freezers, and sample runners. Tissues collected include: the brain, cardiac muscles, respiratory and gastrointestinal organs, bone marrow, etc. Gene expression differs with every tissue, so it was important to have a variety. Expressed RNA was collected from each tissue and sequenced. We used the FASTA code and BLAST to compare RNA sequences in the different tissues. FASTA is a format of text which displays amino acid or nucleotide sequences represented with single-letter codes. Basic Local Alignment Search Tool (BLAST), is a program utilized to compare primary coding information seen in DNA and proteins to determine nucleotides and amino acid sequences. Our study will provide the data necessary to distinguish possible evolutionary relationships among genes in comparison with other organisms. Breeding and genetic studies of the domesticated goat will continue to evolve as a result of this genome mapping and better understanding of its genetic basis.

Student(s): Jessica Lyons, Virginia State University, Biology, Senior
Najah Vann, Virginia State University, Biology, Senior
Cecily Vivas, Virginia State University, Biology, Senior

Mentor(s): Dr. Brian Sayre, Virginia State University, Department of Biology, Associate Professor

Sexual Selection vs. Sexual Preference

Kayla Street

Virginia State University

The first person to propose that competition for mates plays an essential role in reproductive success was Charles Darwin. He published a book entitled "The Descent of Man, and Selection in Relation to Sex" in the year of 1871. (Darwin, C. 1871. The Descent of Man and Selection in Relation to Sex. J. Murray, London.) He hypothesized that any trait that gives a male mating and fertilization advantages will evolve in a population because males with such traits will produce more offspring than their competitors. His findings can be applied to millions of species, including *Poecilia reticula*, commonly known as guppies, which is the topic of my experiment. An important evolutionary process involving natural populations with guppies is sexual selection. Mate choice is important because the differences have been proven to influence the direction and intensity of sexual selection. A male's advertisement is important to triggering a female's preference for mating. Bright colors indicate good genes. It's a direct indicator of good health and vitality. Greater areas of orange on a male guppy attract more females. Based off of the information above I developed an experiment to test the female's preference for males. I will be conducting an experiment to see that if a female guppy is given multiple different male mate options, will they still be fond of the guppy with the orange color? I will have males with orange and blue tails. I will be observing visual interactions in a timely fashion and keeping records.

Student(s): Kayla Street, Virginia State University, Biology, Senior

Mentor(s): Paul Kaseloo, Virginia State University, Department of Biology, Associate Professor

Testosterone As a Mediator of Variation in Basal Metabolic Rate and Activity in Relation to Reproductive Condition and Photoperiod in White-footed Mice *(Peromyscus leucopus)*

Stephanie McDonnel

College of William and Mary

The photoperiodic response of many temperate zone rodents, including white-footed *mice (Peromycus leucopus)*, is a heritable life-history trait with underlying physiological variation. Mice used in this experiment were male *P. leucopus* from two wild-derived bidirectional selection lines: a short photoperiod responsive (R) line, artificially selected for reproductive suppression in short-day conditions (SD), and a nonresponsive (NR) line selected for reproductive maturity in SD. Previously, male R SD mice were found to differ in metabolic rate from male NR SD mice in having greater food intake and basal metabolic rate (BMR). We hypothesized that testosterone may be a key mediator of this metabolic difference, as it is likely to be significantly reduced in R SD mice. Male *P. leucopus* from either line in SD were castrated and given either an implant containing testosterone (T) or an empty control (C). They were then tested for variation in metabolic rate in SD conditions. Preliminary results showed a significant different between T mice and C mice in food intake and seminal vesicle mass, indicating an effect of T. In a preliminary analysis, there was no significant difference among treatment groups in BMR, implying that differences in testosterone are not the cause of differences in metabolic rate between selection lines. Further analysis will provide more information on the effect of testosterone on the metabolic activity of these mice.

Student(s): Stephanie McDonnel, College of William and Mary, Biology, Senior

Mentor(s): Dr. Paul Kaseloo, Virginia State University, Department of Biology, Associate Professor,

Dr. Paul Heidelman, College of William and Mary, Boles-Ash Distinguish Professor

The Impact of Fluoridated Water Pollution on the Development of Pre-metamorphic *Rana catesbeiana*

Jennifer Bailey and Rebecca Hopkins

Norfolk State University

Fluoride is essential to prevent tooth decay but is a pollutant to marine organisms in our nation's waterways. Sodium fluoride is a compound used in toothpaste and mouthwash for the prevention of cavities by stopping and reversing the tooth decay process while strengthening the tooth enamel. The Environmental Protection Agency determined the Maximum Contaminant Level Goal for fluoride in drinking water to be 4.0mg/L, a level that poses no adverse health risk. The EPA determined a secondary standard for fluoride being 2.0 mg/L, a level approved for children's drinking water with no adverse cosmetic and aesthetic effects. The City of Norfolk has a fluoride concentration of 0.7 mg/L mandated by the state of Virginia. This study examines the effects of sodium fluoride on Rana catesbeiana as an endocrine disruptor. American bullfrog pre-metamorphic tadpoles were placed in fluoride polluted aquatic environments containing 26 liters of deionized water with 0.7mg/L and 2.0 mg/L sodium fluoride pollutant and unpolluted aquatic environment control. The tadpoles were exposed to the sodium fluoride pollutant daily for 4 weeks of bioaccumulation. They were observed daily for the onset of metamorphosis. The mortality rate for both experimental tanks was 100%. This exposure resulted in the tadpoles exhibiting an environmental adaptation, living longer than those exposed to less sodium fluoride. The control tank exhibited no mortality. This investigation demonstrated tadpoles exposed to 0.7mg/L and 2.0mg/L had an absence of hind and forelimb development compared to the control tank, which exhibited 100% hind limb development.

Student(s): Jennifer Bailey, Norfolk State University, Biology, Junior

Rebecca Hopkins, Norfolk State University, Biology, Junior

Mentor(s): Mrs. Maureen Scott, Norfolk State University, Department of Biology, Instructor

The Impact of the Environmental Pollutants Perfluorooctane Sulfonate (PFOS) and Sodium Fluoride on Aquatic Organisms

Herbert Smith and Desiree Dubose

Norfolk State University

Overexposure to pollutants can cause serious health and environmental issues. A pathway for overexposure to pollutants is through the waterways such as lakes, rivers, and drinking water. This study evaluated bioaccumulation of the persistent organic pollutant known as perfluorooctane sulfonate (PFOS) and the pollutant sodium fluoride to determine if either have a detrimental effect when introduced into the environment at the standard recommended values of 0.40 µg/L for PFOS and 2.0 mg/L for sodium fluoride set by the Environmental Protection Agency for drinking water. PFOS and sodium fluoride were tested on pre-metamorphic *Rana catesbieana* tadpoles. Ten tadpoles each were placed in 4 separate, labeled 26 liter tanks that were filled with deionized water. One tank was a control, one had PFOS exposure, another had NaF exposure, and the last tank had a combination of both pollutants. The tadpoles were exposed to 96 hours of bioaccumulation and observed for 6 weeks. The mortality rates for the PFOS and PFOS/NaF tanks were 50% and NaF was 60%. There were tadpoles in the NaF tank that had bleeding gut coils and deformities not found in the other tanks. The development of the tadpoles in the control tank was continuous and metamorphosis occurred whereas metamorphosis was hindered in the treated tanks. This study demonstrates that these pollutants adversely affect the development and vitality of aquatic environments. Future work will include blood concentration analysis, histological analysis, and different pollutant values.

Student(s): Herbert Smith, Norfolk State University, Biology, Senior
Desiree Dubose, Norfolk State University, Biology, Junior

Mentor(s): Maureen Scott, Norfolk State University, Department of Biology, Instructor

The Prevalence of Salmonella on Raw Chicken Skin

Angelique Davis and Tristan France

Virginia State University

Salmonella is a gram negative bacterium that adheres to the surface of chicken skin. The first stage is when the Salmonella binds to the water layer on the surface of the chicken skin and meat. The bacteria form a biofilm layer in the second stage of attachment, which makes it difficult to get rid of or to kill the bacteria. All the materials used during this experiment were sterilized. A cotton swab dipped in saline solution was used to collect the chicken skin sample and was streaked on the medium XLD plate. A total of 36 plates were streaked for collection and the samples were incubated at 37˚C. They were checked after three days and observations and results were recorded. Out of 164 samples, 15 tested positive for Salmonella. The samples consisted of 7 producers which were: Perdue, Crescent Foods, Harvest Land, Young Chicken, Holly Farms, Natures Promise, and Save-a Lot. Overall 9.146% of the chicken samples tested positive for Salmonella-like colonies. Different percentages were found from each producer. These results indicate that stricter precautions should be taken to protect the human population from this serious food borne illness.

Student(s): Angelique Davis, Virginia State University, Biology, Senior

Tristan France, Virginia State University, Biology, Senior

Mentor(s): Dr. Hua Shen, Virginia State University, Department of Biology, Associate Professor

The Prevalence of Salmonella on Chicken from Different Processors

Madison Cook and Bria Darrisaw

Virginia State University

In this investigation processed chicken legs were isolated to detect if salmonella was present on any of the samples. These chicken legs were bought from several different processors to determine the prevalence of salmonella on the chicken from any of these vendors. Swabbing the chicken was a three week trial process. Samples from the chicken were plated on an XLD medium to indicate growth of salmonella (Xylose lysine deoxycholate). Salmonella was most present on chicken legs form the processor Holy Farms. 8.2 CFU/cm^2 of Salmonella was present on chicken legs belonging to Holly Farms processor. Out of 164 samples, 94 of them came from Holly Farms. The significance of this researched can be drawn from the fact that the Salmonella based illness, Salmonellosis, still is a relevant in the health of humans. The better we understand the bacteria and how poultry is processed; we can create more preventive procedures that can lessen contamination of the processed poultry.

Student(s): Madison Cook, Virginia State University, Biology, Senior

Bria Darrisaw, Virginia State University, Biology, Senior

Mentor(s): Dr. Hua Shen, Virginia State University, Department of Biology, Associate Professor

Uncovering PKCα's Role in Alzheimer's Disease

Kevin White

Howard University

Amyloid Beta (Aβ) plays a key factor in Alzheimer's disease through the synaptic depression of neurons. Aβ can drive AMPA receptor subunit GluA2 endocytosis but the mechanism is not yet understood. Here we find that Aβ promotes PKCα phosphorylation of GluA2 that results in GluA2 surface removal. Using PKC α knockout mice cultured brain slices and whole-cell recordings, we expected to see no synaptic depression when Aβ is overexpressed. Our experiment will be executed in three parts: Induce long-term depression (LTD) in a wild type brain slice and record, Induce LTD in a PKC α knockout brain slice, and Induce LTD in a brain slice where PKC α has been reintroduced. Using whole-cell recording, some preliminary data was gathered. When LTD is induced in a wild type brain slice, a 24 percent reduction is seen in the AMPA current response. Future goals would be to continue this experiment with PKC α knockout brain slices and PKC α knockout slices with PKC α reintroduced. If PKC α's role in Amyloid Beta induced synaptic depression could be illuminated, this could serve as a good start for reversing synaptic depression and ameliorating some of the symptoms seen in Alzheimer's disease.

Student(s): Kevin White, Howard University, Biology, Junior

Stephanie Alfonso, University of California San Diego, Department of Neuroscience, Graduate Student

Mentor(s): Dr. Roberto Malinow, University of California San Diego, Department of Neuroscience, Professor

CHEMISTRY

Antimicrobial Activity of Silver-Silica-Doped Titania Nanocomposite Thin Films Prepared by Sol-Gel Approach

Brianna Griffin

Virginia State University

The aim of this project was to evaluate the antimicrobial effect of bioactive hybrid nanocomposite (Ag-SiO_2- TiO_2) thin films. The goal is to develop new nanomaterials with improved antibacterial properties for possible applications as inexpensive food packaging or coating for medical devices. The four metal/metal oxide-based films SOLA-BG, SOLB-BG, SOLS-BG and SOLS-ML were prepared by the sol-gel method. The thin films were characterized by Fourier transform infrared spectroscopy (FT-IR), and Ultra Violet-Visible (UV-Vis) techniques. The antibacterial effect of the thin films on *Salmonella enteritidis* (ATCC 13076) and *Staphylococcus aureus* (a lab isolate from human hand) was then investigated. Antibacterial effects were observed for three of the four nanocomposites SOLA-BG, SOLB-BG, and SOLS-ML, as zone of inhibition in tryptic soy agar (TSA) plate. In addition, growth inhibition to the two bacteria differs; all three films showed a clearer zone of inhibition on *Staphylococcus aureus* than *Salmonella enterotidis*. According to the results of this study, some of the thin films could be considered as good candidates for the development of antibacterial biodegradable and photocatalytic nanocomposites. Such bioactive and relatively cost-effective nanomaterials have the potential to address some major challenges of food safety, food security and environmental risks/impact.

Student(s): Brianna Griffin, Virginia State University, Chemistry, Senior

Mentor(s): Hua Shen, Virginia State University, Departments of Biology, Associate Professor

Godwin O. Mbagwu, Virginia State University, Departments of Chemistry, Professor

Daniel Stoelting, Virginia State University, Departments of Chemistry, Assistant Professor

Fabrication of Titania-based Nanocomposites with Potential Antimicrobial Properties

Kathryn Day and Lakisha Duckett

Virginia State University

The search for cost-effective, specific, and sensitive biosensors with electrochemical, or opto-electronic properties is the main focus of this project. Such technology could potentially have clinical applications in the diagnosis of fatal human diseases such as cancer or bio-warfare and/or food-borne pathogens e.g. E. coli and salmonella. Our objectives are to (1) develop simpler methods for the fabrication of nanocomposite thin films by modifying the classic sol-gel method and (2) characterize these thin films using Infra-red (IR) and Ultraviolet –Visible (UV-Vis) spectroscopy. These light responsive two and three-component nanocomposite thin films (NTFs) are titania-based doped with silica and/or gold nanoparticles on glass substrate. Antimicrobial properties against Salmonella, Staphylococcus, and E. coli of these thin films will be exploited.

Student(s): Kathryn Day, Virginia State University, Chemistry, Senior

Lakisa Duckett, Virginia State University, Chemistry, Senior

Mentor(s): Dr. Grace Ndip, Virginia State University, Department of Chemistry and Physics, Chair/Associate Professor

Dr. Hua Shen, Virginia State University, Department of Biology, Associate Professor

Ligand and Symmetry Effects on Magnetic Susceptibility: Comparison of High Spin Distorted Tetrahedral Complexes

Lakisa Duckett

Virginia State University

2,9-dimethyl-1,10-phenanthroline di–X cobalt (II) complexes of the type $[Co(DMP)(X)_2]^{2+}$ (X is Cl^-, Br^-, I^-, SCN^-) were synthesized according to a literature procedure. Similar complexes were synthesized using 6,6'-dimethyl-2,2'-dipyridal, DMDPy, in place of DMP. The use of the ligand series Cl^-, Br^-, I^-, SCN^- produces a systematic change in the energies of the d-orbital splitting which manifests in slightly different colors of the spectrochemical series. The replacement of DMDPy with DMP produces a slightly less distorted complex and a ligand with different pi bonding characteristics. The complexes synthesized are high-spin tetrahedral complexes with two unpaired electrons in the highest occupied molecular orbital. These complexes were characterized using the magnetic susceptibility balance. The purpose of using the balance was to be able to measure the magnetic moment that occurs when the sample is placed in the instrument. The unpaired electrons are attracted into or repelled out of the magnetic field generated by the electromagnets in the instrument. The expected result is that the magnetic moment will be the same since there will be the same number of unpaired electrons in both complexes regardless of the environment based solely on the crystal field theory. The alternative hypothesis, based on ligand field theory, suggests there may be interactions with the metal by the bound ligand characteristics. Further characterization is presented using UV-Vis and IR spectroscopies.

Student(s): Lakisa Duckett, Virginia State University, Chemistry, Senior

Mentor(s): Dr. Colleen Taylor, Virginia State University, Department of Chemistry, Professor

Vibrational Spectroscopy - Effect of Fatty Acids and Polyphenols in Coconut Oil on Cell Cultures

Niesha Paul, Fatima Baro and Brandon Redd

Virginia State University

Vibrational spectroscopy is a unique analytical technique used to measure vibrational energy levels and interactions associated with a chemical bond in a sample. The two main instruments utilized in the vibrational spectroscopy experiment are Infrared (IR) and Raman spectroscopy. Both Infrared (IR) and Raman spectroscopy are non–destructive, non–invasive tools that provide information about the molecular composition, structure elucidation, reaction monitoring, quality control, quality assurance, and interactions within a sample. The main objective of this study was to investigate the quality characteristics of coconut oil based on its chemical fatty acid composition. It will also determine the effect on a typical cell culture using vibration spectroscopy. This experiment was carried out through tracking certain molecules affected in the cell culture by measuring the vibration with a laser. Over the years coconut oil has been known for its richness and high proportion of short and medium chain fatty acids triglycerides (MCT), and medicinal properties. This study mainly focused on the activity of the chemical compounds present in coconut oil: lauric acid, monolaurin, myristic acid, butyric acid, and polyphenols. These compounds individually are potentially useful in combatting diseases. The spectra of cells and nuclei from cultures in the petri dish were measured and showed that Raman spectroscopy can monitor changes.

Student(s): Niesha Paul, Virginia State University, Chemistry, Senior
Fatima Baro, Virginia State University, Chemistry, Senior
Brandon Redd, Virginia State University, Chemistry, Senior

Mentor(s): Dr. Colleen Taylor, Virginia State University, Department of Chemistry, Professor

COMPUTER SCIENCE

Securing Big Data

Sean Gray

Bowie State University

Data is a natural part of our lives. Scientists use data to prove or disprove a hypothesis, advertising firms use polling data to make a certain product appealing to a particular populace, and insurance agents use client data to appeal to the interest of the client. Technology is swiftly advancing, and as such, the concept of big data is now a concern. How stable can such large and multi-structured data set be? What new security issues arise with the concept of big data? What can be accomplished with big data?

"This torrent of new data offers an opportunity to gain unprecedented insight and quickly test new ideas." (Oracle, 2014) Data is categorized as unstructured and structured. Data that is unorganized or difficult to be interpreted by traditional databases or data models is classified as unstructured; whereas, data that can be arranged in a variety of formats which can be obtained from the interaction between people and technology is defined as structured. As the size of data increases, the data encryption algorithms must be improved to handle the multi-structured varieties, real-time velocities, and data that reaches into petabytes in size. The goal of this research is to determine an encryption algorithm that will properly secure big data.

Student(s): Sean Gray, Bowie State University, Computer, Senior

Mentor(s): Dr. Daryl B. Stone, Bowie State University

Self-Efficacy Study on Generation Innovations Computer Camp

Alexia Crumpton

Bowie State University

In this presentation, we describe our experience running Generation Innovation, a camp for middle and high school students. For five summers we have hosted Generation Innovation with the primary goal of exposing students to the breadth of topics in computer science. Most computer camps focus on one topic for the duration of the program. During our camp, we engage students in activities related to multiple computer science topics, such as robotics, mobile applications, and HTML. Nearly 200 middle and high school students, 97% of whom are African American, have participated in our program. In this presentation we describe Generation Innovation activities and the evaluation of the program. Post-camp surveys revealed that participation in Generation Innovation leads campers to better understand the breadth of opportunities available in the computer science discipline.

Student(s): Alexia Crumpton, Bowie State University, Computer Science, Senior

Mentor(s): Dr. Daryl B. Stone, Bowie State University

Dr. Quincy Brown, Bowie State University

ENGINEERING & TECHNOLOGY

3D Printing of Wheel Holders – Thermomechanical Design

Christopher Norfleet, Aaron J. Clark and Nathan R. Carrington

Virginia State University

Planets such as Mars contain a wealth of valuable resources - resources that over time will be needed here on Earth. But taping into Mar's natural minerals and transporting those recourses back here to Earth will be tremendously difficult and extremely costly. The resulting solution is to mine them onsite and begin the terraforming process. Our solution to this problem is the development of an interplanetary mining robot. The use of robotic mining equipment is that next step into the future, a safe and effective way to expand our resources, advancement and the first step in planetary colonization. As a part of the mining robot project, the wheel system design is very critical in effectively driving the robot in the dust surface of Mars. In this project, a wheel holder is designed using a PLM NX CAD. This holder is used to connect a wheel to a motor. Due to thermal expansion during cooling, thermomechanical analysis is applied to design the diameter of the holder. The holder diameter does not fit the motor axle without considering thermal expansion. A 3D printer is used to make the wheel holder. It is expected that the results will be useful in manufacturing plastic parts with the 3D printer.

Student(s): Chris Norfleet, Virginia State University, Computer Engineering, Senior

Aaron Clark, Virginia State University, Computer Engineering, Senior

Nathan R. Carrington, Virginia State University, Computer Engineering, Senior

Mentor(s): Dr. Jimnyun Jo, Virginia State University, Department of Technology, Assistant Professor

Deformation Behavior of Fibers

James Finnie and Janaya E. Perry

Virginia State University

Advanced manufacturing technologies have provided new types of polymer fibers. However, these fibers could show different or new mechanical behaviors in comparison with what would be expected to be found; in particular, bilinear behavior. The objective of this research is to investigate load-displacement behavior of polymer fibers that displays nonlinearity. Using an Intron testing machine, three different types of fibers are tensile-tested to obtain load versus displacement curves. Due to the inherent characteristics of fibers, Instron specimen grips were used to reduce stress concentration during the testing. The Instron Excel data file is used for data analysis because it provides greater details of data. Load versus displacement plots are extracted from the Excel data. The plots of the three types are compared and analyzed statistically. The material characteristics of the fibers are examined at the displacement exhibiting the bi-linear behaviors. The plots show bi-linear behaviors around the first one third of the curves. The research results could be used to help to improve physical properties and/or chemical properties of the future fibers.

Student(s): James Finnie, Virginia State University, Computer Engineering, Junior

Janaya E. Perry, Virginia State University, Computer Engineering, Junior

Mentor(s): Dr. Nasser Ghariban, Virginia State University, Department of Engineering, Associate Professor/Chair

Dr. Jinmyun Jo, Virginia State University, Department of Engineering, Assistant Professor

Digital Design Manufacturing and Process Monitoring for Impeller Fabrication

Marthony Hobgood

Virginia State University

Impellers are advanced mechanical products used in turbo-machineries. An impeller consists of numbers of similar blades revolving at 360 degrees onto a hub surface. The blades consist of a suction surface, a pressure surface, a leading edge, a trailing edge and a shroud surface. Each of the blades is a ruled surface and twisted from the leading edge to the trailing edge. Due to the design complexity of impellers, a promising solution to fabricate impellers is to integrate product design and manufacturing using product life management (PLM) software together with 2-axis lathe/5-axis CNC machining. A 5-axis machine has the flexibility of tool orientations that is a necessary to machine the area between the twisted blades. The 2-axis CNC lathe machine, which is limited to only z and x-axis movement, lacks the capability to completely manufacture the piece. A 5-axis machine alone is more than capable to produce a high quality impeller, but suffers from inefficient machining time issues. Generally, 5-axis machines are capable of control and instruct all the axis of the cutter location (CL) simultaneously, which results for longer machining time and slower cutting speed. However, 2-axis lathe machining can efficiently remove the unwanted material form an impeller's cylindrical bar stock. The objective of this study is to investigate designing the impeller, and then manufacturing the impeller with 2-Axis Lathe and 5-Axis CNC machines, also an inspection system will be developed to monitor the power consumption and vibration during the manufacturing process.

Student(s): Marthony Hobgood, Virginia State University, Manufacturing Engineering, Sophomore

Mentor(s): Dr. Zhenhua Wu, Virginia State University, Department of Engineering, Assistant Professor

Effects of Preheating on the Friction Stir Welding Process

Andwele Grant and Destiny Chavis

Virginia State University

The objective of this study was to explore the effects of preheating on the friction stir welding (FSW) process. Soft metals are commonly joined using the FSW process, but because of inefficient tool life, harder materials like steel are not. Researchers hypothesized that preheating the specimen would lead to a decrease in yield strength ahead of the tool, thus leading to an increase in tool life and range of materials able to be welded. Two friction stir welds were conducted using aluminum, one preheated using an industrial heating pad and insulators to prevent heat transfer into test bed and one not. Thermocouples were placed at and upstream of the start point of the weld at the same distance from the weld center line in tandem with an IR imager to capture thermal data. Results showed an increase in initial temperature and size of heat affected zone in front of the tool in comparison to the non-insulated weld. Future experiments will explore the relationship between preheating and residual stress while also quantifying the amount of tool wear through precise measurement.

Student(s): Andwele Grant, Virginia State University, Mechanical Engineering Technology, Senior

Destiny Chavis, Virginia State University, Mechanical Engineering Technology, Junior

Mentor(s): Dr. Jinmyun Jo, Virginia State University, Department of Engineering, Assistant Professor

Examination of the Relationship between Effective Dose and Risk of Exposure Induced Death due to Space Radiation

Roslyn Jones

Virginia State University

Astronaut safety is a crucial factor in space travel. There are many factors that must be taken into consideration when sending humans into space. Among these factors is radiation from Galactic Cosmic Rays (GCRs) and Solar Particle Events (SPEs) in space. NASA has set the astronaut REID limit to 3% and that it must be assured at a 95% Confidence level. The mathematical correlation between REID and effective dose will enable OLTARIS users to more accurately estimate REID, which will help better determine the protection provided by various materials and shield configurations. There are two webservers that NASA has created that could help determine whether it is safe for an astronaut to travel in space, the NASA Space Cancer Radiation (NSCR) Webserver and the On-Line Tool for the Assessment of Radiation in Space (OLTARIS). The NSCR Webserver calculates risk of exposure induced death (REID) and effective dose; however, material choice and vehicular geometry are limited. OLTARIS calculates the effective dose using user specific dimensions for vehicle geometry and composition of materials; however, it does not calculate REID. The objective of the previous project was to establish a mathematical correlation between REID and Effective Dose Equivalent.

Student(s): Roslyn Jones, Virginia State University, Computer Engineering, Junior

Mentor(s): Dr. Sheila A. Thibeault, NASA Langley Research Center

Dr. Ali Ansari, Virginia State University, Department of Engineering, Professor

Extent of Dopant Activation after Microwave and Rapid Thermal Anneals Using Similar Heating Profiles

Taliya Gunawansa

Norfolk State University

Many sustainability issues arise with the current manufacturing processes used for semiconductor-based solar cells. Microwave (MW) heating could be adopted as sustainable since its capital costs are less and it more efficient than conventional furnace systems. This study compares the extent of dopant activation and damage repair for MW annealed and conventional rapid thermal annealed (RTA) samples with identical heating profiles. Sheet resistance measurements assess the extent of dopant activation and ion channeling monitored the extent of damage repair. Rutherford backscattering spectrometry (RBS) measured the extent of recrystallization of after each anneal. MW's saturation point for the dopant activation was 50 seconds, measured with a four point probe. It can be concluded that higher the dose and time of arsenic in the silicon, the smaller the difference in the sheet resistance between the RTA and microwave annealing. MW Hall measurements showed 1×10^{15} ions cm^{-2} 100s sample had a higher carrier concentration than 2×10^{15} ions cm^{-2} 50s sample. All 50s doses for the RTA samples had inconclusive sheet resistances due to not reaching the saturation point. Ion channeling showed that the MW anneals gave better dopant activation and damage repair for short times for identical heating profiles. Optimizing and modeling the microwave induced dopant activation heating process would aid in obtaining further results.

Student(s): Taliya Gunawansa, Norfolk State University, Optical Engineering, Junior

Mentor(s): Dr. Terry Alford, Arizona State University, School of Matter, Transport, and Energy, Professor

Zhao Zhao, Arizona State University, School of Matter, Transport, and Energy, PhD Student

Dr. Aprilya Lanz, Norfolk State University, Associate Professor

New Methods of Surface Measurement

Danielle Bryan and Raquel Ballard

Virginia State University

There are a variety of techniques available to measure surface roughness in stationary situations. Some of these techniques include using measurement tools that includes stylus, optical, pneumatic, electrical, laser, and ultrasonic sensors. Surface roughness and finish is ultimately essential to understanding of how a particular surface interacts with a certain criteria such as environment. In this experiment a sensor is designed to measure pressure variations for surface finish. In process, surface roughness measurement is stimulating and of all the techniques examined: pneumatic, laser scattering, electrical, and ultrasonic can potentially be used for surface roughness measuring in sampling in a turning machine. However, the pneumatic system was chosen as a method for measuring because it was the best method for the conditions in a turning environment and allows access to multiple surfaces planes. The proposed research will focus on developing a pneumatic sensor to gage the surface roughness during machining process by design and fabrication. The sensor will be used to measure roughness during different conditions to measure sensitivity and repeatability of measured roughness. Ultimately the research project is will make improvements to the sensor by focusing on how fast and close can the sensor be for position as well as experimenting with other parameters and analyzing the results.

Student(s): Danielle Bryan, Virginia State University, Manufacturing Engineering, Junior

Raquel Ballard, Virginia State University, Manufacturing Engineering, Junior

Mentor(s): Dr. Nassir Ghariban, Virginia State University, Department of Engineering, Chair/Associate Professor

The Quad Copter & Lift Force

Kelvin Parker, Wardell Dildy and Abdullah Baras

Virginia State University

A Quadcopter has four propellers that are powered by a motor. The movement of this rotary craft is controlled by manipulating one or more of these propellers at a time. Lift Force is the component of force that is perpendicular to the oncoming flow direction of air or a liquid. The numerical simulations of quadcopter (ARF F450) manipulation are studied. Experiment is also applied to find lift forces and quadcopter parameters such as moment of inertia and mass. The numerical results will demonstrate how fast to manipulate the studied quadcopter.

Student(s): Kelvin Parker, Virginia State University, Mechanical Engineering Technology, Senior

Wardell Dildy, Virginia State University, Mechanical Engineering Technology, Senior

Abdullah Baras, Virginia State University, Mechanical Engineering Technology, Senior

Mentor(s): Dr. Thongchai Phairoh, Virginia State University, Department of Technology, Assistant Professor

VSU Formula SAE Race Car

Raymond Crowder, III

Virginia State University

The concept behind Formula SAE is that a fictional manufacturing company has contracted a design team to develop a small Formula-style race car. The prototype race car is to be evaluated for its potential as a production item. The target marketing group for the race car is the non-professional weekend autocross racer. The purpose of the project is for each student's team to design and build a race car. The students will then perform tests on the prototype based on a series of rules whose purpose is both to ensure onsite event operations and promote problem solving. The competition gives students an opportunity to apply skills learned in class to an actual engineering project. The current VSU car is approximately 40% complete. The vehicle has a frame and wheels installed on custom hubs. The engine is mounted to the frame. Last semester students designed and partially fabricated custom differential, suspension, and impact attenuation systems. This semester the students will install several systems to complete the project. Successful completion of the Formula SAE competition will enable future VSU FSAE teams to secure sponsorship from local industry members.

Student(s): Raymond Crowder, III, Virginia State University, Mechanical Engineering Technology, Senior

Mentor(s): Mr. Joe Dollete, Virginia State University, Department of Technology, Instructor

MATHEMATICS

Analyzing the Linear Relationship between Tenacity, Denier, and Modulus

Sharnice Vaughan

Virginia State University

The Department of Mathematics and Economics has collaborated with Honeywell Incorporated to analyze the dependence of single fiber modulus, denier on its tenacity. Experimental data from Honeywell Labs for 39 groups for single filament and its corresponding bundle groups were given randomly out of 500 samples. We use correlation coefficient to understand the effect of average single fiber modulus or average single fiber denier. Calculations are performed for the bundle as well.

Student(s): Sharnice Vaughan, Virginia State University, Computer Science, Senior

Mentor(s): Krishan Agrawal, Virginia State University, Department of Mathematics, Professor

Lorenz Model & Its Application

Ebony Albritton

Virginia State University

Edward Lorenz proposed three nonlinear differential equations to study weather patterns. The purpose of this work is to study these three non-linear differential equations using MATLAB software and understand the chaotic nature of solutions. The emergence of the chaotic behavior is due to the fact that the solutions are very sensitive to the values of the parameters and the initial conditions.

Student(s): Ebony Albritton, Virginia State University, Computer Science, Senior

Mentor(s): Krishan Agrawal, Virginia State University, Department of Mathematics, Professor

Quantifying the Performance of Spatial and Temporal Early Warning Signals of Disease Elimination

Dominic Gray

Norfolk State University

Early warning signals of disease emergence and elimination seek to forecast changes of state in infectious disease system. Most such signals are a result of "critical slowing down" and other universal patterns near bifurcations. Most work to date has focused on temporal early warning signals, which are known to be statistically inefficient and discard information contained in the spatial pattern of cases. We sought to quantify the performance of spatial indicators and compare them to temporal indicators by simulating a spatial SIR compartmental model with vaccine induced immunity over a spatially homogenous environment. We found that spatial indicators greatly outperform their temporal counterparts, suggesting that additional gains in statistical efficiency could be achieved by adopting these newer methods.

Student(s): Dominic Gray, Norfolk state University, Applied Mathematics, Sophomore

Mentor(s): Dr. John Drake, University of Georgia, Odum School of Ecology, Associate Professor

PSYCHOLOGY

Effects of Parent-Child Communication on Substance Use in African American Youth

Lexus Lang, Xavier Walker and Christina Denslinger

Virginia State University

The purpose of this study was to identify quantifiable characteristics of parent-child communication in order to examine this communication and family cohesion using quantitative and qualitative methods. It was hypothesized that parent-child communication plays a prominent role in the onset of youth substance use, and higher family cohesion and communication and stronger parental relationships leading to lower substance use or absence of substance use initiation. Additionally, youth were hypothesized to be more open with their drug use disclosures in qualitative methods than quantitative ones. The quantitative sample (N = 111) ranged in age from 12-47 and was primarily African American (69.1%). Participants (N = 111) completed the Youth Risk Behavior Surveillance System (YRBSS), Family Adaption and Cohesion Scale (FACES-IV), and Parent-Child Relationship Inventory (PRCRI). The qualitative sample was comprised of focus groups containing eight African American adolescents ages 16-17 and another focus group containing nine adults ages 30-47. Qualitative participants were asked modified questions from the YRBSS. As hypothesized, greater family cohesion and stronger family communication resulted in significantly less substance use and decreased the probability of youth substance use. Although parents reported talking to their children about drugs, all youth participants indicated that parents did not discuss substance use beyond the warning to not do drugs. As hypothesized, youth participants in the focus groups were more forthcoming with their drug use (87.5% versus 67.6% in the quantitative sample). Communication and family cohesion can help insulate against youth substance use, and parent-child communication about drug use may need greater depth.

Student(s): Lexus Lang, Virginia State University, Psychology, Junior

Xavier Walker, Virginia State University, Psychology, Senior

Christina Denslinger, Virginia State University, Psychology, Graduate Student

Mentor(s): Dr. Kimberly Boyd, Virginia State University, Department of Psychology, Associate Professor

History of Parental Drug Use and the Likelihood of Crack/Cocaine use in a Baltimore City Sample of Drug Users

Bria Clark and Gwenna Blanden

Virginia State University

As an individual uses an illicit drug, it is posited to have a direct negative affect on everyone in the household. If children are present, parents may pass on their drug use behavior to the child through modeling. The purpose of this study was to explore the association between parental drug use and subsequent crack/cocaine use in a community based sample of substance users in Baltimore, Maryland. This subsample was a part of the NEURO-Studies designed to examine psychosocial and behavioral HIV risk factors in drug users in Baltimore, Maryland. The current study included 425 (62% women; 232 Black) participants with a mean age of 33.75 (SD =8.72). Participants were split into four groups: neither parent used drugs (n = 252), mother only use drugs (n = 20), father only used drugs (n = 20), or both parents used drugs (n = 83). Authors excluded the mother only group, due to low prevalence. After adjusting for demographic covariates, participants who were Black and both their parents used drugs were less likely to use crack in the past month (0.30; CI = .09, .94) and during their lifetime (0.21; CI = .07, .63). We found that participants who were of Black and reported that both parents used drugs were less likely to use crack/cocaine. Drugs have always been a problem in the community and finding the characteristics on how drugs impact the next generations are important. Implications for potential family based interventions for current substance users are discussed.

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Perceived Classroom Structures and the Effects on Students' Mental, Physical, and Social Behavior

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The purpose of this study was to examine the relational correlations between classroom structures and different aspects of classroom behavior in African American high school students. There were three types of classroom structures; Mastery, Performance - Approach, and Performance - Avoidance (Shim, Cho and Cassady, 2013) Previous studies have shown that classrooms that are perceived to have a Mastery focused structure are usually associated with higher levels of academic success and positive classroom behaviors (Gutman, 2006). It was hypothesized that this study would have similar results. This study focused on African American high school students. The participants included in this study were recruited during a Virginia State University sponsored HBCU-Up Summer Program. The population included 184 African American students who were currently in high school (60% female), ranging from freshmen to seniors. After signing a letter of consent, the students were asked to complete a Patterns of Adaptive Learning Scales (PALS) survey (Midgely, Kaplan, Middleton, Urdan, Maehr, Hicks, Anderman, & Roeser, 1998). The computer based survey was facilitated by student interns on the Virginia State University campus. A Pearson r correlation was ran to analyze the relationships between the different classroom structures, classroom behaviors, and academic success. The results showed that the Mastery classroom approach correlated positively with Academic Efficacy ($r(183) = .297$,$p = .000$) and negatively with other maladaptive classroom behaviors. The Performance - Approach classroom structure correlated negatively with the student's overall sense of Skepticism ($r(184) = -.182$, $p = .014$). Lastly, the Performance - Avoidance classroom structure correlated positively with several maladaptive classroom behaviors. However, none of the classroom structures directly correlated significantly with Academic Success. Plans for future research and intervention are discussed

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The Ability of Eating Habits to Predict Cardiovascular Reactivity to Stress

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Since cardiovascular disease is the second leading cause of death in the United States, the present study examined the ability of eating habits to predict cardiovascular activity. This study is specifically important for African American students as they have a predisposition to increased blood pressure and heart rate. It was hypothesized that poor eating habits would be associated with greater cardiovascular reactivity to stress. Specifically, participants with negative eating habits would have higher heart rates and systolic and diastolic blood pressures. Sixty-nine African American college students between the ages of 18-30 participated in the study. A Hypertension Diagnostic Cardiovascular Profiling Instrument was used to measure heart rate and blood pressure as the participants viewed a racially noxious scene on digital video disc. The Eating Style Profile questionnaire was used to measure seven eating styles. The questionnaire consisted of 42 questions assessing Emotional Eating, Fresh Food vs. Fast Food, Food Fretting, Task Snacking, Sensory, Spiritual Nourishment, and Eating Atmosphere and Social Faire. A Multiple Regression Analysis revealed that Emotional Eating significantly predicted heart rate during the pre-stressor (Beta = -.294, t (1, 68) = 2.57, p = .012), stressor (Beta = -.317, t (1, 68) = 2.81, p = .006), and recovery (Beta = -.241, t (1, 68) = .241, p = .044) periods. This finding may be attributed to the association of emotional eating with unhealthy food choices which leads to high heart rates. The circumstances around the consumption of food contribute to health outcomes. This research is important for young college students as they face unhealthy food choices every day.

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The Ability of Perceived Stress and Math Anxiety to Predict Cardiovascular Reactivity to a Math Test

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According to Ascraft (2002), individuals with high levels of math anxiety become apprehensive completely. The purpose of the present study was to examine the ability of perceived stress and math anxiety to predict cardiovascular reactivity to a math test. It was hypothesized that math anxiety would be a significant predictor of cardiovascular activity. It was also hypothesized that perceived stress would be a significant predictor of cardiovascular activity. Lastly, it was hypothesized that the math anxiety-perceived stress model would be the best predictor of cardiovascular activity. Thirty African American college students (7 males and 23 females) between the ages of 18-30 participated in the study. A Hypertension Diagnostic Pulsewave CR 2000 cardiovascular profiling instrument was used to measure heart rate, systolic blood pressure, and diastolic blood pressure. These measures were taken as the participants performed a math test. Math anxiety significantly predicted systolic blood pressure during the stressor period, Beta = -.403, $t(2, 24) = 2.09$, $p = .047$. The math anxiety-perceived stress model significantly predicted systolic blood pressure during the stressor period, $R^2 = .23$, $F(2, 24) = 3.49$, $p = .047$. It appears that math anxiety is as detrimental as other stressors and can lead to increased cardiovascular functioning during a math test.

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The Association between Depression, Mindfulness, and Alcohol Use in VSU Students: A Preliminary Study

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The misuse of alcohol is a high-risk behavior among college students. Alcoholism is associated with overall depression and depressive symptomatology. However, very few studies have examined the role of mindfulness with regard to the relationship between depressive symptoms and alcohol use. The purpose of the current study is to explore the association between depressive symptomology and alcohol use among VSU undergraduate students. The data used in this study are part of the ongoing parent study entitled, "Psychosocial Determinant of Substance Abuse in African American College Students". To date, the study includes 40 participants (33 women) with a mean age of 21.32 (SD = 4.21). After the informed consent was obtained, participants took approximately 30-45 minutes to complete a computerized survey including depressive symptomatology, mindfulness and alcohol use. There is no association between depression scores and alcohol. However, mindfulness was inversely associated with lifetime alcohol use (rho = -.387, p = .008) and largest number of drinks in a row in the past 30 days (rho = -.285, p = .041). These are preliminary results in an ongoing study. Nevertheless, these results suggest an association between a student's self-awareness, history, and current alcohol use. More data is currently being collected to explore to elucidate these findings. Findings may potentially be utilized to implement mindfulness as a modifiable protective factor in tailored alcohol use interventions.

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The Correlation of African American Male's Well Being, Depression, and Substance Use Behaviors between Family Communication

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The purpose of the study was to examine the relationship between family communication, well-being, depression, and substance use. Previous research has shown that household makeup and home lifestyle has a significant influence on a child's social behavior. It is hypothesized that family communication will have a significant negative correlation to the participant's' current substance use. It is also hypothesized that family communication will be positively correlated with the participants overall feeling of well-being. Lastly it was hypothesized that well-being would be negatively correlated with depression. The participants included in this study were recruited from the Virginia State University, and the surrounding community churches in Chesterfield and Richmond, Virginia. The population was made up of 107 African American males, the majority of the participants used ranged from ages 18-25. After signing a letter of consent, the participants completed the Family Adaptability and Cohesion Evaluation Scales (FACES IV) survey (Olson, 1979), the Ryff's Scale of Well Being survey (Ruff, 1998), the Youth Risk Behavior Surveillance System (YRBSS) survey (CDC, 1991), the Center for Epidemiologic Studies Depression Scale (CES-D) survey (Radloff, 1977), and a few others. The computer based surveys were facilitated by student interns on Virginia State University's campus. The results showed that there was not a significant relationship between family communication and current substance use. Family communication did have a positive correlation with overall all well-being and well-being had a negative correlation with depression. Plans for future research are discussed.

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The Effects of Gender on Depression and Math Anxiety

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By the age of 15, girls are predicted to be twice more likely to suffer from depression than boys (Nolen-Hoeksema & Girgus, 1994). In addition to depression, anxiety can impair ones cognitive functioning. The development of one form of anxiety, math anxiety, affects women more than men and begins at the age 13 for most girls and continues until their college years (Tapia, 2004). The purpose of the present study was to examine the effects of gender on depression and math anxiety. It was hypothesized that women would have higher levels of depression compared to men. It was also hypothesized that men would have greater levels of math anxiety compared to women. Thirty African American college students, between the ages of 18-27 participated in the study. Math anxiety was measured using the Abbreviated Math Anxiety Scale (AMAS). The POMS consist of 65 items measuring 6 mood states: tension, depression, anger, vigor, fatigue, and confusion. An Independent samples t-test was used to examine the effects of gender on depression and math anxiety. In support of the hypothesis, gender significantly affected depression, $t(27) = 2.02$, $p = .05$. Women ($M = 81.7$) were more depressed than men ($M = 67.4$). Gender also had a significant effect on math anxiety, $t(27) = 2.06$, $p = .04$, in that women ($M = 24.7$) had higher levels of math anxiety than men ($M = 18.8$). In conclusion, African American women need effective strategies to cope with negative emotions such as depression and anxiety.

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The Relationship between Spirituality and Depression in African American College Students

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MacDonald (2000) identified five dimensions of spirituality including Cognitive Orientation towards Spirituality, Experiential/Phenomenological Dimension of Spirituality, Existential Well-Being, Paranormal Beliefs, and Religiousness. The Cognitive Orientation towards Spirituality dimension defines spirituality in terms of its significance and relevance to personal functioning. The Experiential/Phenomenological Dimension of Spirituality exists in individuals who define spirituality according to the way that they have experienced it. The Existential Well-Being dimension defines spirituality in terms of its relationship to the meaning of life. The Paranormal Beliefs dimension involves beliefs of psychological paranormal phenomena such as witchcraft and ghosts. The Religiousness dimension defines spirituality in terms of beliefs and attitudes of a religious nature, but also adherence to the rituals of the religion. The purpose of the present study was to examine the relationship between spirituality and depression. It was hypothesized that participants with high levels of spirituality would have lower levels of depression. Thirty African American college students, between the ages of 18-30, participated in the study. Spirituality was measured using the revised Expressions of Spirituality Inventory. Depression mood state, measured by the Profile of Mood State (POMS) questionnaire, characterized as a form of psychological sadness that interferes with daily life. A Pearson Correlation Analysis revealed that Existential Well-Being spirituality was significantly correlated with depression, $r = -.430$, $p = .020$. Participants with high levels of Existential Well-Being had lower levels of depression mood state. In conclusion, the Existential Well-Being dimension served as a buffer against depression and is an effective strategy for coping with depression.

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