Message from the President

As President of The Fort Valley State University, I am delighted about this year’s Research Day event. This event is an excellent means by which attendees and participants alike can observe mentorship in action as our distinguished faculty guide their students through the process of discovery and sharing of results. This kind of activity aptly summarizes one of my ideals for student engagement at this institution as we not only dream big dreams, but as those dreams are realized in the big things we do.

I encourage the majority of our students to be active participants in this year’s event, either by showcasing their own scholarship, or by supporting their peers. I would also like to encourage the majority of our faculty and staff to drop in and reassure our students of the support they have across every constituency of the campus. We hope visitors to the campus will be inspired by what they see, and will tell others about the great things happening here in “the valley.”

Finally, Research Day 2014 should serve as a statement to current and future students that at FVSU, they can explore a variety of intellectual curiosities, which can lead to amazing discoveries. Our faculty and staff welcome the opportunity to serve you and to help you realize your dreams.

Keep on Keeping on!
Ivelaw Lloyd Griffith, Ph.D.
Message from the Provost

Dr. Govind Kannan  
Interim Provost and Vice President for Academic Affairs

On behalf of the Office of Academic Affairs at The Fort Valley State University, I express thanks to all those involved with planning Research Day 2014. We appreciate your efforts to make this event a success and to afford students the opportunity to showcase their scholarship. I also thank faculty members who took the time to mentor their students in the process of research and in the presentation of results. I recognize that these are only a few of the activities, which culminated in hosting this event.

From its early beginnings as an 1890 Land Grant Institution, Fort Valley State has been a leader in research. We are proud to be ranked as one of the top research grant recipients in the entire University System of Georgia. Therefore, Research Day serves to highlight what it means to share and pass on a strong research legacy from faculty to students.

Once again, thanks to the planning committee, and to all who worked behind the scenes to make this event a success. We are pleased by its growth over the past three years, and are confident that this year’s “Spotlight on Student Research” will be equally successful.

Sincerely,

Govind Kannan, Ph.D.
Greetings

Dr. Ian Toppin, QEP/CTL Director  
Co-Chair of Research Day 2014 Planning Committee

Welcome to the fourth annual Research Day at The Fort Valley State University. In previous years Research Day was primarily facilitated by the QEP Office for Enhancing Critical Thinking (QEP/ECT); however, this year’s event being organized in collaboration with the Office of Undergraduate Research. In previous years we also included displays of scholarship from both faculty and students; however, as the number of participants has grown over the years, we are pleased to spotlight only student scholarship at this event. Our goal is for students to consider their participation in Research Day among one of the top academic experiences at FVSU. We also desire to promote inquiry-based learning (research) as a hallmark of students’ academic experience; so that they will graduate with critical thinking skills necessary to confront challenges of life.

On behalf of the members of the Research Day 2014 Planning Committee, I welcome you to Research Day 2014! I invite you to peruse the work of our students; talk to them; encourage them; and most importantly, listen to them as they explain their scholarship through posters and oral presentations. Enjoy!

Best Regards,
Ian Toppin, Ed.D.
Fort Valley State University Research Day 2014
Tuesday, April 15, 2014
Dreaming and Doing: Spotlight on Student Research

Dr. Sarwan Dhir, Professor of Plant Biotechnology
Founding Director, Office of Undergraduate Research
Co-chair of Research Day 2014 Planning Committee

Dr. Andrew Lee, Professor of Communications
Assoc. Director, Office of Undergraduate Research

The Office of Undergraduate Research is excited to co-sponsor and welcome you to Fort Valley State University’s 4th Annual Research Day. Research Day reflects, in part, “important contributions to the [University’s] mission as it relates to academic excellence, intellectual inquiry, leadership, research, and commitment to community through engagement of students and faculty members in a dynamic, [student-centered] learning environment.” Indeed, this special program offers each of us an opportunity to recognize and celebrate the achievements of exceptional undergraduate and graduate students engaged in stellar research in the areas of STEM, Social Sciences and the Humanities.

Fort Valley State University’s 4th Annual Research Day will be celebrated as part of the Council on Undergraduate Research’s (CUR) National Research Week: April 14-18, which will give the University a unique opportunity to showcase the marvelous work our students, along with their faculty mentors, are doing to like-minded national and international audiences. The Office of Undergraduate Research benefits from this exposure as well. President Ivelaw L. Griffith launched the Undergraduate Research Program (URP) initiative in 2013, with an overall mission to foster linkages among faculty members and campus collaborators to infuse cutting-edge research and ‘hands-on experience’ into classroom teaching and foster gains in the form of national and international recognition for our undergraduate and graduate academic programs. The URP will work assiduously to help students realize their dreams, wherein they are able to transform their awesome potential into undisputed academic excellence in their respective areas of undergraduate and graduate research.

In closing, the Office of Undergraduate Research takes this opportunity to congratulate all of the outstanding students participating in this year’s Research Day. Too, we extend special thanks and acknowledgements to the Research Day Committee members, with special recognition of Dr. Ian Toppin, who serves as co-chair for this year’s Research Day, for all the work you did to ensure the success of today’s program. Now, in the words of all of us who applaud our students’ scholastic research achievements: “Let the celebrations of outstanding student scholarship begin!”
Members of Research Day 2014 Planning Committee:

Dr. Ian Toppin, Co-Chair  
Dr. Sarwan Dhir, Co-Chair  
Dr. Andrew Lee, Co-Chair  
Dr. Maisha Akbar  
Dr. Shae Anderson  
Mr. Edward Boston  
Dr. Josephine Davis  
Mrs. Victoria Dubriel  
Dr. Celia Dodd  
Dr. Shadreck Chitsonga  
Dr. Franklin Gross  
Dr. Fred McLaughlin  
Dr. Cheryl Swanier  
Dr. Barbara Wyche
Keynote Speaker

Priscilla Oliver, Ph.D.
Life Scientist, Office of the Regional Administrator of the U.S. EPA

Dr. Priscilla Oliver is a Life Scientist with the Office of the Regional Administrator of the U.S. Environmental Protection Agency in Atlanta, Georgia. She is the EPA Regional Program Manager for the Partnership for Sustainable Healthcare (PSH) Program, a member of the Technical Editorial Advisory Board, and Co-Chair of the Hazardous Materials and Toxic Substances Section of the National Environmental Health Association (NEHA).

Dr. Oliver is a member of the National Council on Diversity in Environmental Health (N-CODE Health) created by the CDC/ Eastern Kentucky University Partnership. She is a graduate of the University of Alabama in Tuscaloosa, with a B.S. Degree in Biology. She completed postgraduate studies in Microbiology at the University of Maryland in Baltimore. She is a graduate of the Master of Public Administration (MPA) Program at Georgia State University in Atlanta. She received the Ph.D. Degree from Georgia State University in Educational Administration with a cognate in Health Administration from the School of Business. Dr. Oliver is also Secretary/ Treasurer of the American Society for Public Administration – Georgia Chapter (ASPA-GA).
In today's cyber society, anonymity is in high demand. Aliases provide users with a sense of security, protecting their true identity from being revealed while active on the web. However, an alternate identifier does not necessarily make an author of a blog or article truly anonymous. An author’s writing style is an additional attribute of his/her identity that may not be considered when taking steps to remain anonymous. Our research discusses how an author can be identified by his/her writing style and how this can be prevented. The Unabomber case is an example of how writing style has been used to identify the true author of a text. In this research, we present an author concealment technique that makes one’s writing style less identifiable.

Dekita Moon, Ph.D. Student
Clemson University

Dekita Moon is currently a research assistant working under the leadership of the Graduate Student Dean. She is also a 3rd-year Human-Centered Computing Ph.D. student in the School of Computing at Clemson University. As an undergraduate at FVSU, Dekita became interested in robotics through the ARTSI Alliance program. She pursued her passion for human interaction with technologies (HCI and HRI), and had her first research experience at Carnegie Mellon's Robotic Institute. In so doing, she obtained hands-on knowledge of implementing autonomous multimodal interaction technologies, programming in Java, and an interest in speech technologies. Graduate school affords her a vast amount of research opportunities, including working on the world's first accessible voting system. She enjoys designing, evaluating, and implementing software application interfaces and looks to be a leading expert in the user experience.
Event Program

8:00 – 8:30  Registration

8:30 – 9:00  Opening Ceremony

Ribbon Cutting

Greetings & Welcome – Dr. Ian Toppin

Introductory Remarks – Interim Provost Govind Kannan

Introductory Remarks – President Ivelaw Lloyd Griffith

9:00 – 9:30  Panel of FVSU Alums

Remarks

Q & A

9:30 – 11:30  Poster Presentations – C.W. Pettigrew Center Lobby

Oral Presentations – Breakout rooms 106, 107, & 110
Awards Luncheon Program
12:00 pm – 1:00 pm

Presiding
Dr. Andrew Lee

Musical Selection “Springtime Melody,” Composer & Performer
Mr. Jhefte Pierre
Accompanied by Dr. Franklin Gross

Welcome and Introduction of the President
Dr. Govind Kannan

President’s Remarks and introduction of keynote speaker
Dr. Ivelaw Lloyd Griffith

Recognition of Research Day 2014 Planning Committee
Dr. Ian Toppin

Introduction of Keynote Speaker

Keynote Speaker
Dr. Priscilla Oliver

Recognition of Research Day 2014 Participants

College of Agriculture
Dr. Mark Lattimore, Interim Dean
College of Arts & Sciences
Dr. Berlethia Pitts, Interim Dean
College of Education
Dr. Ed Hill, Dean
College of Graduate Studies
Dr. Anna Holloway, Dean

Research Day 2014 Judges Awards
Dr. Celia Dodd, Subcommittee Chair

Final Remarks
Dr. Sarwan Dhir, Director of OUR

Adjournment
RESEARCH DAY 2014 PRESENTATIONS

Poster Presentation Sessions
C.W. Pettigrew Center Lobby

Baker, Brentnol  Chiluwal, Anuj  McKinnon, Bradley  Smith, Derrick
Baskett, Jamil  Clark, Brandon  Murray, India  Smith, Jamika
Beaty, Brandon  Cornish, Mia  Nesbit, Joseph  Troutman, Lance
Breary, Terri  Crockett, Brittney  Norris, Ashley  Vaidya, Brajesh
Brown, Terri  Davis, Dwayne  Pickard, Benjamin  Wimes, Jeremy
DeVaughn  Gainor, Mercedes  Quinn, Brandon  Whitfield, La’Keia
Brown, Javonte  Griffin, April  Richardson, Edenbur  Whitfield, La’Keia
Brown, Samantha  Gupta, Binod  Rozier, Key’erra  Williams, Alicia
Buchanan, Jessica  Hicks, Clarence  Rozier, Ray  Williams, Andrea
Calloway, Antonette  McClendon, Sarah  Rucker, Brittany  Williams, Micah
Carter, Blake  McGhee, Ulysius  Scott, Jasmine  Williams, Shericka

Oral Presentations

**Room 106**
Boynton, Anthony
Early, Marci
Oyemakinwa, Isaiah
Gary, Oneisha
Pickett, Glenda
Pierre, Jhefte
Whitfield, LaKeia

**Room 107**
Austin, Karleisha
Davis, Jasmine
Doyle, Craig
Storey, Brittany
Harrison, Allante
Hall, Altony
Hughes, Jasmine

**Room 110**
Brou, Richard
Hernandez, James
Hardaway, Rickell
Haynes, Merriah
Hudgens, Andrew
Lyons, Dearl
Matthews, L’Ainece
POSTER PRESENTATIONS

1. Baker, Brentnol
Major: Biology
Status: Undergraduate Student
FVSU Research Mentor: Seema Dhir
Title: Physical evidence in Crime Scene Investigation Brentnol Baker and Seema Dhir Biology Department, Fort Valley State University, Fort Valley, GA 31030
Question/Problem addressed by the research: Investigation of physical evidence in crime scene investigation

Methodology: Comparison microscopy and polarizing microscopy

Some of the common types of physical evidences found at crime scenes include hair, fiber, glass, paint, tool marks, fingerprints, drugs, documents, soil and minerals, powder residue from firearm discharge and blood, semen or saliva. A forensic scientist examines physical evidence for identification and comparison to ascertain if the object found at a crime scene and the one collected from the suspect have a common origin. A forensic investigator relies on a comparison microscope for side by side viewing of ballistic evidence. In this study we compared bullets for the presence of striation markings to determine if they were fired from the same rifle. We also investigated hair samples from human and non-human sources such as a guinea pig, horse, cat and dog. In hair samples, features observed under high power magnification (100 and 400 x) included cuticle pattern, pigmentation in cortex layer and medullary cavity pattern as well as index. Identifying characteristics of fibers of different origin-cotton, wool, silk and polyester were observed using microscopy. Finally, birefringent substances were detected using a polarizing microscope.

Findings/Results: Identifying features were observed

Implications/Relevance: Physical evidence provides valuable information when investigating a crime scene.

2. Baskett, Jamil
Major: Plant Science Biotechnology
Status: Undergraduate Student
Research Advisor and Advisor Institution: Brenda Schroeder, Washington State University
FVSU Research Mentor: Dr. Sarwan Dhir
Title: Epifluorescence Microscopy of Temporal Interactions of E. cloacae and Onion Bulbs
Question/Problem addressed by the research: Onion (Allium cepa L.) producers in the Pacific Northwest are important contributors to the overall production of onions in the United States. According to the U.S. Department of Agriculture (2010), each acre of onions produced for storage was worth greater than $6,000. Losses due to onion bulb rots during storage can have a significant financial impact on the onion industry. Enterobacter cloacae is an infectious and important bulb rot pathogen that causes onion bulb decay in onion packing sheds throughout the
Columbia Basin. The phenotype of Enterobacter bulb decay begins with light necrosis in a single or a few scales in the neck of the onion bulb which spreads towards the basal plate during storage. The current understanding about E. cloacae colonization behavior in onion plant cell tissue is limited.

**Methodology:** During the summer of 2013, onions bulbs cv. Talon were inoculated with a GFP labeled strain of E. cloacae to study whether the pathogen colonizes in onion cell tissue intercellularly or intracellularly as visualized by using epifluorescence microscopy. A gfp reporter gene was introduced into E. cloacae using electroporation. PCR followed by gel electrophoresis confirmed the insertion of gfp gene into the genome using GFPmut3 and BLA primer sets. Onion slice assays were performed to determine whether E. cloacae colonize in an intercellular or intracellular fashion. Onion bulbs were sliced and plated on water agar and inoculated with 10μl of the GFP labeled E. cloacae strain. Onions were incubated at 37°C and microscopic observations were recorded over a four day period using epifluorescence microscopy.

**Findings/ Results:** Day one and two of microscopy results revealed intercellular colonization of the bacteria on the film of the onion tissue.

**Implications/ Relevance:** This study would be helpful to understand the colonization behavior of E. cloacae in onion bulb rot tissue and the time required by pathogen to colonize the bulb tissue. Ultimately, this could help to develop efficient disease management strategies.

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3. **Beaty, Brandon**  
**Major:** Plant Science Biotechnology  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Sarwan Dhir  
**Title:** High Frequency Axillary Shoot Multiplication and Plant Regeneration in Valeriana officinalis: A Rare Medicinal Plant  
**Question/ Problem addressed by the research:** Valeriana officinalis is a perennial, flowering herbal plant native to Europe and parts of Asia. It is a medicinal plant used as a muscle relaxer for anxiety relief, as well as a sleep aid. Due to its variations, poor seed production and germination, and traditional breeding cost and time, clonal propagation should be used in order to produce large scale homogeneous plants with high yields of Valerian. In propagating Valerian clonally, we have developed a simple one step method for the regeneration of plants/multiple shoots using nodes as explants.

**Methodology:** We supplemented the MS media with various concentrations of cytokinins-benzyl amino purine (BAP) and kinetin (KN), to study which concentration had the best effect on producing Valerian efficiently and effectively.

**Findings/ Results:** The results from this protocol indicated that KN or BAP at 2.5 mg/l was the best concentration for shoot induction. Comparing KN 2.5 mg/l with IAA, IBA, or NAA, maximum number of shoots were observed with KN 2.5 mg/l + IAA 0.1 mg/l. Rooting was
effectively achieved on MS supplemented with IAA at 1.0 mg/l. The subsequent hardening experiment showed that the commercial medium, containing a mixture of decomposed coir waste, perlite and organic compost in the ratio of 1:1:1 by volume was most effective, with 80% of plantlets surviving. Regenerated plants were morphologically uniform, having normal leaf shape and growth.

4. Brearley, Terri  
**Major:** Plant Biotechnology  
**Status:** Graduate Student  
**FVSU Research Mentor:** Dr. Nirmal Joshee  
**Title:** Scutellaria a genus with medicinal value: A comprehensive overview of scaling up, trichome biology, and scanning electron microscopy  
**Question/ Problem addressed by the research:** Determine the optimal treatments for scaling up, determine trichome biology, and investigate SEM.  
**Methodology:** For each part of the research different methods were used and will be explained fully.  
**Findings/ Results:** Findings have been put together with pictures, statistics, and graphs to pull together the research.  
**Implications/ Relevance:** Total extracts from several species of Scutellaria have shown cancer cell apoptosis in vitro and two human breast cancer trials.

5. Brown, DeVaughn  
**Major:** Mathematics  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Mr. Trent Avery "T.A." Walton- University of Arkansas -Fayetteville  
**FVSU Research Mentor:** Dr. Dawit Aberra  
**Title:** Electromagnetic Air-cooled Ring Levitator (EARL): An Educational Model  
**Question/ Problem addressed by the research:** As the world population grows so does the number of insatiable desires; especially in technology. In order to meet this ever-growing demand, we must increase the number of students in the technology fields. This research project addressed the need for an increase in the number of students entering Science, Technology, Engineering, and Mathematics (STEM) fields.  
**Methodology:** The research was put together by the construction of a touch-safe electromagnetic device that K-12 students could operate in order to increase their interest in STEM. The technical objectives for the research project include the modification of the design of the Thomson Coil to levitate rather than launch a non-ferrous aluminum ring and to control the problem of overheating caused by the continuous use of alternating current. The research was put
together by the construction of a touch-safe electromagnetic device that K-12 students could operate in order to get them more interested in STEM.

**Findings/ Results:** We found that we were able to achieve levitation by adjusting the levels of voltage from a variable autotransformer, effectively dissipating the heat from the coil through the use of three cooling fans and that EARL is a touch-safe and reliable demonstrator for educational purposes.

**Implications/ Relevance:** Due to the success of the project, we found that K-12 students and can get excited about STEM and learn from devices that they can operate.

6. **Brown, Javonte**  
**Major:** Computer Information Systems  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Ramana Gosukonda  
**Title:** Personal Information: How to keep it safe and secure online  
**Question/ Problem addressed by the research:** The purpose of this research is to analyze various tools and techniques for their effectiveness for safeguarding personal information online. It is not safe to use the Internet especially if he/she is not aware of potential problems it may cause. For example stolen personal information can cause identity theft.

**Methodology:** In this research various anti-spyware, anti-virus scanner, firewall software, encryption techniques were reviewed and compared for providing optimal protection of personal information Online. In this study a selected software technologies were reviewed based on their popularity, performance, price and features.

**Findings/ Results:** The results indicated that there are differences among the technologies with respect to the features they offer. For instance, having an up-to-date security tools is important because it can protect the computer system from new threats that are developed each day and increase your overall Internet security. However, security tools can be costly especially if it has more advanced security features.

**Implications/ Relevance:** Idea for developing better security tools in combination with Web browser provided tools that could safeguard one’s personal information while online.

7. **Brown, Samantha**  
**Major:** Computer Information Systems  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Ramana Gosukonda  
**Title:** Google: A Case Study of Personal Security Online
Question/ Problem addressed by the research: A look at how Google collect, use, protect, and distribute customers’ personal information; and the affects this might have on one’s personal security.

Methodology: This study explores how Google collects, use, protects, and distributes personal information and what affects does it might have on one’s personal security. Google collects information primarily during the sign up process for a Google account and/ or when you use their or other’s services (for example social networks).

Findings/ Results: Google collects information primarily during the sign-up process for an account and/ or when you use their or other’s services (for example social networks). Google uses user’s personal information to offer tailored content like giving you more relevant search results and advertisements. Google protect users’ personal information by using SSL encryption and a two-step verification method when accessing a Google account. This guards against unauthorized access to their systems. Google provide users with an option to restrict their sharing of personal information online. One way to restrict sharing is go to Google history page at Google.com/history and removing items from history and pausing ongoing data collection. Upon request, Google provide users the collected information, so that users know what data were collected.

Implications/ Relevance: By understanding risks of online use and how to avoid compromising personal data, the online user experience can be greatly enhanced.

8. Buchanan, Jessica
Major: Chemistry
Status: Undergraduate Student
FVSU Research Mentor: Dr. Celia Dodd
Title: Optimization of Diacetyl Chemotaxis assay for Toxicological Assessment
Question/ Problem addressed by the research: The behavior of C. Elegans at different concentrations of Diacetyl by carrying out a Chemotaxis assay.

Methodology: Used a .1, .5, 1 percent of Diacetyl to Ethanol to study the arrangement of C. Elegans in a Chemotaxis assay. A petri dish is divided into 4 equal quadrants, two opposite quadrants marked "Test" and the other two marked "control". The anesthetic is placed at the control and test sites. The worms are placed in the center of the plate with a circle marked around the origin. Allow the worms travel and respond to an odorant. Later score the worms once the allotted time has expired.

Findings/ Results: How do different concentrations of Diacetyl affect C. Elegans attractions to the odorant.

9. Calloway, Antonette
10. Carter, Blake
Major: Computer Science
Status: Undergraduate Student
Research Advisor and Advisor Institution: Dr. Xiao Feng Wang, Indiana University
FVSU Research Mentor: Dr. Cheryl Swanier
Title: Analyzing Malicious Web redirection
Question/Problem addressed by the research: Attackers gain access to host websites in order to redirect visiting browsers to totally malicious websites. To gain an understanding of why and how redirection is used, analyzers must debug and confiscate malicious codes injected by the attackers.

11. Chiluwal, Anuj
Major: Biotechnology
Status: Graduate Student
FVSU Research Mentor: Dr Hari P. Singh
Title: Effect of Row Spacing on Growth Parameters and Biomass Yield of Energycane
Question/Problem addressed by the research: Plant population in planting energycane has been kept similar to sugarcane because of lack of recommended planting spacing particularly for this plant while the aim of cultivating energycane is for biomass yield that is vastly different from sugarcane which is grown for sugar content. For energycane, the aim is to achieve full canopy soon after spring to capture sunlight and avoid weed competition. The current row spacing (1.83 m x 0.91 m) for sugarcane is also used for energycane growing because of existing planting and harvesting equipment of sugarcane, but maximum yield potential has probably not
been reached in Georgia growing conditions. Preliminary research trials at Agricultural Research Station at Fort Valley State University (Singh et al., unpublished) have demonstrated that weed problems were more prevalent in energycane plots than it was in plots of the napiergrass. This is believed to be due to presence of more erect structure of the energycane leaves so that its canopy closure couldn’t completely shade the row in wider spacing. Our sustainable biofuel feedstock production model relies on minimal external inputs including herbicides. So, it is imperative that we determine if by plant population adjustment we can achieve early canopy closure and to what extent early weed growth has detrimental effect on the production of final energycane dry matter. Thus, an experiment to determine energycane growth and development at different plant spacing both within and between rows was needed. Hence this research was carried out to test three between row spacing (1.22 m, 1.52 m and 1.83 m) and two within row spacing (0.61 m and 0.91 m) to analyze the effect on canopy structure, shoot growth, root growth and biomass yield of energycane.

Methodology: Energycane variety Ho (US) 72-114 was planted in October, 2012 at FVSU’s Agricultural Research Station Farm, Fort Valley, GA, USA in different combinations of three between row spacing (1.22 m, 1.52 m, and 1.83 m) and two within row spacing (0.61 m and 0.91 m). Six different combinations of the spacing were used in the experiment and referred as T1 (1.22 m x 0.61 m), T2 (1.22 m x 0.91 m), T3 (1.52 m x 0.61 m), T4 (1.52 m x 0.91 m), T5 (1.83 m x 0.61 m) and T6 (1.83 m x 0.91 m). All treatments were replicated three times.

Four rows of plants were planted in a 9.15 m long plot for each treatment. Treatments were laid out in randomized complete block design Data Collection and Analysis Two plants per plot were selected randomly to measure growth parameters. Height of plants and number of tillers were measured in every two weeks interval. Number of green leaves was measured at monthly interval. Leaf area index (LAI) were measured with plant canopy analyzer (LAI-2000; LICOR, Lincoln, NE, USA) in every two weeks interval. Net photosynthesis rate were measured by using handheld photosynthesis system (CI-340; CID Bio-Science, Camas, WA, USA) at monthly interval. Chlorophyll content of the leaves were measured by using chlorophyll content meter (CCM-300; Opti-Science, Hudson, NH, USA) at monthly interval. Plants were harvested in October, 2013 and fresh as well as dry biomass yield was recorded. Statistical analysis was done using statistical software R (version 3.0.2). An analysis of variance (ANOVA) was performed for multiple comparisions, followed by Tukey-Kramer's honestly significant difference (HSD) to identify groups that were statistically significantly different (P ≤ 0.05).

Findings/ Results: Plant height: Plant height at the time of harvesting ranged from 2.09 m to 2.20 m among the treatments. Minimum spacing treatment (1.22 m x 0.61 m) resulted in tallest plants during various intervals of growth period. The differences in the plant height among various row spacing combinations were statistically not significant (P ≤ 0.05).

Tiller Number: No significant differences in tillers number per plants were found in earlier stage of plant growth among the treatments whereas tillers numbers were found significantly higher in maximum spacing treatment (1.83 m x 0.91 m) than other treatments and significantly lower in
minimum spacing treatment (1.22 m × 0.61 m) than other treatments at later growth stage of the plant. Numbers of tillers per plant varied from 21.8 to 32.7 at harvesting time.

Leaf Number: Number of green leaves per plant was found highest in maximum spacing treatment (1.83 m × 0.91 m) and lowest in minimum spacing treatments (1.22 m x 0.61 m and 1.22 m x 0.91 m) in most stages of the growth. Differences were significant in third and fourth intervals whereas non-significant in others.

Number of green leaf per plant started declining at later stage of the plants in all treatments.

Leaf Area Index: Leaf area index (LAI) was found higher in closer spacing treatments than wider spacing but there were no significant differences among the treatments at different growth stages. LAI increased gradually until August and started declining after October while irregular trend among different treatments was observed in September.

Chlorophyll content: No significant differences were found in chlorophyll content of the leaves among the treatments in any of the five reading taken during the study. Clear trend in differences in chlorophyll content was not observed among the treatments. However, in majority of the observations chlorophyll content was found lowest in minimum spacing treatment (1.22 m x 0.61 m) and highest in maximum spacing treatment (1.83 m x 0.91 m). Chlorophyll content of leaves also started declining from October in all the treatments.

Net photosynthesis rate: No significant differences in net photosynthesis rate were observed among the treatments except in the first reading. Photosynthesis rate was found lowest in minimum spacing treatment (1.22 m x 0.61 m) and highest in maximum spacing treatment (1.83 m x 0.91 m) in all the readings taken during the study and trend in the increase of photosynthesis rate with increase in spacing were observed in most of the observations. Photosynthesis rate of the plants started declining from October in all the treatments which suggests gradual decrease in active vegetative growth of energycane from October.

Biomass yield: Highest dry matter biomass yield of 21.51 Mg/ha was found in minimum spacing treatment (1.22 m × 0.61 m) and lowest biomass yield of 18.78 Mg/ha was found in T5 (1.83 m × 0.61 m) treatment. No significant differences in yields were found among the treatments.

Implications/ Relevance:
The biomass yield obtained in the first year of energycane planting in Middle Georgia is a good indicator of its suitability as lignocellulosic feedstock for biofuel production in the Southeastern United States. Energycane is a perennial plant and full biomass yield is obtained only from the second year onwards. There was no significant difference in biomass yield between different spacing treatments. However, some significant differences and trends in growth parameters were observed among the treatments. Multiple year data is required for definitive conclusions. The important inference of this study is that since the spacing used for planting Saccharum spp. for sugar also produces maximum biomass for lignocellulosic feedstock, existing farm machinery for sugarcane production can also be used in energycane production.
12. Clark, Brandon  
**Major:** Chemistry  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Hunter A. Knox, & Robert E. Abbott, Sandia Nat’l Labs  
**FVSU Research Mentor:** Dr. Dwayne Daniels  
**Title:** RoMi: Refraction Microtremor Using Rotational Seismometers  
**Question/Problem addressed by the research:** We present the results of a shallow shear-wave velocity study that utilized both traditional geophones and a newly developed rotational seismometer (Applied Technology Associates ARS-16). We used Refraction Microtremor (ReMi), a method developed by John N. Louie, during processing to determine both Rayleigh and Love wave dispersion curves using both vertical and horizontal sources.  

**Methodology:** ReMi uses a distance-time (x-t) wavefield transformation technique to image the dispersion curve in slowness-frequency (p-f) space. In the course of the ReMi processing, unwanted P waves are transformed into p-f space. As rotational seismometers are insensitive to P waves, they should prove to be superior sensors for Love wave studies, as those P waves would not interfere with interpretation of the p-f wavefield.  

**Findings/Results:** Our results show that despite having one-fifth the geophone signal-to-noise ratio in the distance-time wavefield, the ARS-16 produced superior results in the p-f wavefield. Specifically, we found increases of up to 50% in ReMi spectral ratio along the dispersion curve. This implies that as more quiet and sensitive rotational sensors are developed, deploying rotational seismometers instead of traditional sensors will yield significantly better results. This will ultimately improve shallow shear-wave velocity resolution, which is vital for calculating seismic hazard.  

**Implications/Relevance:** These surveys are done for characterization of building development.  

13. Cornish, Mia  
**Major:** Computer Science  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Ramana M. Gosukonda  
**Title:** Who's Really in Charge?...Technology Rules the School System  
**Question/Problem addressed by the research:** We are living in a generation where many people are so consumed with technology that they can barely function without it. Many students and teachers are now using smart boards, tablets and e-books in order to learn and teach. Is pencil and paper just a thing in the past now? If not now, will it be within the next 10 or 20 years? I will be investigating why technology has had such a large impact on people's lives as well as the impact it has in the school system.
Methodology: This research was put together by reviewing related literature and by administering a non-scientific survey of my own to gather feedback from different students, faculty, and staff about their opinions on technology and how it has and will impact the school system in years to come.

Findings/Results: Studies show that within the next 15 years school systems will be completely dependent on technology. Instead of using pencils and paper to write, tools such as I-pads and tablets will be their replacement. E-books have replaced standard paperback books and cell phones are now personal organizers.

Implications/Relevance: Technology is becoming the single most relied upon tool in the world. Many students as well as faculty depend on technology for almost everything. Technology will only get better in the years to come and people should understand and accept that it will soon without a doubt dominate what is done in every school system.

14. Crockett, Brittney  
**Major:** Mathematics  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Dawit Aberra  
**Title:** The Optimization of A University's Water Efficiency  
**Question/ Problem addressed by the research:** What are the mathematical concepts used to determine the amount of water consumption and reduction on the campus of Fort Valley State University?

**Methodology:** In order to create a realistic view of the water consumption on the campus, a number of academic, recreational, and residential facilities were each subjected to a utility analysis, comparison to a benchmark, and an on-site walk through, during which the number of sinks, faucets, shower heads, and toilets were tallied and classified by brand and flow-rates.

**Findings/Results:** Utilizing mathematical concepts, it was concluded that the campus currently over-uses water, especially in residential buildings. Simple implementations such as a change in faucets, toilets, and shower heads can yield a decrease in water consumption with a relatively short period of payback.

**Implications/Relevance:** Our small efforts to focus on the optimization of water efficiency on the campus of Fort Valley State University help to contribute to the world-wide "Green" initiative, which focuses on the reduction of water and energy consumption and its benefits.

15. Davis, Dwayne  
**Major:** Biology  
**Status:** Graduate Student  
**Research Advisor and Advisor Institution:** Gang Yao, University of Missouri
FVSU Research Mentor: Seema Dhir
Title: The Correlation between Pupillary Unrest with Respiration and Heart Rate
Question/ Problem addressed by the research: Pupillary unrest, scientifically known as hippus, is the continuous fluctuation, constriction and dilation of the pupil even in steady illumination. The pupil is innervated by the autonomic nervous system and its oscillation is controlled by the parasympathetic and sympathetic modulation of the iris muscles. A link has been shown between respiratory patterns and pupillary oscillation, as well as heart rate variability. This study examined the connection between the frequencies of breathing rate, heart rate, and pupillary oscillation.

Methodology: During normal, slow and deep breathing, we measured pupil size, breathing rate, and heart rate. Using Fast Fourier Transform (FFT), the frequency spectra of each parameter (pupil size, breathing rate, and heart rate) were analyzed. Pupil size was measured using two high-speed infrared cameras in a binocular pupillogram recording system, and a pressure sensor was used to measure breathing rate.

Findings/ Results: A correlation was observed between breathing rate, heart rate, and pupil oscillation frequency. This effect was more pronounced during the slow deep breathing trial.

Implications/ Relevance: Further study will focus on the dynamic properties of the pupil measuring Pupillary Light Reflex (PLR) during controlled breathing.

16. Gainor, Mercedes
Major: Chemistry
Status: Undergraduate Student
Research Advisor and Advisor Institution: Dr. Vincent Chevrier, Arkansas Center for Space and Planetary Sciences, University of Arkansas
FVSU Research Mentor: Dr. Dwayne Daniels, & Dr. Aditya Kar
Title: Hydrocarbon Ices under Simulated Titan Surface Conditions
Question/ Problem addressed by the research: Titan has a hydrological cycle driven by methane and the surface conditions (90 K and 1.5 bar) are close to the triple point of methane, thus it can exist in different phases on Titan. This study focuses on the ice phase of these hydrocarbons because it is important to understand the stability of ice layers in cases of global cooling as colder climatic periods have been suggested at geological timescales. Ice layers on the surface of lakes have also been suggested via evaporative cooling of the lakes. This ice layer could be responsible for the lack of waves on the lakes. We used FTIR to characterize the difference between different phases of ethane and methane, and the sublimation process of methane. It is important to understand these phases in lab as they will help us understand the geological past of Titan.

Methodology: We used our Titan simulation chamber to simulate Titan’s atmosphere and surface conditions. The chamber is purged with nitrogen gas before the experiment. Then, the gas is pressurized to
1.5 bar. Titan temperatures are reached by flowing liquid nitrogen through coils around the module. Once the chamber has reached relevant temperatures, hydrocarbons gas is introduced into the condenser maintained at 94 K for liquid methane and 110 K for liquid ethane. We then open the condenser and pour the liquid into the petri dish. We then continue to cool the chamber until the liquid becomes frozen (below ~ 92 K). The temperature and mass are continuously recorded during the experiment. We used the Nicolet 6700 Smart Diffuse spectrometer with nitrogen purge gas to collect infrared spectra from 1.0 to 2.5 µm with 4cm⁻¹ spectral resolution. This allows us to cover five of the Titan atmospheric windows at 1.19, 1.33, 1.4, 1.66, and 2.0 µm.

**Findings/ Results:** A total of 7 Titan simulations of pure methane and pure ethane were run. At 3800 sec methane is added to the petri dish. At 5000 sec it begins to freeze and becomes completely solid at -183ºC. The mass becomes stable at 6500 sec until it starts to decrease at 8200 sec. Spectra of methane were collected during the length of the experiment. The reflectance increased from 70% to about 75% during the phase change from liquid to solid ice. In this experiment we were able to collect spectra during the transition between phases. The spectra recorded during the solid phase shows the band depth is decreasing. Ethane is dropped into the petri dish at 4000 sec, and the mass remains constant until the end of the run. There is a steady decrease in the temperature and it stabilizes until the ethane completely freezes. The formation of solid ethane ice is shown by the drop in temperature at 5000 sec. The temperature then stabilizes again until the end of the experiment. In ethane spectra a shift in reflectance of the spectra occurs with change from liquid to solid phase changes. The reflectance increases from about 67% to about 83%. However, unlike methane, the band depth in the ice spectra increases.

**Implications/ Relevance:** Studying methane ices will help to gain a better understanding of the hydrological cycle through evaporation/sublimation rates and also to determine the physical state of the lakes on Titan. Identification of the phase of the hydrocarbons can be interpreted by experimental data. Reflectance changes can be used to interpret light and dark features found on Titan’s surface by Cassini spacecraft. Although direct comparisons of brightness variations across Ontario Lacus are not possible due to the non-normal viewing angle of measurement, Ontario Lacus revealed a dark structure corresponding to the low lying and flat radar structure of the lake and shows variation in the albedo. Darkening of the lake interior at 2 microns is consistent with the lab reflectance results of liquid ethane.

**17. Griffin, April**  
**Major:** Education Specialist  
**Status:** Graduate Student  
**FVSU Research Mentor:** Dr. Teah L. Moore  
**Title:** The Impact of Executive Coaching with At-Risk Students  
**Question/ Problem addressed by the research:** Aiming students toward college already comes with challenges, however, at-risk students present with additional challenges. These students come from homes with little to no supervision, guidance, and support. At-risk student neighborhood environments do not always present with role models of success in traditional
ways. The research seeks to explore students’ perception and responses to executive coaching, which has previously been used to assist adults in career and life aspirations.

**Methodology:** Orange Duffel Bag Initiative, out of Atlanta, started several 12 session classes in the Macon, Georgia Area. These classes consisted of high school students selected by their school counselors. The high school students met certain criteria which identified them as at-risk students, such as low parental involvement, excessive absences, homelessness, and low performance. Clark Atlanta University developed an assessment, evaluation, and research plan. FVSU were invited to participate and assist in data gathering. FVSU graduate students enrolled in a research course assisted in program evaluation and data collection for the program. Mid-term assessments and Exit interviews were conducted. Graduate students then analyzed the data and wrote up their findings.

**Findings/ Results:** The high school students developed life plans that included attending college. They viewed that having a plan would be better assist them in their goals. They developed short range and long range goals, such as staying in school, improving their GPA. There was an increase in knowledge about what is necessary to reach their career goals that include college attendance. In addition, a number of the high school students observed that their attitude toward life and others has changed and recognized a significant decrease in arguing with family members. Lastly, a number of students stated they would remain with the foster care system while they attend college and reach their career goals.

**Implications/ Relevance:** The study demonstrates that executive coaching can be impactful on high school students as it has been for adults. The role of the life coaches and the advocates has effected a change in the high school students lives by demonstrating the importance of having adults in their lives to provide guidance. It further demonstrates that adage that knowledge is power.

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**18. Gupta, Binod**  
**Major:** Animal science/food technology  
**Status:** Graduate Student  
**FVSU Research Mentor:** Dr. Young W Park  
**Title:** Evaluation of sensory properties of goat milk ice creams formulated with 3 different levels of caprine milk fat.  
**Question/ Problem addressed by the research:** Ice cream has been a very popular frozen dairy food around the world. Although many studies have been reported on bovine milk ice cream, the scientific literature on caprine milk ice cream has been almost nonexistent.

**Methodology:** Three batches of 3 different low fat ice creams were produced as skim (0.46%; SIC), 2.0% (2IC) and whole (3.65%; WIC) goat milk ice creams formulated with the commercial ice cream mix. The Sani Serv ice cream machine (A5223P, Mooresville, IN, USA) was used to make soft serve ice creams. Upon manufacture, all experimental fresh ice creams were stored in a freezer at -18oC for 0, 2, 4 and 8 weeks. Sensory characteristics of all ice creams were
evaluated by an 8-member sensory panel, using ADSA collegiate ice cream scorecards. Flavor traits were determined by normal range of flavor score 1-10, where excellent 10 (no criticism), good 8-9, hair 6-7, and poor 5 or less, respectively. Body & texture, and color properties were assessed by normal range of 1-5 scores, where 5 being no criticism.

**Findings/ Results:** The results showed that there were no significant differences in all sensory characteristics of flavor, body & texture, and color traits between 0 to 8 weeks storage periods for the 3 goat ice creams, except a few cases of flavor and body & texture. No detectable color changes were found in all 3 types of ice creams. For flavor properties, the sweet and whey flavors between 0 and 2-8 weeks for 2IC and WIC were appeared to be different, while no differences in flavors were observed in SIC. For body & texture traits, increases in weak body in WIC, and increases in sandiness and sogginess were occurred in 2IC from 0 to 8 weeks. The 2IC showed a slight improvement in weak body as the storage time advanced. It was concluded that very few changes occurred in sensory properties of all 3 types of goat milk ice creams up to 8 weeks frozen-storage.

**Implications/ Relevance:** Goat milk products, including ice cream have been becoming popular among health conscious consumers, bovine milk products allergy people, elderly, sick, etc. Moreover, it is more digestible due to smaller size of fat globules in it as compared with bovine milk ice creams. Goat milk ice cream provides more nutrients including amino acids etc. than bovine milk ice cream.

19. Hicks, Clarence  
**Major:** Plant Science Biotechnology  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Sarwan Dhir  
**Title:** High Frequency Axillary Shoot Multiplication and Plant Regeneration in Valeriana officinalis: A Rare Medicinal Plant  
**Question/ Problem addressed by the research:** Valeriana officinalis is a perennial, flowering herbal plant native to Europe and parts of Asia. It is a medicinal plant used as a muscle relaxer for anxiety relief, as well as a sleep aid. Due to its variations, poor seed production and germination, and traditional breeding cost and time, clonal propagation should be used in order to produce large scale homogeneous plants with high yields of Valerian. In propagating Valerian clonally, we have developed a simple one step method for the regeneration of plants/multiple shoots using nodes as explants.

**Methodology:** We supplemented the MS media with various concentrations of cytokinins-benzyl amino purine (BAP) and kinetin (KN), to study which concentration had the best effect on producing Valerian efficiently and effectively.

**Findings/ Results:** The results from this protocol indicated that KN or BAP at 2.5 mg/l was the best concentration for shoot induction. Comparing KN 2.5 mg/l with IAA, IBA, or NAA, maximum number of shoots were observed with KN 2.5 mg/l + IAA 0.1 mg/l. Rooting was
effectively achieved on MS supplemented with IAA at 1.0 mg/l. The subsequent hardening experiment showed that the commercial medium, containing a mixture of decomposed coir waste, perlite and organic compost in the ratio of 1:1:1 by volume was most effective, with 80% of plantlets surviving. Regenerated plants were morphologically uniform, having normal leaf shape and growth.

20. McClendon, Sarah  
**Major:** Biology  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Tiffanie Alcaide, Winship Cancer Institute  
**FVSU Research Mentor:** Dr. Sarwan Dhir  
**Title:** IGF1R and EGFR Signaling Crosstalk in TNBC Epithelial-mesenchymal Transition (EMT) Migration, and Invasion  
**Question/ Problem addressed by the research:** Triple negative breast cancers (TNBCs) are a heterogeneous group of breast cancers characterized by poor prognoses due to the lack of three receptors: estrogen receptor (ER), progesterone receptor (PR), and HER2/neu. As a result treatments for TNBCs are limited to conventional chemotherapy, and diagnosis is correlated with highly metastatic, recurrent, and incurable disease. The transmembrane receptors epidermal growth factor receptor-1 (EG1FR) and Insulin-like growth factor receptor-1 (IGF1R) are overexpressed in TNBCs. Both receptors play key roles in cell motility and invasion.  

**Methodology:** We examined the inhibitory effects of EGF1R and IGF1R using the drugs pirodophyllin (PPP) and Erlotinib (EROL) in TNBC cells line and the effects on downstream pathways of epithelial- to- mesenchymal transition, migration and invasion. Combinatorial Treatments with inhibitory drugs decreased expression levels in mesenchymal protein markers, and decreased migratory and invasive potential in TNBC cells. Basal expression levels of IGF1R and EGF1R and downstream epithelial and mesenchymal protein markers were examined by Western blotting a panel of TNBC cell lines. Wound-healing assays were performed to assess the directional migratory effects IGF1R and EGF1R inhibition on TNBC cell lines. Matrigel chamber assays were performed to assess the effect of EGF1R and IGF1R inhibition on the invasive potential of TNBC cells. All TNBC cell lines expressed basal levels of IGFR and EGF1R proteins at varying levels.  

**Findings/ Results:** Highest expression of IGF1R and EGF1R was detected in MDA-MB-468 cells and the lowest expression in Hs578T cells. Cell migration was observed after 24hrs in all treatments. All wound-healing assay treated with inhibitory drugs were sustained in the HCC1806 cell line. Little to no migration occurred in combinatorial treatments. Invasion potential decreased in all treatments and decreased dramatically using PPP in the HCC1806 cell line and in combinatorial treatments. Collectively these results demonstrate the importance of IGF1R and EGF1R inhibition to prevent migration, invasion, and epithelial to mesenchymal transition. The EGF1R and IGF1R receptors are inhibited by PPP and Erlotinib, which increased epithelial markers and decreased invasion and migration.
Implications/ Relevance: The EGF1R and IGF1R signaling pathways treated with combinatorial inhibitor treatments warrants further investigation as novel therapeutics for TNBC.

21. McGhee, Ulysius  
Major: Plant Science Biotechnology/Biology  
Status: Undergraduate Student  
Research Advisor and Advisor Institution: Puthiyaparambil Josekutty, Penn State University - Harrisburg  
FVSU Research Mentor: Dr. Sarwan Dhir  
Title: Effect of Genotypes on in vitro Propagation of Jatropha curcas  

Question/ Problem addressed by the research: Jatropha (Jatropha curcas L.,Euphorbiaceae) is a drought tolerant, non-food, biodiesel crop widely grown in the tropical and sub-tropical regions of the world. It is a species regarded suitable to grow on unproductive agriculture lands as well as marginal lands and yields 30-40 oil by seed weight. However, it can’t be grown as a crop in the temperate regions because of its susceptibility to cold stress. Cold tolerance can be introduced to Jatropha through genetic engineering with cold binding factors (e. g. CBF3). An efficient in vitro regeneration system is essential to develop cold tolerant J. curcas through genetic transformation. We hypothesized that a major reason for this variation could be the difference between genotypes.

Methodology: Therefore, we studied the in vitro regeneration potential of 10 genotypes J. curcas grown in the greenhouse at Penn State Harrisburg. We used young nodal segments (2.0-3.0 cm), and approximately 1.0 cm leaf segments from immature, fully opened leaves as explants. Explants were disinfected with a detergent was (10 min) followed by 5.0 min each in 10% bleach and 0.1% HgCl2 followed by 5.0-6.0 rinses with sterile water. Callus induction was achieved on CI medium; Murashige and Skoog 1962 (MS) medium modified with 1.5 mg/L Benzylaminopurine (BAP) and 0.05 mg/L indole-3-butyric acid (IBA). Axillary bud break was achieved in one week on SI medium; MS medium supplemented with 3.0 mg/L BAP and 0.1 mg/L IBA irrespective of the genotypes. MS medium supplemented with 2.0 mg/L BAP and 0.5 mg/L Kinetin (Kn) (SM medium) was used to generate multiple shoots. Callus induction occurred in 10-30 days depending on the genotype. By week 6, the rate of callus induction ranged from 17.65% in genotype (Jat2) to 75.56% in (Jat5). The axillary shoot multiplication rate varied from 2.0 – 4.0 shoots per explant amongst the genotypes studied.

Findings/ Results: Only 4/10 genotypes regenerated directly from leaf explants cultured facing the adaxial side on the CI medium and the regeneration rate varied between 20%-60% among these genotypes. Callus induction and in vitro regeneration of J. curcas are genotype dependent.

Implications/ Relevance: The data presented is preliminary, considering that the work was carried out in 8 weeks and experiments were not repeated. To make the results more accurate, the experiments will be repeated with similar replications, including more genotypes. The pooled data will be analyzed using Analysis of Variance (ANOVA) and a test of significance (e.g. t test) to make it more accurate.
22. McKinnon, Bradley  
Major: Computer Science  
Status: Undergraduate Student  
FVSU Research Mentor: Dr. Cheryl Swanier  
Title: Windows or Mac OS  
Question/ Problem addressed by the research: Between Windows and Mac OSX, which operating system is more popular with average computer users?  

Methodology: Surveys, Sale Charts, and overall opinions  

Findings/ Results: Windows is the preferred operating system.  

Implications/ Relevance: To help average users make a choice more suited for them when looking to purchase a new computer.  

23. Murray, India  
Major: Biology  
Status: Undergraduate Student  
FVSU Research Mentor: Seema Dhir  
Title: What can you do with a degree in Forensics?  

Question/ Problem addressed by the research: What is the scope of Forensics?  

Methodology: Review of Literature  

Findings/ Results: Forensic biology is a sub-discipline of forensic science. Forensic science is the application of science to “matters of law”, that include crimes such as homicides, sexual assaults burglaries; disputes among individuals such as wrongful death, patents; establishing rights such as land disputes and investigation of disasters natural or man-made. A forensic scientist assists in recognition and collection of evidence, analyze evidence using scientific methods and assist attorney office and law enforcement office by testifying in the court room. A forensic scientist does not investigate crime scene or interrogate or arrest suspects. Samples from crime scene are sent to a crime lab for a variety of services including crime scene investigation, latent print examination, forensic biology, controlled substance analysis, postmortem toxicology, firearms, tool marks and trace evidence examination, explosives and fire debris examination. Some of the prominent branches of forensic science are – forensic anthropology, forensic entomology, forensic odontology and forensic biology. The job of a forensic biologist is to generate individual identifying characteristics from biological evidence such as blood or DNA. Upon completion of his/her education a forensic biologist may be employed by a state or federal crime lab or work for a crime lab in private sector.  

Implications/ Relevance: Knowledge about the depth and breadth of the forensics was gained. Increased curiosity to gain hands-on experience in forensic biology. Summer internship opportunity being sought to fulfill the gap.
24. Nesbit, Joseph  
**Major:** Agricultural Education  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Andrew Sharpley, University of Arkansas  
**FVSU Research Mentor:** Dr. Sarwan Dhir  
**Title:** Can Land Applying Spent Iron and Water Treatment Residuals Decrease Nutrient Runoff from Poultry Houses?  
**Question/ Problem addressed by the research:** Northwest Arkansas is home to over 1 billion broilers and is second only to GA in annual poultry production. With large numbers of poultry farmers, EPA has determined that dust particles from the poultry house exhaust fans contains high levels of phosphorus (P), which can be washed into streams in surface runoff when it rains.  

**Methodology:** One way to help combat this problem is by applying byproduct residuals from steel and water treatment plants that contain both iron (Red mud-RM) and aluminum (Water Treatment Residuals-WTR) in trays directly in front of exhaust fans to trap the dust as it exits the house. The residuals have a very high capacity to bind P, and stop it from leaving the site. With this being said once the byproduct residuals are applied we will collect them and run tests to see if they release Phosphorus (P) through surface runoff (rainfall simulation) in order to determine their binding potential and to determine if they release absorbed phosphorus overtime.  

**Findings/ Results:** The RM and WRT residuals sorbed or binded huge amounts of P. This was up to 10% by weight of material. In comparison, most soils can only bind less than 0.1% P by weight. Basically, the residuals act as a very efficient sponge for P. The application of both WTR and RM decreased the concentration of dissolved P in runoff from pastures. All treated residuals decreased the concentration of P in runoff compared to the control plot, except for WTR with 100% P saturation.  

**Implications/ Relevance:** The fact that the residuals absorbed a large amount of P makes it perfect to apply around broiler houses in order to decrease the nutrient loss going into runoff and then to streams. While the spent residuals may be used as a slow-release fertilizer, more research is needed on that specific aspect.

25. Norris, Ashley  
**Major:** Plant Science Biotechnology  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Seema Dhir  
**Title:** Study of the Factors Influencing Agrobacterium-mediated Plant Regeneration and Transformation using Moringa oleifera  
**Question/ Problem addressed by the research:** Moringa olifera Lam., commonly known as drumstick, has potential as a commercial medicinal and nutritional supplement. The present investigations were attempted to develop the rapid in vitro plant regeneration system and to standardize the Agrobacterium tumefaciens mediated transformation protocol from axillary shoot and via somatic embryogenesis.
**Methodology:** Axillary shoot growth was induced by supplementing MS medium with cytokinins. Of the three cytokinins tested, namely benzylaminopurine (BAP), kinetin (KN), and thidiazuron (TDZ), BAP at 2.5 mM was found to be optimal in inducing bud break, producing an average of 12-18 axillary shoots per explants after 4 weeks of culture. The elongated shoots were transferred individually on a root induction medium containing 0.5 mM indole-3-butyric acid (IBA) and within 4 weeks roots were produced. Fast growing white embryogenic callus were also established from leaf segments of in vitro raised plants on MS medium supplemented with 4.52 mM 2,4-D and 11.09 mM BAP. The highest induction frequencies of somatic embryos were obtained on MS medium containing 13.31 mM BAP and 3% sucrose with an average of 28 embryos per gram of callus. Early detection of plant transformation events is necessary for the optimization and to enhance the virulence to increase the transformation procedures. For this purpose some important parameters like types of explants, co-cultivation time and optical density of Agrobacterium culture medium were studied. Agrobacterium strain containing neomycin phosphotransferase (NPTII) gene as selectable marker and β-glucuronidase (GUS) as a reporter gene was used for transformation. Transient and stable GUS expressions were studied in transformed explants and regenerated calli respectively.

**Findings/ Results:** Highest transient GUS (70%) expression was observed at pH 5.8 after 3 days of co-culturing in 2-days-old explants. Optical density of 560nm=1 was considered optimal to obtain the highest transformation rate. Primary leaves showed higher transformation efficiency (80%) than hypocotyl (60%) or root (40%) explants. Results obtained were based on the percentage of GUS expression which was observed 2 days post-transformation.

**Implications/ Relevance:** The optimized parameters evaluated in this study can be key factors for other recalcitrant Moringa as soon as the methodological are optimized in Agrobacterium-mediated transformation system.

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26. Pickard, Benjamin  
**Major:** Plant Science Biotechnology  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Lakshmi S. Nair, University of Connecticut Health Center  
**FVSU Research Mentor:** Dr. Sarwan Dhir  
**Title:** Fabrication and Characterization of Lactoferrin Fibers  
**Question/ Problem addressed by the research:** Lactoferrin is an 80kda iron binding globular protein. It is produced by various exocrine glands and is present in breast milk. Lactoferrin’s uniqueness as a skeletal regenerative molecule lies in its ability to modulate the response of various cells involved in musculoskeletal tissue regeneration. Lactoferrin promotes proliferation of osteoblast cells and inhibits osteoclast mediated bone resorption, which makes it a potential candidate for use in bone tissue engineering. Electro spinning is a technique, which uses an electrical charge to ejaculate very fine fibers out of a syringe. The final product is a non-woven
fiber mat composed of nanofibers. The purpose of this study was to test feasibility of developing nanofibrous structures from human recombinant lactoferrin by the process of electro spinning.

**Methodology:** In this study different concentrations of lactoferrin solutions (100, 150, 200, 250 mg/ml) were spun along with gelatin (75mg/ml), which was used as a control. The Scanning Electron Microscope (SEM) images demonstrated the feasibility of forming fibers in the nanoscale. Mouse mesenchymal stem cells were cultured in basal media, which contains Alpha Minimum Essential Medium (αMEM) and 1% pen-strep, and basal media with and without 10% serum for 1 to 3 days followed by 3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium, (MTT) assay, to evaluate the cell viability.

**Findings/ Results:** This experiment shows that lactoferrin has anti-apoptotic properties, which may significantly improve the efficacy of cell based therapy for orthopaedic applications.

**Implications/ Relevance:** This study provides a novel, efficient method to prepare Lactoferrin nano-fibers by the process of electro spinning.

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27. Quinn, Brandon  
**Major:** Agricultural Engineering Technology  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Archie Williams  
**Title:** Biodiesel Feedstock Determination Using an Electronic Nose  
**Question/ Problem addressed by the research:** To collect and determine odor print characteristics of biodiesel fuels produced from materials known as sources of possible allergens to people. To determine if the electronic nose can determine the biodiesel feedstock is based on training samples of biodiesel fuel and biodiesel fumes.

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28. Richardson, Edenbur  
**Major:** Computer Science  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Dr. Ramana Gosukonda  
**FVSU Research Mentor:** Dr. Ramana Gosukonda  
**Title:** Robotic Warfare The Good, Bad, and Ugly  
**Question/ Problem addressed by the research:** War seems to be an unavoidable part of human nature, the consequences to which can only be described as tragic. Looking at the history of mankind the mentality towards war has not changed, but the weapons have.

**Methodology:** This study will investigate the potential of robotic warfare and the consequences that come about from the replacement of flesh and blood to metal and oil.

**Findings/ Results:** The results of this study explores the potential as well as problems (ethical and otherwise) of use of robotics on the battlefield.
**Implications/ Relevance:** Use of robotics in warfare has the potential to bring about major changes in the way we view the battlefield. The following questions emerged: with fewer human casualties for the winning side, will there be less sensitivity toward the real horror of conventional warfare? Could the possibility of a push button war desensitize us to the point that we no longer empathize with our enemy? Could robotic use in war make it easier provoke greedy manufacturers to promote war for profit? Can we really trust our leaders with the power to wage war without human costs?

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**29. Rozier, Key'erra**  
**Major:** Plant Science Biotechnology  
**Status:** Graduate Student  
**Research Advisor and Advisor Institution:** Harry Klee, University of Florida  
**FVSU Research Mentor:** Seema Dhir  
**Title:** The Scientific Process of Improving Flavor of Tomato  
**Question/ Problem addressed by the research:** Tomatoes are usually red fruit from plants of Solanum lycopersicum, commonly known as tomato plants. When picking a tomato, the appearance and firmness is the number one factor for commercial growers, but consumers always want better flavor. The flavor of a tomato is fairly complicated because of its many ingredients, which basically makes breeding for better flavor very difficult. Plant breeding techniques for high yields varieties has destroyed flavor. As yield of tomatoes per plant has gone up, sugar, acid, volatile and micronutrient content has gone down.

**Methodology:** The tomatoes tested (using sensory evaluation) in this study were derived from crosses of Maglia Rosa Cherry (a variety with good flavor) and FL8059 (a variety with poor flavor, but good commercial qualities). Fruit from plants derived from this cross were examined to find the best tasting tomato with good commercial attributes. Important commercial properties were looked at like fruit size, fruit appearance, and yield.

**Findings/ Results:** The attributes associated with good flavor were identified with high aroma volatiles and high soluble solids.

**Implications/ Relevance:** In the future, we plan to continue research on this aspect by testing more commercial varieties to find the best tasting tomato with high yields including sugar, acid, volatile and micronutrient contents.

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**30. Rozier, Ray**  
**Major:** Computer Science  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Ramana M. Gosukonda  
**Title:** Near-field- communication (NFC) Future of Peer-to-Peer Lending Information
**Question/ Problem addressed by the research:** Near-field communication (NFC) is an emerging technology in the area of peer-to-peer (P2P) lending information. As smartphones and other technologies evolve it is becoming a hot topic because of how useful in the near future it can be with the possibility of sending and receiving data rapidly without contact connections.

**Methodology:** This study reviewed the NFC uses, technology and signals and RF measurements on NFC units. This study further compared NFC technologies with conventional contact-less technologies with respect to communication between electronic devices in close proximity.

**Findings/ Results:** The results of this research indicated that the NFC technologies are far superior to that of other P2P technology or even other capabilities such as Bluetooth or Wireless LAN devices in lending information. Communications between NFC-capable devices can be active-active (peer-to-peer) as well as active-passive.

**Implications/ Relevance:** Near Field Communication (NFC) is a new, short-range wireless connectivity technology that that could be used in many applications. A simple touch or placement of a device close to something would initiate the desired service.

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**31. Rucker, Brittany**  
**Major:** Plant Science Biotechnology  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Harry Klee, University of Florida  
**FVSU Research Mentor:** Dr. Sarwan Dhir  
**Title:** Don’t Refrigerate Your Tomatoes; It Just Might Knock Your Socks Off!  
**Question/ Problem addressed by the research:** Tomatoes are often stored chilled to prolong shelf-life. When this happens, much of the tomatoes’ flavor is lost. To understand the basis for the loss of flavor after chilling, we analyzed 24 heirloom and modern tomato varieties before and after chilling.

**Methodology:** Taste panels were conducted on chilled and non-chilled fruit to determine which varieties lost flavor after chilling. The taste, smell, color, shape, and after-taste of different types of tomatoes were looked at and carefully recorded. The taste of some varieties, such as Maglia Rosa Cherry and Flora-Dade, were less affected by chilling. We also examined the effect of chilling on several biochemical attributes including sugars, acids, and aroma volatiles. High levels of glucose, fructose and citric acid are important for good flavor, while high levels of malic acid are associated with poor flavor.

**Findings/ Results:** Loss of glucose, fructose, and citric acid and increases in malic acid in chilled fruit may be responsible for the deterioration of tomato flavor after chilling. We also observed changes in levels of aroma volatiles after chilling of tomatoes. Increases in undesirable volatiles and decreases in desirable volatiles may also contribute to poorer flavor in chilled tomatoes.
Implications/ Relevance: These results may help researchers to develop a tomato that tastes better even after chilling.

32. Scott, Jasmine
Major: Plant Science Biotechnology
Status: Undergraduate Student
FVSU Research Mentor: Seema Dhir
Title: Genetic Transformation of Valeria (Valeriana officinalis L) through Agrobacterium
Question/ Problem addressed by the research: Valeria (Valeriana officinalis L.) is a hardy, perennial, flowering plant used as an herbal medicine. The roots contain a compound, Valerian, an excellent remedy for anxiety, nervous tension and insomnia. Tissue culture and molecular engineering have provided rapid methods to develop desirable varieties of cultivated plant species. Transient expression has a wide range of applications in molecular biology. The goal of this work was to establish an optimal transient expression system using Agrobacterium for T-DNA gene delivery into different explants from which the whole plantlets can be regenerated.

Methodology: Leaf explants derived from one-month-old seedlings of in-vitro-grown Valeria plants were infected by A. tumefaciens carrying a binary vector that harbors a gusA gene and an nptII gene. The infected leaf explants were incubated for three days before they were subjected to gusA histochemical assay. The transformability was determined as the percentage of leaf explants expressing the gusA gene and as the intensity of gusA expression per responsive leaf explant. Parameters tested in this study included - different acetosyringone, Silver Nitrate (AgNO3) and Calcium Chloride (CaCl2) concentrations used during the incubation period, wounding type and the length of the pre-culture period of explants prior to infection, different bacterial density (OD) and duration of immersion periods.

Findings/ Results: The results based on transient gusA gene expression of explants suggested that one month old leaf explants inoculated for 60 minutes with 0.4 OD and 150 μm acetosyringone, 60 μm AgNO3, and 0.25 μm CaCl2 showed 80-90 % transformation efficiency.

Implications/ Relevance: Therefore, the investigation of factors that influence T-DNA delivery is an important first step in the utilization of Agrobacterium in the transformation of Valeria tissues.

33. Smith, Derrick
Major: Plant Science Biotechnology
Status: Undergraduate Student
Research Advisor and Advisor Institution: Max Feldman, Donald Danforth Plant Science Center
FVSU Research Mentor: Dr. Sarwan Dhir
Title: Identifying Relationships of Soil Characteristics and Genotypes of Setaria viridis
Question/ Problem addressed by the research: The genetic and experimental tractability of Setaria viridis make this plant a useful model system for trait discovery applicable to other evolutionarily related C4 grass species (maize, sorghum, sugarcane, biofuel grasses). Our goal is to identify genetic adaptations that improve plant productivity in response to environmental variables by comparing the performance of natural Setaria viridis accessions in response to soil variables associated with their collection site.

Methodology: Chemical attributes including soil pH, electrical conductivity, and elemental composition were determined from the native soil of 73 different Setaria viridis natural populations. A moderate, but statistically significant positive correlation between these values and those derived the Soil Survey Geographic Database (SSURGO) is observed if the most extreme values are removed. Concurrently, we evaluated the performance of natural Setaria viridis accessions in response to elevated soil salinity.

Findings/ Results: Our results illustrate that natural accessions exhibit a broad spectrum of ability to germinate on soils with elevated salinity however this trait is not correlated with the salt content of soil found in their native habitat.

34. Smth, Jamika
Major: Food and Nutrition
Status: Undergraduate Student
FVSU Research Mentor: Dr. Linda D. Johnson
Title: Training Child Care Professionals to Make Healthy Choices about Food in Child Care Centers

Question/ Problem addressed by the research: Training using an evidence-based nutrition education course funded by a grant through Share Our Strength, a national non-profit organization, focused on engaging child care professionals caring for low-income children in a series of participatory cooking lessons using five modules. This training was intended to (1) empower child care professionals to provide nutritious meals for the children in their care and (2) to empower them to teach healthy eating habits to children in their care through learner-center training using recipes prepared during the training.

Methodology: Twenty-four child care professionals from five counties with minority children under the age of 6 in low income services areas were recruited through letters and flyers to home based and center based child care professionals. All participants completed an enrollment form. A survey administration protocol was used to gather data. The Fort Valley State University Human Subjects Committee reviewed and approved all research protocols, informed consent and subject release forms. Every child care professional completed an enrollment form, and participant waiver. The program impact on participants was evaluated by providing and analyzing participant surveys. Traditional pre and posttests protocols were administered, meaning that participants completed surveys both before the first session and after the last session. Surveys were scanned and analyzed by SNAP, a survey software program to determine whether new skills acquired by child care professionals were effectively used after training.
Findings/Results: The research results suggest that the training provided a significant degree of awareness and implementation of skills learned. While the data show positive trends, providers should increase water intake.

Implications/Relevance: These findings represent a subset of data from a larger study with other 10-hour training courses for child care professionals offered in various locations and further follow-up research will occur.

35. Troutman, Lance  
Major: Computer Information System  
Status: Undergraduate Student  
FVSU Research Mentor: Dr. Ramana M. Gosukonda  
Title: Cybercrime: How to keep children safe from abuse

Question/Problem addressed by the research: In this day and time technology has made major advancements. These advances also come with a few challenges, especially in the territory of unethical behavior. For example, the Internet has been used by predators and pedophiles to attract children and young adults and exposed them to illicit sexual activities. This has been a great concern for families as young children are often unable to differentiate right from wrong.

Methodology: This research selected software technologies including Internet Service Provider's parental block, reviewed them and compared them for security features and efficiency.

Findings/Results: The results indicated that there were differences in the technologies studied. Peer-To-Peer Marshall was a better solution because its programming structure was overall compatible with all operational software. Additionally, it gives a print out of any new clients that are created through its log-in information.

Implications/Relevance: Since the P-2-P software follows forensics practices and preserves a detailed log file of all activities it perform, it could be used to deter any negative interactions that a child may have online. It could also be used to prevent obscured content.

36. Vaidya, Brajesh  
Major: Plant Biotechnology  
Status: Graduate Student  
FVSU Research Mentor: Dr. Nirmal Joshee  
Title: Palynological studies on medicinal Scutellaria ocmulgee, a threatened plant from Georgia.

Question/Problem addressed by the research: Scutellaria ocmulgee (Ocmulgee skullcap) is a threatened species from Georgia. Palynological study is conducted to understand pollen behavior. The germination percentage of S. ocmulgee is studied on liquid and semi-solid substrates for pre-anthesis and post-anthesis staged pollen grains including the pollen viability
Though pollen tube formation is rare resulting in poor seed set, stigmatic surfaces show receptivity.

**Methodology:** Pollen viability assessment using different fluorescent staining methods, pollen germination in Brewbaker and Kwack medium, scanning electron microscopy to understand pollen morphology, pollen output using hemocytometer, aniline blue staining for pollen tube formation in pistil are used.

**Findings/ Results:**
1. Pollen viability on different substrate.
2. Difference in pollen viability in pre-anthesis and post anthesis stages.
3. Pollen shapes and sizes.

**Implications/ Relevance:** This work can be used to understand the palynological behavior, for conservation effort, and to understand why there is low seed set in medicinally important threatened Scutellaria ocmulgee.

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**37. Wimes, Jeremy**  
**Major:** Plant Science Biotechnology  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Harry Klee, University of Florida  
**FVSU Research Mentor:** Dr. Sarwan Dhir  
**Title:** Volatiles Analysis: Secret Ingredients of Taste in Tomato Commercial Varieties  
**Question/ Problem addressed by the research:** Due to traditional plant breeding techniques, the flavors of tomatoes have drastically declined. Breeding for flavor quality has been replaced by breeding for commercial traits. Certain traits found in the selected commercial variety were useful (i.e. shelf life, firmness). We maintained these useful traits by a crossing commercial variety with a flavorful heirloom variety with an aim of creating a better modern tasting fruit.

**Methodology:** There are several common methods available, such as Polymerase Chain Reaction (PCR), taste paneling (sensory evaluation) and Gas Liquid Chromatography (GLC) for volatiles analysis. Polymerase Chain Reaction was used to determine the presence of useful genes in the progeny of the crosses. The flavor was measured in weekly taste panels (sensory evaluation). The taste panels were conducted in the lab and tested using lab members. Weekly harvest tomatoes ripening showed the progress of the fruit which correlates with the taste panel results. Soluble solids were measured to determine sugar content, a key factor in tomato flavor. Through gas liquid chromatography, major aroma volatiles were determined, which are key essentials in great taste of tomatoes.

**Findings/ Results:** Our data supports the ability to produce quality flavored tomatoes with additional commercially important traits.
Implications/ Relevance: The biochemistry of the different tomatoes were analyzed and the data obtained from that can be used for future research into tomato flavor.

38. Whitfield, La'Keia
Major: Computer Science
Status: Undergraduate Student
FVSU Research Mentor: Dr. Xiangyan Zeng
Title: Unsupervised Classification of Remote Sensing Images

Question/ Problem addressed by the research: Satellite images have been the subject of extensive research in a broad range of applications, such as planning and management of public transportation systems and environment investigation. Remote sensing images come in different types, including visible, hyperspectral and others; they differ from each other in the number and the wavelength range of band measurements in each pixel. Visible data consists of pixels composed of three color values of red, green, and blue (RGB).

Methodology: This project explored the classification of ground objects using the RGB color information in remotely sensed images. The classification was conducted using the K-means algorithm, which is an unsupervised learning algorithm for the clustering problem and is popular for many applications. K-means clustering aims to screen n observations into k clusters in which each observation belongs to the cluster with the nearest distance. We used this method to classify the RGB pixels in a remotely sensed image into a pre-defined number of categories.

Findings/ Results: We have studied the classification problem from two perspectives. First, we compared the classification results of different color spaces. The image was converted from the original RGB space into another color space and classification was performed in the new space. We found that the new color space produced better classification maps. Second, we incorporated the spatial consistency of neighborhood into K-means. For example, a pixel in a cement parking area could be misclassified by the color information. Considering the spatial consistency in the neighborhood, this pixel is more likely to be a cement one than is any other categories. Therefore, a penalty term was added to the distance between this pixel and the non-cement categories in K-means.

Implications/ Relevance: The incorporation of neighborhood information achieved smoother classification maps. All computer programs in this project were written in Java programming language and the NetBeans development environment (IDE).

39. Whitfield, La'Keia
Major: Computer Science
Status: Undergraduate Student
FVSU Research Mentor: Dr. Ramana M. Gosukonda
Title: Technology Addiction: How Positive Influences Can Have Negative Effects
**Question/ Problem addressed by the research:** Technology is an intricate aspect of our daily lives with multiple benefits to quell our desires. However, a person who is addicted to technology could be classified in the same category as an alcoholic due to similar characteristics. Is technology addiction more prevalent among college students in their starter years or near the end of their college experience?

**Methodology:** In this research, a survey was conducted to identify technology addiction and its effects on students of Fort Valley State University (FVSU). The survey instrument included ten questions covering areas such as student's major, gender, technology use, and the year of their attendance at FVSU. The survey was conducted on 100 students.

**Findings/ Results:** Results of the survey indicated that there were differences among the students with respect to their technology use.

**Implications/ Relevance:** The research could be used to create preventive measures to decrease the possibility of technology addiction without sacrificing efficiency.

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**40. Williams, Alicia**  
**Major:** Biotechnology  
**Status:** Graduate Student  
**FVSU Research Mentor:** Dr. Sarwan Dhir  
**Title:** Cell Suspension Cultures Establishment and Transient Gene Expression in Arundo donax  
**Question/ Problem addressed by the research:** Arundo donax is a warm-season perennial grass that has received considerable attention as a potential dedicated biofuel and bio-product feedstock. Genetic improvement of this plant is needed for better cellulosic ethanol production, especially to improve cellulose-to-lignin ratios. Cell suspension cultures offer an in vitro system for mutant selection, mass propagation, gene transfer, and cell biology.

**Methodology:** Toward this end, cell suspension cultures were initiated from embryogenic callus and characterized with different cell type morphologies: sandy, fine milky and ultrafine cultures. Furthermore, we demonstrated transient expression of electroporation mediated DNA uptake in the intact suspension cells by measuring the activity of Green Fluorescent Protein (GFP) gene driven by the maize ubiquitin 1 promoter. The influence of several factors including electric field strength, buffer composition, and time course of transient gene expression, DNA concentration, enzyme, ice/heat and treatment was examined on GFP gene expression (number of green spots/cells).

**Findings/ Results:** Maximum GFP gene expression (an average of 2250 green cell/clumps using 1mL of fine cell suspension) was observed after 48 h when cell were pre-incubated with electroporation (EPR) buffer for 1 h, followed by electroporation with a single electric pulse of 500 V/cm discharged from a 0.25μF capacitor in the presence of 20 μg DNA/ml. Changing the electroporation buffer conductivity (with low-high salt concentrations), had maximum effect on the number of green cells. Similarly, increasing the amount of DNA from 20-50 μg/mL in the
EPR buffer had a slight effect on the expression frequency (from 1080-1295 green clumps/spots). The number of green cell was increased by 30 min pretreatment with an enzymatic solution (1% Cellulase R-S, 1% Macerozyme R-10), as well as heat and ice treatment before electroporation.

**Implications/ Relevance:** Our results indicate an efficient suspension cell and transient assay system can be used to facilitate gene expression and transgenic plant regeneration studies.

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**41. Williams, Andrea**  
**Major:** Biology  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Dr. Eric Stabb, University of Georgia  
**FVSU Research Mentor:** Dr. Celia Dodd  
**Title:** Determining Phosphate Source Utilization of Vibrio fischeri  
**Question/ Problem addressed by the research:** The goal for this project was to determine which organic and inorganic phosphate sources can support the growth of V. fischeri, a bacterium that can be isolated from the Hawaiian Bobtail squid, and to determine if there are luminescence phenotypes associated with various phosphate sources.

**Methodology:** Growth and luminescence curves were performed by using 1mM NAD+, 378 µM Na2PO4, 37.8 µM Na2PO4 and other phosphate sources as the sole phosphate source in minimal media (MM).

**Findings/ Results:** V. fischeri can utilize both inorganic and organic phosphate sources. ES114 (wildtype) and a PhoB deletion mutant (∆phoB) were tested, and we found that ∆phoB had a higher final OD in NAD+ compared to ES114. ES114 had a higher specific luminescence in 1mM NAD+ than ∆phoB.

**Implications/ Relevance:** By understanding the host-microbe interaction between the Hawaiian Bobtail squid and Vibrio fischeri, the interaction can serve as a model for other animal-bacteria interactions.

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**42. Williams, Micah**  
**Major:** Computer Science  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Drs. Ramana M Gosukonda & Cheryl Swanier  
**Title:** iRobot: Testing the Odometers Accuracy  
**Question/ Problem addressed by the research:** One of the most important systems on a robot is its pilot and odometry. These systems allow the robot to move and be accurate while doing so, enabling the robot to localize its position and path plan. The iRobotic platform which is used in many colleges for research purposes has a basic pilot and odometry system. This system uses
the on-board controller to monitor the power used by the motors to determine the distance and direction traveled by an iCreate robot.

**Methodology:** In this research, the accuracy of the iRobot’s pilot and odometry system was tested by programming the pilot. Components that were accountable for accuracy/inaccuracy were investigated. The iRobot was programmed to either move or turn. The movements were measured in millimeters or radians to see how accurate the odometry measurements were. An algorithm was designed to improve the inaccuracies of odometer system and it was tested for its helpfulness.

**Findings/ Results:** The results indicated that the iRobots’s odometer was not accurate and the inaccuracies were caused by battery power, wheel slip, and the speed in which the robot moved. Additionally, how the iRobot determines its distance and direction traveled had a flaw in it. The algorithm that was designed to improve the iRobot odometer accuracy was helpful but it was not able to correct it significantly due to the variables mentioned earlier.

**Implications/ Relevance:** In conclusion, the iRobot is a good platform for educational research. Although the odometry has its defects, it is mostly sensitive to angular error. When the pilot algorithm was implemented the accuracy was improved, but not significantly.

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**43. Williams, Micah**  
**Major:** Computer Science  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Dr. David S. Touretzky, Carnegie Mellon University  
**FVSU Research Mentor:** Dr. Cheryl Swanier  
**Title:** Chiara Mantis: Testing, and a Redesign of the Original  
**Question/ Problem addressed by the research:** The Chiara Mantis, a hexapod robot modeled after the praying mantis insect, has been two years in the making. The goals of the original insect-inspired design were static stability, power efficiency, and range of motion, but when testing there where several problems that arose that caused the legs, arms, abdomen flexion mechanism, and pan/tilt assembly to either fail, reduce range of motion, or be power inefficient. In this project we investigated an alternative design to reduce weight and complexity, reduce power requirements, and improve range of motion.

**Methodology:** This redesigned Mantis used more off-the-shelf parts than the original, to reduce cost and complexity. Solidworks was used to design the custom parts, which were fabricated from ABS, acrylic, delrin, or aluminum using a laser cutter, mill, lathe, and 3D printer.

**Findings/ Results:** Through the process of testing and redesigning the original mantis, a fully built hexapod has been realized, resulting in reduced weight and complexity, reduced power requirements, and improved range of motion.
Implications/ Relevance: The next step in this project is to integrate the Mantis (hardware) with Tekkotsu (software) and to create a model of the Mantis in Mirage, a virtual environment simulator, in order to start designing the motion and walking algorithms.

44. Williams, Shericka
Major: Plant Science Biotechnology
Status: Undergraduate Student
Research Advisor and Advisor Institution: Natalie N. Redmon, Florida A&M University
FVSU Research Mentor: Dr. Sarwan Dhir
Title: Identification of Proteins in Differentiated SH-SY5Y Neuroblastoma Cells Treated Chronically with Mu-opioid Agonist Damgo

Question/ Problem addressed by the research: Opioids used in treating chronic pain have a few disadvantages such as the development of tolerance and dependence. Opioid tolerance occurs when there is a loss of analgesic effectiveness because of prolonged opioid administration. The mechanism(s) of opioid tolerance is not well understood and a considerable amount of research is being conducted to understand these mechanisms. 2D-Gel based proteomic approach was used to identify proteins to investigate the mechanism for opioid tolerance. The purpose of this study is to identify proteins that are regulated during chronic treatment with mu-opioid agonist [D-Ala2, N-MePhe4, Gly-ol]-enkephalin (DAMGO).

Methodology: In this study, differentiated SH-SY5Y neuroblastoma cells were used as our model to show tolerance due to the natural expression of mu-opioid receptors 1 (MOR-1). The cells were grown in DMEM/F-12 media at 37°C, 95% air/5% CO2 and differentiated with Retionic Acid (RA) (10µM) for six days. The cells were chronically treated with DAMGO (10µM) and Naloxone, an opioid antagonist, (10µM) alone for 24 hours or pre-treated with Naloxone for 1 hour followed by DAMGO treatment for 24 hours. Real-time quantitative PCR (RT-PCR) was used to show changes in MOR-1 expression. 2D-Gel based proteomics were used to identify proteins that are regulated during chronic DAMGO treatment. RT-PCR showed changes in MOR-1 expression and 2D-Gel based proteomics showed changes in protein expression after chronic treatment with DAMGO.

Findings/ Results: The results indicate that identification of proteins in differentiated SH-SY5Y neuroblastoma cells using 2D-Gel based proteomics may help to explain a mechanism in the development of opioid tolerance.

45. Woodson, Ashley
Major: Environmental Health
Status: Graduate Student
FVSU Research Mentor: Dr. Clarence Riley
Title: An Update of the Health Status of North Central Health District 5-2

Question/ Problem addressed by the research: What is the current health status of the population served by the North Central Health District 5-2?
Methodology: Research was carried out to determine the current health status of the population served by the North Central Health District 5-2. This was completed using OASIS, SENDSS, and immunization records, and compiled into computer database for use by local, state, and national health offices.

Findings/Results: The common health disparities among the 13 counties of District 5-2 are cardiovascular disease, cancer, STDs, and injuries.

Implications/Relevance: The purpose of this research was to provide each county its updated health status in order to raise awareness and develop programs which aid in the health-care needs of the county's communities. This information is mainly used by those seeking grant funding, creating educational programs as well as educating the community.

46. Withrow, LaDonna
Major: Agriculture Education
Status: Undergraduate Student
FVSU Research Mentor: Dr. Curtis Borne
Title: A Longitudinal Study of the Diversity in Georgia Agriculture Education

Question/Problem addressed by the research: The Diversity in Agriculture Education in Georgia project was funded by Toyota Motors USA and the national FFA (Future Farmers of America) Foundation. The Purpose of project was to: 1. To increase minority enrollment in secondary and post-secondary agricultural education courses. 2. To increase enrollment in the College of Agriculture, Family Sciences and Technology. 3. To increase enrollment in Agricultural Education at Fort Valley State University. 4. To increase minority participation in state and national conferences and career and leadership activities.

Methodology: Longitudinal data was collected each semester from teachers and students at three partner high schools from fall of 2010 to spring of 2014.

Findings/Results: Analysis of the longitudinal data revealed that the female enrollment had increased; 66% of the enrollment at the participating high schools are Black / African-American, 32% are White / European-American, 1.82% are Asian and 2.8% are Hispanic; 84% of the FFA Officers are Black / African-American and 16% are White / European-American; 54% of the Career Development Event (CDE) participants were Black / African-American, 41% were White / European-American and 5% were Hispanic; 45% of the students earning FFA degrees were Black / African-American and 55% were White / European-American.; the number of Black / African-American students participated in state and national FFA events and conferences at a higher rate than other races.

Implications/Relevance: This research was done to show that the numbers of African American student participation in Agricultural sciences is growing each year.
ORAL PRESENTATION

1. Austin, Karleisha
Major: Biology
Status: Undergraduate Student
Title: An observation of feeding patterns in horses and parasitism
FVSU Research Mentor: Dr. Frederick McLaughlin
Question/Problem addressed by the research: Does feeding from the ground enhance parasitism?

Methodology: It was hypothesized in this study that the Tennessee Walker, who throws its food on the ground and eat, is more likely to have pin-worms than Standard Bred horses. Fecal samples collected from horses. Feeding patterns were observed in horses and parasitism. After using broad spectrum de-wormers to kill the worms, fecal samples from a male Standard Bred and Tennessee Walker, were collected over a day’s time period. Samples were collected directly from the ground. Bags were tightly secured and were identified with a permanent marker. Information about the age, sex and date of collection was recorded. Fecal samples were examined for worms on the same day or stored for processing next day. Lastly a fecal count was done to see if the medicine was effective or not.

Findings/Results: Parasitism is the single most important impediment in successful horse rearing all over the world, and many species of parasites are found to infect horses. Pinworm eggs are picked up by horses from contaminated feed, water, bedding, and may also be present on tail wraps, grooming materials, and even fence posts and stalls. Parasites are most successfully prevented through a combination of strategies such as, cleanliness, pasture rotation, deworming, and mainly decrease parasite burden in environment. Feeding practices affect chances of parasitism

Implications/Relevance: Provides greater insight into the importance of clean feeding practices.

2. Boynton, Anthony
Major: English
Status: Undergraduate Student
Title: The Dismissal of Black English as White Supremacist Perpetuation
FVSU Research Mentor: Dr. Washella Simmons
Question/Problem addressed by the research: What is the legitimacy of Ebonics? Why is there a dismissal of the language? What are the implications attached to dismissing its legitimacy? This is research project will discuss the denial of black culture in a linguistic sense.

Methodology: Using the research of scholars such as Geneva Smitherman's book Talkin' That Talk to legitimize Ebonics. Research in cultural studies and linguistics also aid to support the thesis.
Findings/ Results: By denying the Black English’s legitimacy we synchronously deny the people who speak the language and their culture. Such denial perpetuates white supremacist actions against black cultural conventions.

Implications/ Relevance: For a campus, specifically, where a large majority of students use Ebonics/Black English on a regular basis, the relevance is grandly obvious.

3. Brou, Richmond  
Major: Agricultural Economics  
Status: Undergraduate Student  
Title: Socio-economic and demographic factors that affect county level adult obesity rates in Georgia  
FVSU Research Mentor: Dr. Mohammed Ibrahim  
Question/ Problem addressed by the research: Obesity is one of the greatest threats to the health of America’s adult population. According to the Centers for Disease Control and Prevention (CDC), about 36% of U.S. adults are considered obese. In Georgia, self-reported obesity among adults in 2012 was 29.1%. Obesity in adults was defined as body mass index (BMI) greater than or equal to 30, where BMI is calculated as weight in kilograms divided by height in meters squared, rounded to one decimal place (Centers for Disease Control and Prevention). Obesity has been linked to numerous diseases an increased risk of numerous comorbidities, including high blood pressure, high blood cholesterol, type 2 diabetes mellitus, coronary heart disease, osteoarthritis, and asthma. In 2008, the estimated obesity related illnesses cost in the U.S. was 147 billion dollars. The goal of this research is to determine what social, educational, and economic factors associated with adult obesity rates in Georgia.

Methodology: Data were collected and analyzed to investigate factors associated with adult obesity for all 159 counties in the state. The ordinary least squares method was used in estimating the empirical model. The following factors were included in the model: education, unemployment, African America population in the county, number of fast food restaurants in the county and number of recreational facilities.

Findings/ Results: The results indicate African American population in county and the unemployment rate were associated with higher adult obesity rates at the county level. Factors such as education, number of fast food restaurants in the county and number of recreational facilities were found not to influence the adult obesity rates.

Implications/ Relevance: Programs that address adult obesity among African Americans and unemployment in Georgia will have a significant impact on the percentage of adult obesity in the state. These factors, however, need further in depth analyses to ascertain which policy prescriptions may be suitable to address adult obesity issues.
4. Davis, Jasmine  
**Major:** Biology  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Dr. Christopher Aiken, Vanderbilt University  
**FVSU Research Mentor:** Dr. Celia Dodd  
**Title:** Investigation of the Maturation Models in Human Immunodeficiency Virus-1  
**Question/ Problem addressed by the research:** To understand the maturation process of immature HIV-1 virus, proposed methods of maturation were studied. Based on previous studies, we predict that maturation of HIV-1 occurs through the proposed model of rearrangement.

**Methodology:** HIV-1 particles were produced through transfection of 293T cells. Following isolation and identification of HIV-1 core fractions using an auto-densi-flow gradient fractionator and ELISA, immature HIV-1 cores were treated with protease and run through SDS PAGE gels to isolate CA protein.

**Findings/ Results:** The data suggest that the capsid of immature HIV-1 virus rearranges during the maturation process supporting the proposed model of rearrangement.

**Implications/ Relevance:** In order to be infectious HIV-1 has to reach maturity. Finding out how it matures is relevant to the discovery of new targets in the development of new therapies. By better understanding the structure, one can target a specific point during the maturation process and keep the virus from reaching the infectious state, rendering it unable to replicate.

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5. Doyle, Craig  
**Major:** Agricultural Economics  
**Status:** Undergraduate Student  
**Title:** Consumer Willingness to Purchase Goat Milk Ice-cream  
**FVSU Research Mentor:** Dr. Mohammed Ibrahim & Mrs. Jackie Whitehead  
**Question/ Problem addressed by the research:** This research was done to determine if consumers’ are willing to purchase goat milk ice cream. This study is relevant because ice cream is one of America’s favorite frozen treats and if consumers cannot tolerate cow milk ice cream, in which most of today’s ice cream is produced, then an alternative which is ice cream produced by goat milk can be purchased. Goat and cow milk do not differ greatly because they both contain about 13% dry solids. Goat milk’s chemical structure is similar to a human mother’s milk with its complete protein containing all the essential amino acids without the heavy fat content and catarrh producing material in cow milk. They both contain lactose, which is milk sugar and the most important carbohydrate present, but goat milk lactose content is about 10% lower than that of cow milk which allows lactose-intolerant people to be able to tolerate it. Goat and cow milk both contain protein which is comprised of about 80% caseins and 20% whey proteins. The caseins are present in form of micelles which is large aggregates of protein and phosphate. However the number of small micelles is much greater in goat milk than cow milk. Goat milk also contains a larger number of small fat globules than cow milk. The folic acid and vitamin B12 content is lower than that of cow milk, but goat milk contains more vitamin A and
D. The composition of minerals in goat and cow milk are different in a few ways but the potassium, copper, and manganese content is higher in goat milk while zinc is low. These benefits make goat milk easier to digest because: the size of fat globules, medium chain triglycerides (MCT), and curb strength. Goat also produces less mucus providing relief to those suffering from respiratory complaints. (Cooke, 2010).

Methodology: This survey was administered in the FVSU building in October, 2013 at the Agricultural Exposition in Moultrie, Georgia. This event consists of many different schools, farmers and businesses with many visitors so the sample consumers were very versatile. The surveys were given to consumers after they sampled the goat milk ice cream. The survey consisted of eleven questions in which age, gender, race, education, household income, taste, willingness to purchase, knowledge of the product, and comparison of the goat milk ice cream to cow milk ice cream were the relevant variables. A total number of 87 surveys were collected. After collecting the surveys and coding them in a data base, descriptive statistics was used to determine the percentage of each variable or question. Descriptive statistics was to determine the varieties of age and income, and how they influence the consumer willingness to pay for goat milk ice cream at different prices.

Findings/ Results: The findings of this research revealed that out of the 87 usable surveys 43% of the consumers had tried goat milk ice cream before. There were 54 consumers that tried the vanilla flavored goat milk ice cream and 83% of them rated the taste very pleasant, while 17% of them rated the taste pleasant. Strawberry flavored goat milk ice cream was also sampled and out of the 34 consumers that sampled it, 85% of them rated the taste very pleasant, while 15% rated it pleasant. Consumers were asked to rate the taste of goat milk ice cream and compare it to cow milk ice. Out of the 87 consumers who sampled the goat milk ice cream, 84 answered the question. Of the 84, 46% of them described the taste as better than cow milk, while 52% rated the test about the same and 1% was undecided about the comparison. Consumers were also if they would be willing to purchase goat milk ice cream if it was available for sale. Out of the 85 who answered the question, 100% said yes they would. Since this survey suggested that consumers were willing to purchase goat milk ice cream if it was available for sale, it was important to determine how much they were willing to pay. Eighty-six consumers responded to this question. Out of the 86, 7% was willing to pay 25 cents, 19% was willing to pay 50 cents, 16% was willing to pay 75 cents, 30% was willing to pay one dollar, and 28% was willing to pay over a dollar. The finding showed that 69% of the consumers who took the survey were white, while 26% were black, and about 5% was another race. The majority of the respondents were males (55%) and 45% were females. The average age of the respondents was about 38 years old, and the average education level was at least a high school diploma. Since this research is to determine consumers’ willingness to pay for goat milk ice cream, respondents were ask what was their household income for the previous year. Out of the 66 who answered the question, 15% of them made less than 20,000 dollars a year, 9% of them made between 20,000-29,999 dollars, and also 9% of them made between 30,000-39,999 dollars a year. About 18% of them made between 40,000-49,999 dollars a years, while 48% of them made 50,000 dollars or more. The majority of the respondents made 40,000 dollars or more (76%) and out of that 76%, 48% made
50,000 dollars or more. The average price consumers are willing to pay for the ice cream is between 75 cents and one dollar.

Implications/ Relevance: Consumers do enjoy the taste of goat milk ice cream, and are willing to purchase goat milk ice cream if it was available for sale and ice cream can be that perfect path to happiness in the moment, but the after effects have been unhappy for too many (lactose intolerant) for too long. Laloo’s is a major producer of goat milk ice cream with 100% goat’s milk. Research shows that goat milk is higher in nutrient rich proteins, lower in fat, easier to digest for the millions of people who are sensitive to cow’s milk (Laloo’s, 2013). Therefore, realizing that this study was conducted on a small scale and more research is needed, in time, this product just may become the world’s leading market seller.

6. Early, Marci
Major: Mathematics
Status: Undergraduate Student
Research Advisor and Advisor Institution: Ajiri Ogbimi, & Dawit Aberra
FVSU Research Mentor: Dr, Dawit Aberra
Title: Mathematical Aspects of Energy Conservation and Auditing Tactics
Question/ Problem addressed by the research: What are the Mathematical Aspects of Energy Conservation and Auditing Tactics?

Methodology: As a part of a grant from the United States Department of Defense, the Cooperative Developmental Energy Program at Fort Valley State University sponsored a 9-week Internship program in which selected students participated in research on energy conservation and renewable energy resources. The interns were instructed to perform energy audits on three specified facilities on the campus of Fort Valley State University (FVSU) in hopes of reducing the amount of money spent on utilities, as well as improving the comfort level of the occupants and ultimately reducing the amount of energy used. The three specified facilities were selected on a basis that the buildings differed in age. Patton Hall, the oldest of the buildings, was built in 1920, The Computer, Technology and Mathematics building was built in the 1980s, and the Academic Classroom and Laboratory Building, the newest of the buildings was built in 2006. Energy auditing tactics including the use of modeling/simulation programs, onsite walkthroughs, utility bill analysis (where available), and benchmarking techniques. The calculations involved in this research were extensive and spread themselves in different areas of mathematical analysis.

Findings/ Results: After performing the necessary calculations, we were able to present the acceptable total cost of energy, payback period, annual energy, and financial savings for each of the three buildings.

Implications/ Relevance: Currently, there has been a worldwide focus on the amount of energy we as humans are consuming. Our energy consumption effects the environment in which live. Whether it’s the pollution of our air supply, the depletion of the ozone layer, or the warming of
the globe, even the smallest of our actions have significant effects. By performing energy audits on our school, we are helping to contribute to a betterment of our environment and our future.

7. Gary, Oneisha  
Major: Agricultural Economics  
Status: Undergraduate Student  
Title: Willingness to Pay for Georgia Grown Pecans  
FVSU Research Mentor: Dr. Mohammed Ibrahim & Mrs. Jackie Whitehead  
Question/ Problem addressed by the research: The objective of this study was to determine factors that influence consumers’ willingness to pay an extra amount for Georgia Grown Pecans. The study was also conducted to determine how responsive consumers are to purchase produce with the Georgia Grown label or symbol on the package.

Methodology: The data for this research were collected by the Fort Valley State University State Agricultural Research Department at the 2010 Georgia National Fair. Surveys were given to Fair attendants who passed by survey station. The questionnaires covered consumer’s views of fresh produce, definition of locally grown foods, and well known produce that are grown in Georgia. In addition, the survey also included questions relating to demographic information of age, gender, income, education, and number kids with the household. The questions that were related to the consumer willingness to pay for Georgia Pecans were the main focus of the survey. A total of 748 completed surveys were collected over a five day period. The logit model was used in this study. The model was chosen for this analysis because the dependent variable is binary meaning the dependent variable can only take two possible variables; usually 0 or 1. Because the resources gathered are the expressions of individual perspectives; the estimations are predicted to be consistent and reasonable. The equation below was developed to predict the probability that the respondent would be willing to pay at least one to twenty cents additional to the set price for Georgia grown pecans.

Findings/ Results: The results from the logit model indicate that respondents with a high school education, bachelor’s degree, married, or white were more likely to pay extra for Georgia Grown Pecans. The results also indicated that the likelihood of paying additional amounts, preferably one to twenty cents more for Georgia Grown Pecans decreases among respondents in the $75,000 or more income bracket.

Implications/ Relevance: In this particular model education and income were high risk aversions toward the initial expectation of having a greater willingness to pay extra for Georgia grown pecans, therefore; one variable was eliminated from each group to prevent perfect collinearity. To our knowledge there have been no other studies to determine the factors that influence consumer willingness to pay for Georgia grown pecans. The results of this study will be beneficial to Georgia pecan producers, policy makers and researchers.

8. Hall, Altony
**Major:** Mathematics  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Dr. Lawrence F. Drummy, Air Force Research Labs, Dayton, OH  
**FVSU Research Mentor:** Dr. Dawit Aberra  
**Title:** Model-Based Low Voltage Image Analysis of Core-Shell Hybrid Nanoparticles  
**Question/Problem addressed by the research:** Core-Shell nanoparticles have a wide range of uses. One of the more important uses is in Nano-Dielectrics. Before a particle can be used as a Nano-Dielectric component, we must first assemble the particles and characterized their assembly. A few challenges arise through the process, however. To address challenges in assembly, the following hypothesis can be formed. How does the polymer shell molecular weight and grafting density affect the measured shell thickness and particle to particle spacing in hairy nanoparticles and their assemblies? The next challenge surrounding core-shell nanoparticle application involves determining which characterization techniques are suitable for the direct determination of polymer shell properties. Of these properties, the primary property of interest is extraction of shell thickness data. An effective characterization of core shell nanoparticles is critical due to the presence of shell material on the core surface.

**Methodology:** To begin creating an understanding of this phenomenon, surface grafted polymers must be explored. It is understood that as grafted chain density increases, chain-chain interactions cause an extension of the polymer chains, forming what is known as a polymer brush. The general relationship between polymer brushes involves the power scaling law relation between swollen brush thickness and grafting density. The analytic approach to the grafted polymer brush exploits that grafted chains of high molecular weight are increasingly strongly stretched relative to their ideal radius. These ideas, which center on brush theory, serve as a basis for exploration. For 0D assemblies or single particles, shell thickness is predicatable by brush theory on curved surfaces. For 1D, 2D and 3D assemblies, apparent shell thickness is reduced as polymers from neighboring particles interpenetrate.

When deciding upon characterization techniques, the following factors must be considered: measurement of size, shell thickness, elemental and surface analysis, optical properties, thermal stability and dielectric properties. The characterization techniques can classified into a small set of categories: microscopic analysis, spectroscopic analysis, scattering analysis and thermal gravimetric analysis. Microscopic and scattering analyses serve as the center of focus for this research.

Microscopic analysis is the most commonly used technique for visualizing nanoparticle types. Scanning electron microscopy is the most common technique for analyzing nanoparticle size and shape. This technique, however, presents great difficult in distinguishing the difference between core and shell materials as it only generates a surface image. A higher magnification SEM option called field-emission SEM (FESEM), which provides additional information about the shell including its rough or smooth characteristic, has become increasingly useful. Transmission electron microscopy (TEM) is able to provide a host of additional information about core-shell nanoparticles: confirmation of core/shell formation through contrast difference, overall particle...
size, core size, shell thickness, uniform or non-uniform shell coating, lattice fringes of the shell material, etc. The differences in contrast give way to eased measurement of particle size and morphology. The limitation of these techniques – SEM and TEM – includes their inability to generate 2D images of the surface, so surface characteristics are difficult to determine. To counteract these limitations a series of items must be done which will be discussed later.

For our experimental purposes, the focus of this research will be on the measurement of particle size, particle spacing and shell thickness. The experimental stages of the particle analysis include first the synthesis of the particles which we call Hybrid (Hairy) NanoParticles, synthesizes using a grafting form. The stages of this grafting form of synthesis include the functionalization and polymerization of styrene in to 3 Sample types. These three sample types have similar grafting densities and varied molecular weight of the polymer.

To characterize the particles we use Low Voltage TEM and Electron Tomography. The Low Voltage TEM provides direct measurement of brush height and the Tomography provides direct 3-D imaging of silica particle packing. To find the direct measurement of the brush height, ImageJ, a photo processing software is used. This software allows for intensity scans of particles within the images to be taken. This intensity data is then imported in to Excel, where estimations of shell sizes are made. This same data is then then fit to a core-shell model developed in Mathematica for 2nd level comparison of the data. The product of these two methods, are graphs of best fit to our core-shell model and a table containing the estimated brush heights of the particles.

**Findings/ Results:** This research is ongoing, and results are not available for distribution at this current moment. A series of findings have arisen thus far in research, however. Of these findings one of them includes the first hand observance is layering in the particle composite has led to a discussion as two whether or not layering occurs at the substrate of the composite or on the composites surface. Through 3D tomographic reconstructions in our own research, we are arguing the existence of layering at the surface because of large aggregates found protruding from said layer. This argument contradicts the argument led by Bockstaller in the ACS Nano 2011.

**Implications/ Relevance:** The impact of this research is found primarily in the "Solids & Films" sector of the field of material science. The use of hybrid core-shell nanoparticles is essential to modernizing and streamlining the applications of: print electrics, data storage, conductive lubricants, dielectrics, optics, dynamic damping and alloying.

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9. **Hardaway, Rickell**  
**Major:** Mathematics  
**Status:** Undergraduate Student  
**Research Advisor and Advisor Institution:** Dr. Byron Winston & Dr. Thad Scott, University of Arkansas  
**FVSU Research Mentor:** Dr. Dawit Aberra
Title: Are Northwest Arkansas Lakes Sources or Sinks of Carbon Dioxide to the Atmosphere?

Question/Problem addressed by the research: Our research focused on two questions: 1) Does Carbon dioxide limit primary production; and 2) are inland waters sources or sinks of Carbon dioxide?

Methodology: During this study, our data focused on a 25 month span from May 2011 to May 2013. The lakes used in the study were three Northwest Arkansas Bella Vista lakes: Brittany, Norwood, and Rayburn. For each lake, data was taken from 12:00 am- 11:45 pm daily from May 2011- May 2013. The temperature, pH, Specific conductivity, Dissolved Oxygen (DO) concentration, and Depth were measured for each lake every 15 minutes. Using Microsoft Excel, the data for each of the three lakes was separated by year and divided into months and weeks. The data for each lake was reviewed, checking for values that were out of range due to machine error and the recommended pH range for aquaculture. Next, we estimated daily variations in pH for August 14, 2011 and 2012 because this is typically the hottest time of year and the lake is actively involved in photosynthesis. We analyzed the relationship between dissolved oxygen concentration and pH and then derived measurements for alkalinity, Carbon dioxide, Carbon, and other areas. Lastly, we calculated daily averages of the Carbon in the lake for each day that data was recorded per lake. Those averages and corresponding dates were input into Sigma Plot to construct a graphical representation of the partial Carbon dioxide measured for each lake.

Findings/Results: After analyzing the data from the daily variations in partial Carbon dioxide (pCO2) in our data set, we found that during the summer months, the pCO2 was below atmospheric levels and during winter months, pCO2 rose above atmospheric levels. This means that during summer months, the lakes acted as sinks of Carbon dioxide to the atmosphere and primary production was limited whereas in the winter, the lakes acted as sources of Carbon dioxide to the atmosphere and there was no limitation of primary production.

Implications/Relevance: Atmospheric Carbon dioxide is increasing and has reignited discussion on the role of Carbon dioxide in aquatic systems by focusing on whether primary production is limited by Carbon dioxide and whether inland waters are sources or sinks of Carbon dioxide. Given the important role that Carbon dioxide plays in the regulation of the regional and global climate, accurate representation is needed.

10. Harrison, Allante
Major: Mathematics
Status: Undergraduate Student
Research Advisor and Advisor: Xiaofeng Meng & Zhigang Peng, Georgia Institute of Technology
FVSU Research Mentor: Dr. Dawit Aberra
Title: Detection of Missing Earthquakes within the Barnett Shale of Texas Using the USArray
Question/Problem addressed by the research: With new data from the transportable array of seismic stations and the discovery of "missing" earthquakes, what is the relationship between
hydraulic fracturing based fluid injection and seismic activity in an area with that is not normally susceptible to natural seismicity?

**Methodology:** The research was put together through a combination of three stages: (1) the identification of "missing" (uncatalogued) earthquakes using waveform cross correlation techniques, (2) the accessing and analysis of fluid injection well data, and (3) the interpretation of data to find possible relationships between injection and earthquake occurrence.

**Findings/ Results:** During one month of study, we noticed a sharp increase in earthquake occurrence. Injection data for individual days within a month were not available, so the study interval is being expanded to verify the hypothesis that these are "induced" earthquakes.

**Implications/ Relevance:** Once a relationship is identified, improvements can be made to hydraulic fracturing practices and the public can be advised to take proper steps to lessen incurred damage from these earthquakes.

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11. Haynes, Merriah  
**Major:** Biology  
**Status:** Student  
**Title:** The effect of nitrogen fertilizer on mustard greens  
**FVSU Research Mentor:** Dr. James Brown  
**Question/ Problem addressed by the research:** What is the effect of nitrogen fertilizer on mustard greens?  
**Methodology:** Grew mustard greens in different concentrations of nitrogen  

**Findings/ Results:** The Earth’s atmosphere is made of 79% of nitrogen. Plants cannot use the form of nitrogen in the atmosphere because the triple bond in nitrogen is one of the strongest bonds. It takes a lot of energy to break it apart making nitrogen gas nonreactive. Nitrogen concentration fertilizers are directly applied to plants instead. The purpose of this research was to compare the growth of plants without and with added nitrogen fertilizer. A higher percentage of nitrogen concentration fertilizer will allow plants to grow twice its size. The Mustard Greens were grown in organic soil and were watched carefully for growth changes without applying fertilizer. After thirty days of growth nitrogen fertilizer were measured in treatments of 0g, 40g, 80g, 120g, and 160gm and were directly applied to plants. Nitrogen fertilizer did make the plants grow healthier and stronger but the mustard greens that had a treatment of 120g or more of nitrogen fertilizer did not last as long as the Mustard Greens that had treatments of 80g- 120g of nitrogen fertilizer.  

**Implications/ Relevance:** Nitrogen fertilizer affects the growth of mustard greens.

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12. Hernandez, James
Major: Biology  
Status: Undergraduate Student  
FVSU Research Mentor: Dr. Celia Dodd  
Title: Effect of Brominated Flame Retardant BDE-47 on the Developing Nervous System in C.elegans  

**Question/ Problem addressed by the research:** Elevated levels of brominated flame retardants have been correlated to the increased incident of neurobehavioral disorders in children. In order to elucidate the mechanism of BDE exposure on the nervous system toxicological models of flame retardant exposure must be developed. The current study examined the use of C.elegans as a whole organism model for detecting flame retardant neurotoxicity.

**Methodology:** Following synchronization neuronal GFP expressing C.elegan strain NW1229 eggs were collected and treated with BDE-47 (0 uM, 2uM, 5uM). Worms were then plated and allowed to develop to L2 to L3 larval stage before analysis of effects on neuronal development through fluorescent microscopy.

**Findings/ Results:** Analysis of the nerve ring revealed a significant increase inerve ring neuronal content following chronic developmental exposure to BDE-47.

**Implications/ Relevance:** The results of this study imply that 1) C.elegans represents a useful model for studying neurotoxicity of brominated flame retardants and 2) BDE-47 could potentially effect brain development in children exposed in utero.

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13. Hudgens, Andrew  
Major: Biology  
Status: Student  
Title: An Evaluation of the Effectiveness of De-wormed Horses in Middle Georgia  
FVSU Research Mentor: Dr. Frederick McLaughlin  

**Question/ Problem addressed by the research:** Does the size of the pasture makes a difference?

**Methodology:** The purpose of this was to test the effectiveness of the deworming regime performed on horses at Fort Valley State University (FVSU) and a farm in Reynolds, Georgia. The experiment was tested by two methods: a fecal egg count procedure and the compared stool samples for horses in Reynolds, Georgia. Based on the controlled environment, pasture rotation and size, and the close monitoring of the horses at FVSU, we hypothesized that FVSU would have an effective de-worming program. Four fresh stool samples were taken from the horse pasture at FVSU and the pasture in Reynolds, Georgia. Each three-gram sample of feces involved were mixed in a 10 ml solution of fecasol, and placed in test tube with cover slips on top. This allowed the eggs to float to the top of the cover slip, and then each sample was placed on a slide and viewed under the microscope. With each sample, an egg count and identification was determined.
FVSU Research Mentor: Dr. Mohammed Ibrahim

**Question/ Problem addressed by the research:** In Georgia, like the rest of the U.S., goat meat consumers are mostly immigrants from traditional goat meat consuming nations. Anecdotal evidence however shows that some native born Americans also consume goat meat and goat meat products. The goat meat market is very informal and segmented. On the supply side, domestic meat goat producers are mostly native born, majority of who do not consume goat meat. The U.S. has been a net importer of goat meat since 1991 (Ibrahim, 2008). U.S. goat meat imports come mainly from Australia and New Zealand. It has been suggested that as immigrants get assimilated they may change their consumption behavior, thereby shifting their consumption away from goat meat and to more traditional American meats. For the goat industry to be sustainable, it is therefore timely to market goat meat to more native born Americans. The study attempts to identify current goat meat consumers as well as potential goat meat consumers in Georgia. Insights gained in this study will benefit meat goat and meat goat industry as well as researchers in the state of Georgia.

**Methodology:** The Survey Research Center at the University of Georgia conducted the survey between April 17th and May 18th, 2012 when a telephone interview was administered to an RDD (Random Digit Dial) probability sample of 593 Georgia residents 18 years old or older. The purpose of the survey was to assess the proportion of Georgia residents who reported eating goat meat, and to determine various preferences for those that eat goat meat. Estimates based a sample of this size are subject to sampling error of +/- 4.0% at the 95 percent confidence interval. Sampling error is the probable difference in results between interviewing a sample of the population of adult Georgians versus interviewing the entire population of adults in Georgia.
Sample surveys are subject to other sources of error such as non-response error and error associated with the wording of questionnaire items. The cooperation rate for the study was 42.6%.

**Findings/ Results:** This paper reports descriptive statistics of the preliminary analysis of the Georgia goat meat consumer survey. Results indicate that about 15 percent of respondents reported that they or a family member have tasted or eaten goat meat, while 85 percent of the respondents said they had never tasted or eaten goat meat. Of those who said they had tasted or eaten goat meat, 26 percent reported purchasing raw goat meat. When asked whether they would be willing to buy goat meat if it was made available in their local store, about 54 percent respondent in the affirmative. In terms of where they purchase goat meat, 16 percent of the respondents indicated they buy their meat from ethnic meat shops and 15 percent said they purchase from ethnic grocery stores (e.g., international markets). About 48 percent agreed that domestic goat meat is safer than imported meat. As for paying a premium price for domestic goat meat, 42 percent of the respondents were willing to pay a premium price.

**Implications/ Relevance:** Goat meat consumption could be increased, especially among the native born population, by targeting those who are willing to taste goat meat.

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**15. Lyons, Dearl**  
**Major:** Biology  
**Status:** Undergraduate Student  
**Title:** The association between rheumatoid arthritis and periodontal disease  
**FVSU Research Mentor:** Dr. Frederick McLaughlin  
**Question/ Problem addressed by the research:** What is the relationship between rheumatoid arthritis (RA) and periodontal disease?  

**Methodology:** We hypothesized that patients with RA will have a much more severe form of gum disease. In this study, dental patients with rheumatoid arthritis and periodontal disease were asked to sign a consent form to complete a survey. Anonymous clinical cases in a dental practice as well as other clinical research data were examined.

**Findings/ Results:** There has been a statistical link between periodontal disease and rheumatoid arthritis (RA). Rheumatoid arthritis is a chronic inflammatory disorder that typically affects the joints, hands and feet, but may affect other joints in the body. However, periodontal disease, also referred to as gum disease, can range from simple gum inflammation to serious gum disease, in which there is major deterioration of soft tissue and bones that support the teeth.

**Implications/ Relevance:** There is a close association between rheumatoid arthritis and periodontal disease.

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**16. Mathews, L’Airnece**
**Major:** Biology  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Frederick McLaughlin  
**Title:** Microbial organisms found in the Flint River; Taylor County, Reynolds, Georgia  
**Question/ Problem addressed by the research:** How do temperature changes affect the microbial population in the Flint River?

**Methodology:** We hypothesized that Escherichia coli, commonly called E. coli (fecal-coliform bacteria) and Salmonella may be found in the Flint River. Testing for individual disease-causing agents is possible and is often done where there is a known or suspected outbreak of a water-borne disease. Samples were collected from the Flint River located in northeastern Taylor County, on Highway 96 off Ward Edwards Bridge to find if any bacteria and organisms are at this location. Data collected were the temperature of the water in degrees Celsius, the air temperature in degrees Fahrenheit, the wind speed, and percent cloud cover. The pH of the water samples were taken and then transferred to nutrient agar plates and placed in an incubator for 24-36 hours at a temperature of 37 °C to promote bacterial growth. Next, various tests were utilized to determine what bacteria were present.

**Findings/ Results:** Rivers are self-formed and maintained and are known for being unidirectional in flow, having linear form, and fluctuating discharge. The Flint River is a 344-mile-long river in Georgia that supports recreation, fisheries, and local economies. Rivers evolve in response to climate, geology, and weathering. They are also affected by their surrounding terrestrial ecosystem, human presence and utilization, as well as environmental change. Most bacteria found in rivers are harmless to humans and are natural components of lakes, rivers, and streams. However, certain bacteria have the potential to cause sickness and disease in humans. The tests include: Gram stain, Triple Sugar Iron (TSI), Eosin Methylene (EMB), Simmons Citrate, and the drug sensitivity test. Gram stain testing has resulted in both gram positive and gram negative bacteria. One has been classified as E. coli. Further, research also shows that there is some amount of Klebsiella and Clostridium. The drug sensitivity test was performed on Klebsiella, finding that it was resistant to the antibiotics used for this research.

**Implications/ Relevance:** Temperature changes affected the microbial population of potential pathogens.

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**17. Oyemakinwa, Isaiah**  
**Major:** Mass Communication  
**Status:** Undergraduate Student  
**FVSU Research Mentor:** Dr. Andrew Lee  
**Title:** Advertisers Pressuring News Publications and Influencing Newspaper Content  
**Question/ Problem addressed by the research:** Is newspaper content influenced by advertisers? Do the newspaper’s affiliations compromise the articles being written for those publications? Are ad directors at small newspapers more likely to compromise their editorial
integrity than those at large newspapers? Does the size of the newspapers affect the possibility of biased articles?

**Methodology:** The research will use a quantitative approach, where the New York Times and the Atlanta Journal Constitution will be examined to determine whether advertisers influence news content of the newspaper content.

**Findings/Results:** The owners of the publications do not directly play a role in influencing the news publication’s content. The affiliations of the two media companies Cox Enterprises, Inc. and The New York Times Company which publish the newspaper do not have any affiliations that would corrupt the information being released through the newspaper.

**Implications/Relevance:** If possible, in the future this research paper would be presented to newspapers and magazine publications. The presentation to the publications would inform them of the possible corruption advertising can potentially have on a publication and the obligation for clarification in regards to their ethics. This information would be presented to media companies so they can gauge the factors that may affect the news content. Advertising executives would be presented this information to be informed about the output that their influence can have and the audience’s reaction towards biased news content.

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**18. Pickett, Glenda**  
**Major:** Social Work  
**Status:** Undergraduate Student  
**Title:** Dangers of Co-Sleeping with Infants  
**FVSU Research Mentor:** Ms. Juone Brown  
**Question/Problem addressed by the research:** Is it safe to sleep with your infant/newborn?

**Methodology:** Data used from Georgia Child Fatality Review Direct Observation with families; home visits

**Findings/Results:** There has been an increase in the number of infant deaths due to co-sleeping.

**Implications/Relevance:** Information gathered will be used to secure grants to help educate mothers and fathers about the dangers of co-sleeping.

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**19. Pierre, Jhefte**  
**Major:** Music  
**Status:** Undergraduate Student  
**Title:** Chorales and African American Spirituals Remixed: An Inspiration from J.S. Bach and Samuel Coleridge-Taylor  
**FVSU Research Mentor:** Dr. Ya-Hui Cheng
Question/ Problem addressed by the research: How the musical composition can fuse the styles from Johann Sebastian Bach and Samuel Coleridge-Taylor?

Methodology: Harmony and Voice Leading Findings/ Results: Sacred music was deeply influenced by the social and cultural background in which composers resided. By discovering the compositional skills from J.S. Bach and Samuel Coleridge-Taylor, I applied what I have found into my composition "Psalm 139" which will be discussed in my talk.

Implications/ Relevance: J.S. Bach's music demonstrates the church music from the result of the protestant movement in 18 century. Samuel Coleridge-Taylor presents the African Spiritual from the African Diaspora in 20 century. My work "Psalm 139" fuses their styles to demonstrate the neo-spiritual hymn in the 21 century.

20. Storey, Brittany
Major: Biology
Status: Undergraduate Student
Research Advisor and Advisor Institution: Dr. Eddilisa Martin, University of North Texas Health Science Center
FVSU Research Mentor: Dr. Melinda Davis
Title: Breast Cancer Prevention
Question/ Problem addressed by the research: Overcoming barriers to breast cancer screening among high-risk women in Dallas, Texas.

Methodology: The research was put together by a breast cancer prevention program held for 8 weeks and surveys for participants to complete during each session.

Findings/ Results: Women were more educated about breast cancer and understood the importance after class sessions were completed.

Implications/ Relevance: I concluded that a higher percentage of women in lower income areas lack the knowledge and resources needed regarding breast cancer.

21. Whitfield, La'Keia
Major: Computer Science
Status: Undergraduate Student
Title: Virtual Environments and Visual Programming: Combatants Against and Allies for Society
FVSU Research Mentor: Dr. Cheryl Swanier
Question/ Problem addressed by the research: Computing has become an intricate aspect of our daily lives. Cell phones, iPads, and laptops only scratch the surface of how computing has influenced our society. Virtual environments and visual programming are two tools that we use to promote diversity in computing in K-12 education.
Methodology: Technology has changed not only our educational system, but also our social environment and various other fields. Whether we acknowledge this fact or not depends on how much of an impact technology has made on our daily life, and how far we’re willing to go with its usage.

Findings/ Results: Whether a student learns in a physical environment or a virtual environment, there will still be challenges not just for the student, but for the teacher as well.

Implications/ Relevance: In conclusion, each source has revealed several aspects of computer science and computing. From computing in K-12 education to computing in numerous careers, social experiments regarding the effects of virtual environments on the human psyche, and the use of virtual environments for acts of rehabilitation. Needless to say, we have been affected by computing too much to distance ourselves and although not all of the results are positive, the benefits are too great for us to ignore.
Fort Valley State University Research Day 2014  
Tuesday, April 15, 2014  
Dreaming and Doing: Spotlight on Student Research

**Special Thanks**

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Dr. Shadreck Chitsonga - Prepared event evaluations  
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Mrs. Victoria Dubriel – Submissions review  
Dr. Franklin Gross – Marketing, musical entertainment  
Dr. Cheryl Swanier – Selection of “Panel of Alums”  
Dr. Barbara Wyche - Advisory leadership

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