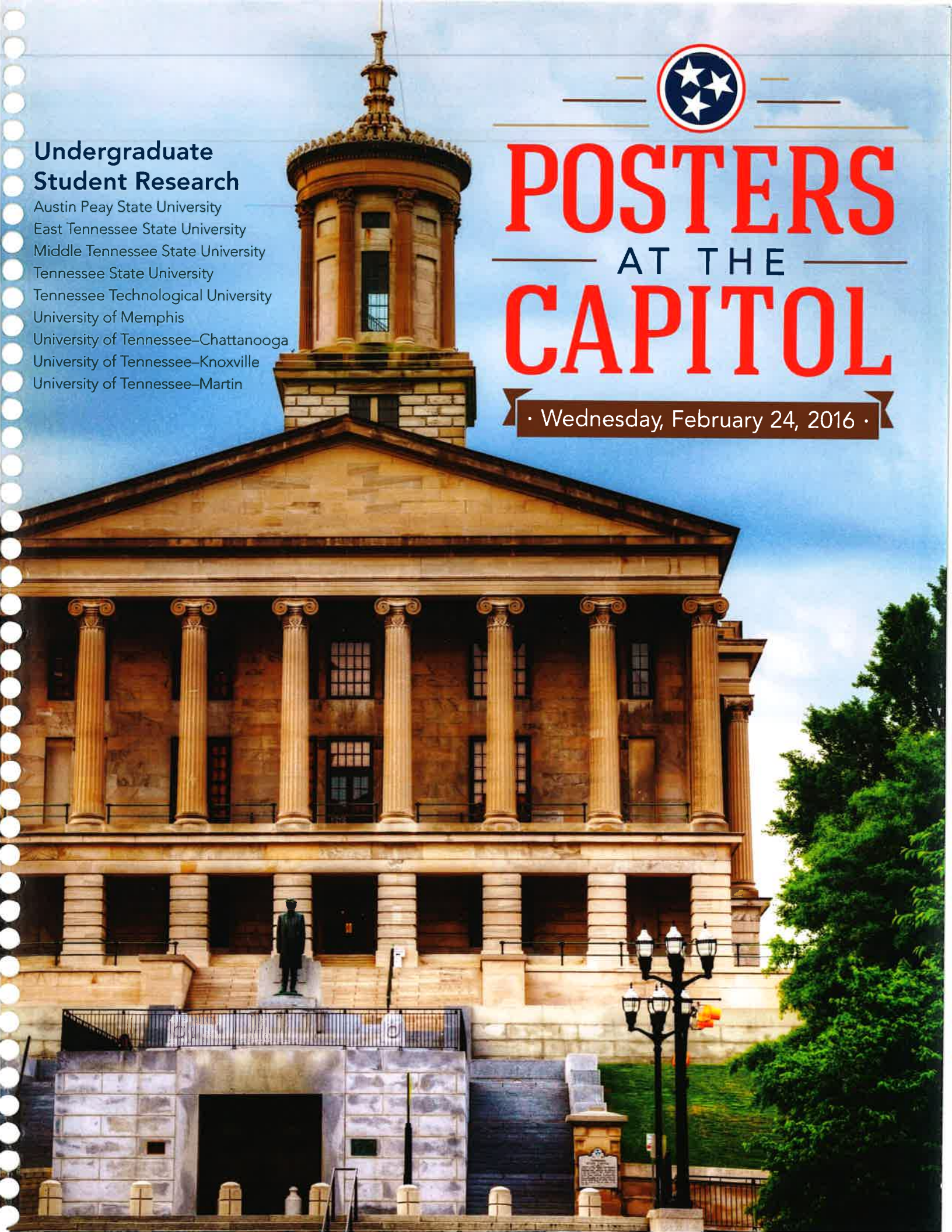

Undergraduate Student Research

Austin Peay State University
East Tennessee State University
Middle Tennessee State University
Tennessee State University
Tennessee Technological University
University of Memphis
University of Tennessee–Chattanooga
University of Tennessee–Knoxville
University of Tennessee–Martin

POSTERS AT THE CAPITOL

· Wednesday, February 24, 2016 ·

Posters-at-the-Capitol 2016
Legislative Plaza
Tennessee State Capitol
Nashville, Tennessee

Goals:

On February 1, 2006, Tennessee joined a dozen other states by exposing state legislators to undergraduate research from across the state through the first-ever Tennessee Posters-at-the-Capitol. Sixty-three undergraduate students from six Tennessee Board of Regents (TBR) universities and three University of Tennessee campuses will present their research through posters at the Tennessee State Capitol in Nashville. Legislators will be encouraged to meet students from their districts and see first-hand the outstanding research being conducted by undergraduates across the state. The Posters-at-the-Capitol project, sponsored by the Tennessee Board of Regents and the University of Tennessee system, and hosted by Middle Tennessee State University, has two goals—to expose legislators to undergraduate researchers and to expose undergraduates to their legislators. The state of Tennessee is the beneficiary of this exciting effort.

Participating TBR Universities

Austin Peay State University (APSU), Dr. Alisa White, President
East Tennessee State University (ETSU), Dr. Brian E. Noland, President
Middle Tennessee State University (MTSU), Dr. Sidney A. McPhee, President
Tennessee State University (TSU), Dr. Glenda Glover, President
Tennessee Technological University (TTU), Dr. Philip B. Oldham, President
University of Memphis (U of M), Dr. M. David Rudd, President

Participating University of Tennessee Campuses

The University of Tennessee at Chattanooga (UTC), Dr. Steven R. Angle, Chancellor
The University of Tennessee, Knoxville (UTK), Dr. Jimmy G. Cheek, Chancellor
The University of Tennessee, Martin (UTM), Dr. Robert M. Smith, Interim Chancellor

Schedule of Events for February 24, 2016:

9:30 a.m. (CST) Students arrive at Capitol and check-in, tunnel-level entrance, Poster set-up in Legislative Plaza (connected to Capitol)
10:00 a.m. Students meet with legislators in their offices or Stand by their poster in Legislative Plaza
11:15 a.m. Briefing session (TBA)
11:30 a.m. Lunch (2nd Floor Hallway, Capitol Building, near Senate Chamber)
12:30 p.m. Photo with Governor Haslam (time not confirmed)
1:00 p.m. Poster presentations in Legislative Plaza
2:00 p.m. House Chamber with Representatives (optional)
3:00 p.m. Senate Chamber with Senators (optional)
3:00 p.m. Pack-up and departure

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WELCOME *from the* GOVERNOR

Dear Friends:

I am honored to welcome students from all across the University of Tennessee and the Board of Regents systems to the Capitol for the annual "Posters at the State Capitol" event.

This event is a great opportunity for some of our brightest young minds to present their research to lawmakers. I hope that your participation in "Posters at the State Capitol" is an enriching experience that inspires you to further academic achievement. Working together we will make Tennessee an even better place to live, work and raise a family.

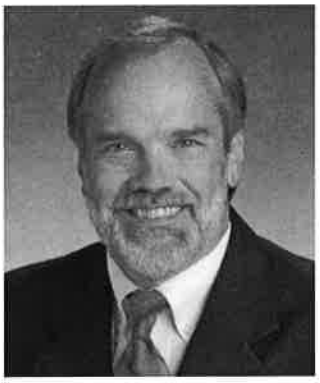
Again, I welcome you to the annual "Posters at the State Capitol" event, and wish you well in all your future endeavors.

Warmest regards,

Bill Haslam

Tennessee Board of Regents

1415 Murfreesboro Road - Suite 350 - Nashville, Tennessee 37217-2833
(615) 366-4400 FAX (615) 366-4464



Greetings,

The outstanding students and the research they present here represent the innovative spirit exhibited throughout our Tennessee Board of Regents institutions. Our campuses take pride in the variety of research opportunities available to undergraduate students, and today's event allows those students to directly demonstrate the value of that experience in their own words.

We want to thank our state leaders for showcasing the quality research being conducted across all our state universities and colleges. The students here today — and many others who study with them — will discover new technologies, develop important leadership skills, and enhance their critical thinking to improve their success and transform our communities in Tennessee.

We appreciate your participation in this event. Best wishes for a bright and successful future.

Sincerely,

John G. Morgan,
Chancellor

THE UNIVERSITY of TENNESSEE

KNOXVILLE, CHATTANOOGA, MARTIN, TULLAHOMA, MEMPHIS

PRESIDENT'S OFFICE

Welcome to Posters at the Capitol:

This worthy program offers an opportunity to share a celebration of research, scholarship, and creative activity of our faculty and students. These projects, presented by undergraduate research students, represent significant discovery and achievements that build new knowledge, solve emerging problems, and expand the creative thinking that is essential to healthy, productive society.

Our undergraduates' areas of expertise reflect world-class research and creative activity that elevate our students and advance the frontiers of knowledge. As researchers and scholars, these students pursue the "how's" and "why's" in their various disciplines. Their discoveries impact how we live, work, and understand our world. These students benefit greatly from the University of Tennessee's world-renowned partnerships with Oak Ridge National Laboratory, which provide unique capabilities and contribute to Tennessee's emerging global prominence in alternative energy.

As the state's flagship public research institution, The University of Tennessee takes its commitment to research at all levels very seriously. Students from our Knoxville, Chattanooga, and Martin campuses, mentored by dedicated faculty mentors, are pleased to share their scholarship with our state's leaders and the public. We are delighted to showcase their work, providing a small window to the excellence going on within our classrooms and laboratories every day.

Sincerely,

Joseph A. DiPietro
President

Welcome from Austin Peay State University
Alisa White, President

Austin Peay State University (APSU) is committed to promoting undergraduate research and recognizes that undergraduate research initiatives provide a transformative learning experience for undergraduate students and an opportunity to interest them in pursuing innovative research activities beyond their undergraduate careers. During the Posters at the Capitol event, you will have the opportunity to meet some of Austin Peay's outstanding student researchers and learn about the impressive research projects they completed in collaboration with dedicated and talented faculty members. The APSU Office of Undergraduate Research (OUR) is dedicated to working with undergraduate students and faculty to inform students about research opportunities and funding sources, identify partnerships, and provide opportunities for students to present their completed research. Financial support for undergraduate students who are conducting and presenting research is provided through collaborations between academic affairs and student affairs in order to make this opportunity available to as many students as possible.

Welcome from East Tennessee State University
Brian E. Noland, President

East Tennessee State University is committed to the value of research and creative experiences as essential, both to a strong, effective undergraduate education and to preparing students for success in graduate or professional schools and entry into a competitive workforce. We are pleased to collaborate with our sister institutions to feature the accomplishments of our undergraduate research students in the annual Posters-at-the-State Capitol event. Each year, we strive to showcase the diversity of research endeavors at ETSU. This year, we continue this tradition by representing undergraduate research in the musical and theater arts. The strength of our Undergraduate Research Program and the dedicated spirit and commitment of our faculty is reflected in the quality and diversity of the work of these students. I am proud of the efforts made across our campus to introduce students to the vitality, rigor, and excitement of exploration and discovery, and of the many faculty scholars who mentor these students. The ETSU community is pleased and greatly appreciates the response of our State Legislators and Governor to the original and unique achievements of undergraduate researchers across the State of Tennessee.

Welcome from Middle Tennessee State University
Sidney A. McPhee, President

The second goal of our university's Academic Master Plan is to promote individual student success and responsibility for accomplishments through fostering a student-centered learning culture. Creating a culture of research and inquiry for undergraduates through a campus-wide initiative that engages students in a journey of discovery through exploration of real-world research problems is a strategic direction that supports this goal. Our Undergraduate Research Center coordinates students' research efforts across the campus by encouraging participation through initiatives such as the Honors College, FirstSTEP, TLSAMP, URSCA, and other student research experiences. Posters-at-the-Capitol, an event that has been awarded TBR's Academic Excellence Award, is an exciting forum to share our students' work with state legislators.

Our commitment to undergraduate students participating in research is unwavering. I think the quality of the abstracts in this booklet and the posters exhibited at the Capitol will convince you that our resources and efforts are not misplaced. MTSU is delighted to participate in the Posters-at-the-Capitol event.

Welcome from Tennessee State University
Glenda Glover, President

It is my pleasure to welcome you to the Posters at the Capitol event. Undergraduate research is an integral component of our students' educational experience at Tennessee State University and we are honored to be here. Engaging students in the process of science assures the achievement of the highest level of learning. The posters on display by our undergraduate students represent the larger body of research work performed by students across the University's eight colleges/schools.

This level of illustration demonstrated here today, could not have been made possible if not for the dedicated faculty involved. These educators devote an extraordinary amount of time to the research enterprise and to serving as research mentors for our students.

Again, welcome and thank you for your continuous support of Tennessee State University.

Welcome from Tennessee Technological University
Philip B. Oldham, President

Welcome to the Posters at the Capitol. Congratulations to all the participating students and thank you to all those supporting their efforts. Discipline-based, independent creative scholarship and research is the heart and soul of any modern education. To actively learn by doing is the ultimate educational experience and often the real differentiator for employment in this highly competitive global economy. From my personal experiences participating in research as an undergraduate and supervising many student research projects in my career, the challenge of original research provides significant and lasting personal benefits regardless of the initial results or project outcome.

As Tennessee's Technological University, TTU is proud of its long history in research and creative scholarship. Undergraduate research is an integral part of the educational experience provided to our students regardless of their academic major. One of the most rewarding parts of the research experience is the chance to share your discoveries with your peers and other colleagues at events like this. Best wishes to all the outstanding apprentice scholars participating.

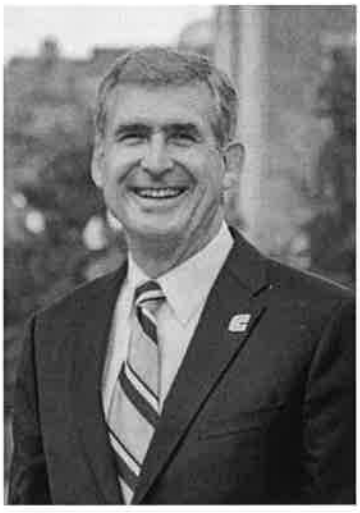
Welcome from University of Memphis
M. David Rudd, President

Congratulations and best wishes to all of the students participating in this year's Posters at the Capitol event. We recognize the tremendous commitment you have made not only to your individual project, but to the challenge of creating original research within your area of study.

As an urban metropolitan research university, the University of Memphis celebrates undergraduate research as an integral part of our educational mission. We are particularly proud of the work of the outstanding students we sponsor for this event. The intellect, creativity and ingenuity expressed in their collective body of research increases our capacity to change lives in our community.

Thank you to our legislative representatives of the State of Tennessee for hosting this important gathering of scholars so they may share their important discoveries with their colleagues, and with us.

Welcome from University of Tennessee at Chattanooga
Steven R. Angle, Chancellor



Welcome to Posters at the Capitol. The University of Tennessee at Chattanooga is proud to feature the accomplishments of our undergraduate students. UTC considers undergraduate research to be an integral part of the educational experience.

UTC's Office of Undergraduate Research and Creative Activity, located within the Honors College, communicates and facilitates undergraduate research and creative opportunities and highlights the accomplishments of our students and faculty. We have an annual research day showcase for faculty and students from all colleges and departments to prepare a poster, display, or platform presentation and share their discoveries with peers and colleagues. Our Provost Student Research Awards are designed to provide UTC students with a special opportunity to participate in original research with faculty members.

We appreciate the opportunity to showcase the work of our students. Best wishes to all of the apprentice scholars participating.

Welcome from University of Tennessee, Knoxville
Jimmy G. Cheek, Chancellor

As one of the first comprehensive public institutions in the nation, the University of Tennessee, Knoxville has an admirable heritage of academic leadership and service. UT-Knoxville's core enterprises are education, research, and outreach, and research experiences for undergraduate students are crucial to our venture to become a Top 25 public university. Such hands-on experiences help students excel in their classrooms and persist to attainment of their degree. Our goal of integrating research into our undergraduate students' academic experiences is evidenced by the vitality and intensity of the Chancellors' Honors Program, the Haslam Scholars Program, the College Scholars Program, the annual Exhibition of Undergraduate Research and Creative Achievement (EURēCA), and honors programs within the various colleges and departments. Many of these programs feature a faculty mentor devoting her or his time and expertise to the student's progress.

We hold ourselves to the highest standards of continually enhancing research, scholarship, and outreach as essential elements of our role as the state's flagship research-intensive university. To aid in this effort, we are building more relationships and partnerships with other organizations and agencies–particularly with Oak Ridge National Laboratory, Y-12, and Tennessee Valley Authority. For undergraduate students, the Chancellor's Office and ORNL each sponsor summer internship programs designed to promote research and creative activity. All undergraduate students enrolled at UT-Knoxville are eligible for these unique opportunities. I am honored to introduce research projects conducted by our undergraduates to the Tennessee State Posters-at-the-Capitol event.

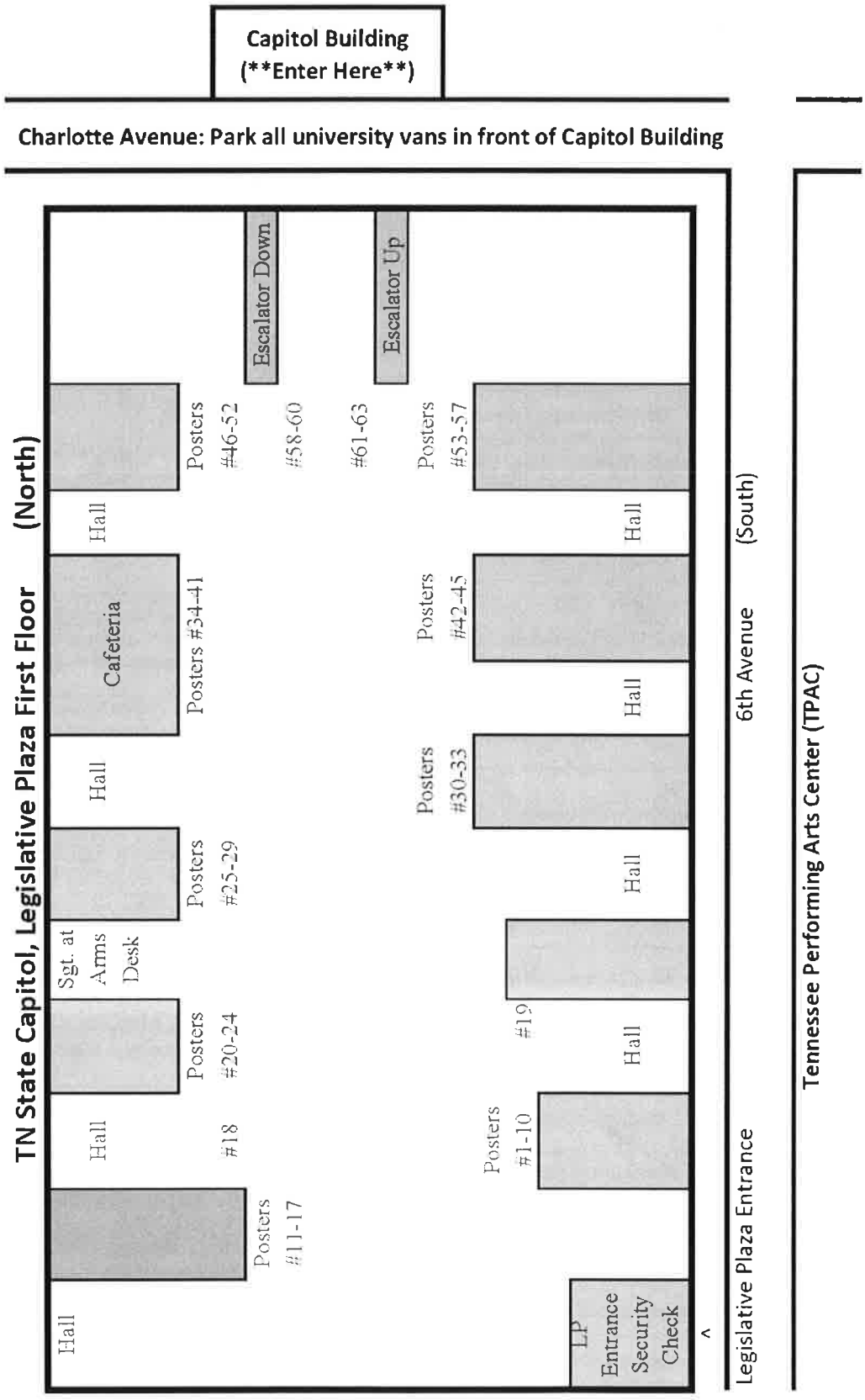
Welcome from University of Tennessee, Martin
Robert M. Smith, Interim Chancellor

UT Martin is a top-tier institution among southern master's universities in the 2015 edition of America's Best Colleges compiled by U.S.News & World Report. As an important component of our primary mission of teaching, undergraduate research continues to be a valuable, productive element within many of our programs. Undergraduate participation in research projects and funded activities has increased during the past several years and crosses disciplines including agriculture, business, education and behavioral sciences, engineering, the humanities and numerous scientific disciplines. Research is a required element within the highly selective UT Martin Honors Programs. We are particularly proud of numerous student recognitions involving research activities at the state, regional, and national levels.

Research is a valued and supported component of a UT Martin educational experience as evidenced by its inclusion within many academic programs. Research is often coupled with real-world experiences such as the TVA Investment Challenge, summer internship opportunities at the Oak Ridge National Laboratory, and various other opportunities within grants and governmental programs at the local, state, and national levels.

We are proud to present selected research projects representing a cross section of ongoing undergraduate research at UT Martin.

Map of Poster Locations



Posters by Poster Number

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2	Danielle Davis	University of Memphis	The Shift from Parent Involvement to Engagement: Educational Implications	21
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4	Mattie Monroe	Tennessee Technological University	New Copper Complexes as Potential Anti-Cancer Agents	22
5	R. Allan Diegan	University of Tennessee, Martin	North American Cyclone-Teleconnection Relationships	23
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7	Daniel Cunefare	Middle Tennessee State University	Automatic Acoustic Cardiography for Continuous Monitoring of Heart Failure Patients	24
8	Blaine Boles	East Tennessee State University	Comparative Studies in Japanese and Appalachian Poetry	24
9	Nicole Kirch	Austin Peay State University	How effective are various filters at removing noise from audio signals?	25
10	Erik Hearn	University of Tennessee, Chattanooga	An examination of ecological rules on phenotypic variation in *Coccinella septempunctata* (Coleoptera: Coccinellidae) - a comparison between environmental factors and elytra spot size variation	25
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25	Alesha Hicks	Middle Tennessee State University	Analysis of the Efficacy of a Health Literacy Intervention in Middle Tennessee	33
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29	Coral Thayer	University of Tennessee, Knoxville	Exploration of the Roman Military Bathhouse Complex at 'Ayn Gharandal	35
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31	Melanie Patterson	University of Tennessee, Martin	Whole-Body Vibration training on Knee Osteoarthritis	36
32	Carsyn Snagg	Tennessee State University	Mutant atrial natriuretic peptide causes cellular mitochondrial dysfunction in atrial HL-1 cells	37
33	Samuel Hulsey	Middle Tennessee State University	Blame it on the Weather: Challenges to Climate Change Adaptation in the Callejón de Huaylas, Ancash, Peru	37
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39	David Richards	Deborah Ballou & Thad Perry	40
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Green, Mark	Nicole Santoyo	Austin Peay State University	27
Green, Mark	Amber Kearns	Austin Peay State University	44
Green, Mark	Travis Powell	Austin Peay State University	61
Gresham, Dolores	Lane Parmely	Austin Peay State University	35
Haile, Ferrell	Kelsey Richards	Tennessee Technological University	13
Haile, Ferrell	Jonathan Abbotoy	Tennessee Technological University	48
Harper, Thelma	Ryan Tilluck	Middle Tennessee State University	59
Harper, Thelma	Chanel Alford	Tennessee State University	6
Harper, Thelma	Mariam Boules	Tennessee State University	15
Harper, Thelma	Geral Nwosu	Tennessee State University	24
Harper, Thelma	Carsyn Snagg	Tennessee State University	32
Harper, Thelma	Matthew Edwards	Tennessee State University	41
Harper, Thelma	Danelle Solomon	Tennessee State University	50
Harper, Thelma	Brittaney Hogan	Tennessee State University	58
Harper, Thelma	Elisabeth Stansberry	Tennessee State University	17
Harper, Thelma	Rachel Stewart	Tennessee Technological University	30
Harris, Lee	April Jones	University of Tennessee, Martin	40
Harris, Lee	April Golatt	University of Tennessee, Martin	63
Jackson, Ed	Maggie Renshaw	University of Memphis	37
Johnson, Jack	Mary Poss	Middle Tennessee State University	51
Johnson, Jack	Natalie Bennett	University of Tennessee, Knoxville	3
Johnson, Jack	Daniel Enciso	University of Tennessee, Knoxville	55
Johnson, Jack	Amina Darbashi	University of Tennessee, Chattanooga	19
Johnson, Jack	Heather Murray	University of Tennessee, Chattanooga	45
Kelsey, Brian	Hunter Rhodes	University of Memphis	46
Kyle, Sara	Louis Varriano	University of Tennessee, Knoxville	38
McNally, Randy	Alesha Hicks	Middle Tennessee State University	25
Niceley, Frank	William Trey Johnson	University of Tennessee, Knoxville	12

Posters by Senator

Senator	Student	University	Poster #
Norris, Mark	David LeVine	University of Memphis	20
Norris, Mark	Kendall Major	University of Memphis	28
Overbey, Doug	Coral Thayer	University of Tennessee, Knoxville	29
Ramsey, Ron	John Jarrett	East Tennessee State University	26
Ramsey, Ron	Susan Olmsted	East Tennessee State University	43
Ramsey, Ron	Kallie Curtis	Tennessee Technological University	22
Stevens, John	R. Allan Diegan	University of Tennessee, Martin	5
Stevens, John	Houston Howard	University of Tennessee, Martin	14
Stevens, John	Sean O'Brien	University of Tennessee, Martin	23
Stevens, John	Melanie Patterson	University of Tennessee, Martin	31
Stevens, John	Nick Morgan	University of Tennessee, Martin	49
Stevens, John	Marné Helbing	University of Tennessee, Martin	57
Tate, Reginald	Danielle Davis	University of Memphis	2
Tate, Reginald	Abigail Gardiner	University of Memphis	11
Tate, Reginald	Anqi Wang	University of Memphis	54
Tracy, Jim	Daniel Cunefare	Middle Tennessee State University	7
Watson, Bo	Patrick Zdunek	University of Tennessee, Chattanooga	1
Watson, Bo	Caitlyn Clifford	University of Tennessee, Chattanooga	19
Watson, Bo	Elliot Newell	University of Tennessee, Chattanooga	36
Yarbro, Jeff	Lauren Heusinkveld	Middle Tennessee State University	16

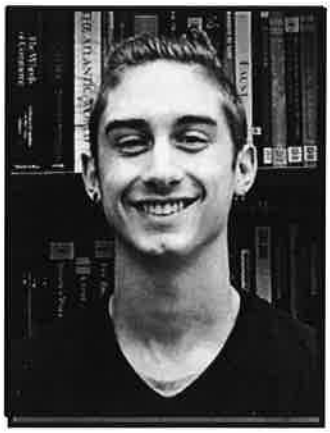
Posters by Representative

Representative	Student	University	Poster #
Armstrong, Joe	Stephanie Eddy	University of Tennessee, Knoxville	47
Beck, Bill	Rachel Stewart	Tennessee Technological University	30
Carter, Mike	Patrick Zdunek	University of Tennessee, Chattanooga	1
Carter, Mike	Elliot Newell	University of Tennessee at Chattanooga	36
Casada, Glen	Heather Murray	University of Tennessee at Chattanooga	45
Casada, Glen	Amina Darbashi	University of Tennessee, Chattanooga	19
Casada, Glen	Mary Poss	Middle Tennessee State University	51
Clemmons, John Ray	Lauren Heusinkveld	Middle Tennessee State University	16
Cooper, Barbara	April Jones	University of Tennessee, Martin	40
Cooper, Barbara	April Golatt	University of Tennessee, Martin	63
Hardaway, G.A.	Abigail Gardiner	University of Memphis	11
Hardaway, G.A.	Anqi Wang	University of Memphis	54
Hill, Matthew	Blaine Boles	East Tennessee State University	8
Hill, Timothy	John Jarrett	East Tennessee State University	26
Holt, Andy	R. Allan Diegan	University of Tennessee, Martin	5
Holt, Andy	Sean O'Brien	University of Tennessee, Martin	23
Holt, Andy	Marné Helbing	University of Tennessee, Martin	57
Hulsey, Bud	Kallie Curtis	Tennessee Technological University	22
Johnson, Curtis	Nicholas Lee	Austin Peay State University	18
Johnson, Curtis	Nicole Santoyo	Austin Peay State University	27
Johnson, Curtis	Travis Powell	Austin Peay State University	61
Keisling, Kelly	Mattie Monroe	Tennessee Technological University	4
Lamberth, William	Kelsey Richards	Tennessee Technological University	13
Lollar, Ron	Kendall Major	University of Memphis	28
Love, Harold	Chanel Alford	Tennessee State University	6
Love, Harold	Mariam Boules	Tennessee State University	15
Love, Harold	Geral Nwosu	Tennessee State University	24
Love, Harold	Carsyn Snagg	Tennessee State University	32
Love, Harold	Matthew Edwards	Tennessee State University	41
Love, Harold	Danelle Solomon	Tennessee State University	50
Love, Harold	Brittaney Hogan	Tennessee State University	58
Love, Harold	Elisabeth Stansberry	Tennessee State University	17
Lundberg, Jon	Susan Olmsted	East Tennessee State University	43
Lynn, Susan	Trang Huynh	Middle Tennessee State University	42
Matheny, Judd	Alex Pilkinton	East Tennessee State University	52
McCormick, Gerald	Caitlyn Clifford	University of Tennessee, Chattanooga	19
McManus, Steve	Hunter Rhodes	University of Memphis	46
Mitchell, Bo	Erik Hearn	University of Tennessee at Chattanooga	10
Pitts, Joe	Nicole Kirch	Austin Peay State University	9
Pitts, Joe	Amber Kearns	Austin Peay State University	44
Pody, Mark	Samuel Hulsey	Middle Tennessee State University	33
Pody, Mark	David Richards	Middle Tennessee State University	39
Powell, Jason	Sheila Johnson	Austin Peay State University	53
Ragan, John	Alesha Hicks	Middle Tennessee State University	25
Sanderson, Bill	Maggie Renshaw	University of Memphis	37
Sargent, Charles	Natalie Bennett	University of Tennessee, Knoxville	3
Sargent, Charles	Daniel Enciso	University of Tennessee, Knoxville	55
Sexton, Jerry	William Trey Johnson	University of Tennessee, Knoxville	12

Posters by Representative

Representative	Student	University	Poster #
Stewart, Mike	Ryan Tilluck	Middle Tennessee State University	59
Swann, Art	Coral Thayer	University of Tennessee, Knoxville	29
Terry, Bryan	Daniel Cunifare	Middle Tennessee State University	7
Todd, Curry	David LeVine	University of Memphis	20
Turner, Johnnie	Danielle Davis	University of Memphis	2
Van Huss, Micah	Josie Klepper	East Tennessee State University	34
Van Huss, Micah	Vladi Razskazovski	East Tennessee State University	60
Weaver, Terri Lynn	Jonathan Abbotoy	Tennessee Technological University	48
White, Mark	Louis Varriano	University of Tennessee, Knoxville	38
Wilburn, Leigh	Lane Parmely	Austin Peay State University	35
Williams, Ryan	Alexis McWilliams	Tennessee Technological University	56
Williams, Ryan	Shikha Amin	Tennessee Technological University	62
Wirgau, Tim	Houston Howard	University of Tennessee, Martin	14
Wirgau, Tim	Melanie Patterson	University of Tennessee, Martin	31
Wirgau, Tim	Nick Morgan	University of Tennessee, Martin	49
Zachary, Jason	Bridget Sellers	University of Tennessee, Knoxville	21

1. Patrick Zdunek



University of Tennessee, Chattanooga
Faculty Mentor: John Lee

Synthesis, Characterization, and Reactivity of Ruthenium(II) Complexes of Tris(2,2,2-trifluoroethyl)phosphite Supported by Electron Rich Arene Ligands and Extension to N-Heterocyclic Carbene Ligands

Ruthenium(II)-phosphite complexes of the type [Ru(p-cymene){P(OCH2CF3)3}(Cl)2] (1), [Ru(hexamethylbenzene){P(OCH2CF3)3}(Cl)2] (2), and [Ru(Cp*){P(OCH2CF3)3}2(Cl)] (3) have been prepared and characterized by multi-nuclear NMR and UV-vis spectroscopy in addition to single-crystal X-ray diffraction. Complex 1 was further reacted to produce [Ru(p-cymene){P(OCH2CF3)3}(Ph)(OTf)] (4) as a potential catalyst for olefin hydroarylation. Olefin hydroarylation involves the formation of a new C-C bond via addition of an aromatic C-H bond across an olefin. In the presence of 4, catalytic olefin hydroarylation attempts involving benzene and either ethylene or 1-hexene were completed. New directions involving an N-heterocyclic carbene (NHC) complex of the type [Ru(p-cymene)(NHCtBu-OH)(Cl)2] (5), where NHCtBu-OH = 3-methyl-1-(3,3-dimethyl-2-butanol)imidazolin-2-ylidene, will be described where the tris(2,2,2-trifluorethyl)phosphite has been replaced with a proposed hemilabile hydroxyl functionalized NHC ligand. The structural effects of 1-3 with different neutral and anionic aromatic ligands, catalytic C-H functionalization attempts with 4, and future directions with hemilabile hydroxyl NHC ligands will be presented as well as a general explanation of the importance of catalytic chemistry as it relates to environmentally conscious chemistry at an industrial level.

2. Danielle Davis

University of Memphis
FacultyMentor: Denise Winsor

The Shift from Parent Involvement to Engagement: Educational Implications

The aim of this project is to create a sustainable parent community that moves beyond parent involvement to parent engagement. Facilitating effective interactions between schools and parents has been shown to empower parents to play a critical role in their child's development and academic success. Participants were parents of students attending an urban iZone school located in Memphis, TN. The school was targeted as performing in the bottom 5% of the state. Recognizing the lack of interaction and communication between school and home, needs-based assessments were generated to gain the parents' perspective, including a qualitative survey and interviews. As a result of their identified needs, events, programs, and interactive sessions have been established for parents to participate in for the 2015-16 school year. The educational implications of this project are threefold: (1) to reach over 300 students whose parents are directly involved in the program, thereby having positive impacts on the student's development and academic achievement (2) to generate a broader interest among low performing urban schools in the district and (3) to serve as a model for administrators and other school leaders to incorporate our program as a method to increase involve, engage, and empower parents.

3. Natalie Bennett

University of Tennessee, Knoxville
Faculty Mentor: Dallas Donohoe

Inactivation of Pyruvate Dehydrogenase Mediates Decreased Butytrate Oxidation in Colorectal Cancer Cells

Colorectal cancer is the third leading cause of cancer-related deaths in the United States, and diet has been proposed to impact both cancer incidence and progression. Dietary fiber is fermented into butyrate, which has been shown to have anti-proliferative and pro-apoptotic effects on colorectal cancer cells. Non-cancerous colonocytes utilize butyrate, a short-chain fatty acid, as their primary energy source. In contrast, colorectal cancer cells show increased glucose utilization (the Warburg effect), while decreasing butyrate oxidation. This is vital as butyrate accumulates in the cancer cell and exerts its anti-cancer actions through altering gene expression. My hypothesis was that by blocking the Warburg effect and increasing oxidative metabolism, butyrate oxidation would be increased in the colorectal cancer cell. Dichloroacetate (DCA) is a pharmacological agent that has been shown to hinder the Warburg effect and increase oxidative metabolism. Specifically, DCA inhibits pyruvate dehydrogenase kinase, which results in unphosphorylated and active pyruvate dehydrogenase (PDH). DCA should decrease the Warburg effect and increase butyrate oxidation. Using a Seahorse XF Analyzer to measure butyrate oxidation and Western blot to monitor PDH phosphorylation, I found that DCA does increase butyrate oxidation in colon cancer cells. DCA treated cells showed ten times less phospho-PDH (inactive) compared to non-DCA treated cells.

4. Mattie Monroe (Ashley Barnes)

Tennessee Technological University
Faculty Mentor: William Morris, Xiaohua Xiang, and Edward Lisic

New Copper Complexes as Potential Anti-Cancer Agents

The recent discovery that certain copper and palladium thiosemicarbazone complexes have very high anti-cancer activity has led us to the synthesis of many brand new α-N-heterocyclic thiosemicarbazone compounds as ligands for the metal complexes. This research presentation describes the synthesis and chemical characterization of our new molecules and their copper and palladium complexes, and then demonstrates and describes their biological activity through the use of topoisomerase IIα enzyme assay studies. Our work shows that the copper complexes are potent topoisomerase IIα enzyme inhibitors, but the free ligands and the palladium complexes are not.

5. R. Allan Diegan

University of Tennessee, Martin
Faculty Mentor: Mark Simpson

North American Cyclone-Teleconnection Relationships

This work examines 30 years of cold season cyclone tracks over North America and examines potential associations with the NAO and PNA teleconnections. Both tropical and extra-tropical cyclones are important features by which the atmosphere is able to transport energy and momentum from the tropics to the poles. They are products of synoptic-scale changes in the general circulation across the mid-latitudes and reflect the teleconnections affecting those changes. While many studies have documented and archived the individual cyclone tracks for many years, this archive has not been updated since the early 2000s in any consistent way. This study uses the NCEP/NCAR 40-year reanalysis of surface pressure data for cold season months of October through March of 1980-81 to 2009-10 to obtain centers of lowest pressure and establish a track of them on a daily basis. We then used the ArcGIS Spatial Analysis line density module to produce a raster grid of frequencies. Each grid cell became a variable by which we obtained principle components of the tracks and correlate the components to the PNA and NAO. Future research will focus on expanding this analysis to the summer months and for investigating the relationships of cyclones to other teleconnections.

6. Chanel Alford

Tennessee State University
Faculty Mentor: Deok-Soo Son

The effects of TGFα/ EGFR Axis in the Progression of Triple Negative Breast Cancer

Triple negative breast cancer has a large impact on breast cancer rates, with approximately 12- 24% of all breast cancer diagnoses belonging to the triple negative category. The lack of estrogen receptors, progesterone receptors, and HER2 receptors make treating triple negative breast cancer pharmacologically very difficult as these sites are where most current drug treatments act. Since studies have shown that triple negative breast cancers present with a higher inflammatory index than non-triple negative breast cancers , our research focuses on identifying the role of inflammation in triple negative (TN) breast cancer. We evaluated the gene expression profiles and activation of the EGFR/transforming growth factor (TGF)α axis for non- TN breast cancer and TN breast cancer using western blot and ELISA. Cells were treated with TGFα added at time intervals of 5, 15, 30, 60, 120 minutes. Cell lysates were prepared and Western Blot was performed for EGFR/pEGFR, Akt/pAkt, and Erk/pErk. Additionally, we checked the proliferative properties of cells exposed to TGFα and tumor necrosis factor (TNF). Luciferase assay evaluated the transcription regulating properties of the CXCL2 promoter, an inflammatory chemokine. Western blot analysis has confirmed the presence of pErk and pAkt and Akt.

7. Daniel Cunfare

Middle Tennessee State University
Faculty Mentor: Yating Hu

Automatic Acoustic Cardiography for Continuous Monitoring of Heart Failure Patients

This project aims to develop a low cost sensing and diagnostic system to continuously monitor the recovery process of the heart failure patients. The signal is recorded with a custom-built low noise/high resolution accelerometer placed on the patient's chest. The recorded signal is transformed into a matrix of time and frequency information using a form of the discrete wavelet transform. This allows the calculation of power ratios per frequency band at different time intervals to be computed. This information is then compared for before and after treatment cases. A set of 42 heart failure and control recordings is analyzed using this method. Because third heart sound (below 30 Hz) normally becomes more profound as the heart failure proceeds, it is used as the target signature for the evaluation. The initial results point to there being more power in the lower frequency range (15 – 30 Hz) during a heart failure incident. In the after treatment recordings, more acoustic energy shifts to a higher (40 – 60 Hz) frequency range. This result matches up well with the clinical expectation.

8. Blaine Boles

East Tennessee State University
Faculty Mentor: Jesse Graves

Comparative Studies in Japanese and Appalachian Poetry

A conflict exists between imposing global modernity and isolated Appalachian tradition. Most instances of this acculturation show deleterious effects on the tradition's folkways. This project juxtaposes the dynamic of modernizing Appalachian culture to modernized Japanese culture through their respective poetic traditions.

First the paper establishes Appalachian poetry's attachment to place. This attachment to place is shown to be a manifestation of the Western obsession with self. After defining what Japanese poetry is, Japanese verse is read to observe what role the self plays. The particulars of Japanese poetry are then compared against those of Appalachian poetry (through a dissection of six poems). Then, through a critical dissection and twenty poems, the discourse of this acculturation is explored to harmonize the contrasting cultures.

The research concludes that the modern Appalachian must become comfortable with a lack of self in a global culture. One must realize that one is aware of only a small portion of what will and has existed. To dwell on this notion of insignificance is to come to terms with the reality of existence. Therefore, one maintains a self by acknowledging the non-existence of the self. This understanding is what Zen Buddhism allows Japanese verse to unconsciously acknowledge.

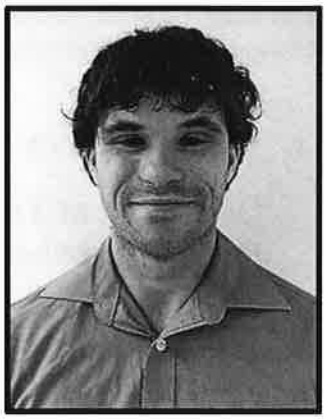
9. Nicole Kirch

Austin Peay State University
Faculty Mentor: Na Zhu

How Effective Are Various Filters at Removing Noise from Audio Signals?

Noise is a random sequence of frequencies that can permeate and degrade audio signals. Signals pick up noise in non-ideal environments like industrial factories or heavy traffic in a city. With noise it is difficult to gather useful data from the waveform, and many industries like cellphone, hearing aid and audio recording require noise free audio signals. The main focus of this research is to take different filtering algorithms and compare them side by side in their effectiveness at removing noise. These filters are based on either time domain or frequency domain algorithms: low pass, high pass, band pass and window. Prerecorded vocal and music samples will have noise added, then will be passed through the filters and compared to the original signals. Each filter's characteristics will be noted for how they worked with the different signals. Data gathered from this research will be important for designing future acoustic devices.

10. Erik Hearn



University of Tennessee, Chattanooga
Faculty Mentors: Eric O'Neill, John Obrycki, and Yukie Kajita

An Examination of Ecological Rules on Phenotypic Variation in Coccinella Septempunctata (Coleoptera: Coccinellidae) - A Comparison Between Environmental Factors and Elytra Spot Size Variation

Classical biological control, the use of non-indigenous natural enemies, has been practiced in North America for over 130 years. Despite the long history, classical biological control has not developed as a predictive science, frequently resulting in unexpected ecological and economic costs. There have been only a few studies in evolutionary biology associated with biological control programs. Coccinella septempunctata were introduced as biological control agents from Eurasia to North America to manage agricultural pest insects. Currently, C. septempunctata are widely distributed throughout most of North America. We studied quantitative trait variation in native and introduced populations to test for evidence of evolutionary processes influencing phenotypes. We also compared environmental factors with quantitative trait variation to better understand potential sources of natural selection. Our results showed a positive correlation between precipitation and elytron spot size in native range but not in introduced range suggesting that spot size variation follows Gloger's rule in native range. There was no correlation between temperature and spot size. We discuss potential underlying mechanisms, including founder effect, different selective regimes, and phenotypic plasticity, to understand different patterns of spot size variation and precipitation relationship between native and introduced ranges.

11. Abigail Gardiner

University of Memphis
Faculty Mentor: Yongmei Wang

Monte Carlo Simulations of the Chromatographic Behavior of Ring Polymers Compared to Linear Polymers

Liquid chromatography at the critical condition (LCCC) is one method that has been highly valuable for separating polymers with complex architectures and creating pure polymer samples. At the critical condition, the retention time of a polymer is independent of its molecular weight and, therefore, polymer samples can be separated based on differences in chain architecture. In this study, we used Monte Carlo simulations to study liquid chromatography of ring polymers. The behavior of ring polymers at the Critical Condition for corresponding linear chains is not well understood. We simulated ring and linear chains modeled as random walks on a simple cubic lattice inside a slit pore, modeling the partitioning of polymer chains into the pores of the stationary phase of a chromatography column. In agreement with experimental results, we find that ring chains are more attracted to the pore than a linear chain of the same molecular weight. We then investigate how K, the partition coefficient for a chain entering the pore from a bulk solution, varies as a function of chain length and the strength of the polymer-surface interaction for both ring and linear chains, allowing us to compare the behavior of ring and linear chains under LCCC.

12. William Trey Johnson

University of Tennessee, Knoxville
Faculty Member: Todd Freeberg

Predator-risk-sensitive Foraging Behavior of Carolina Chickadees (Poecile Carolinensis) and Tufted Titmice (Baeolophus Bicolor) in Response to the Head Orientation of Snake Predator Models

Animals have evolved to reduce risk of predation by recognizing the threatening cues of potential predators. However, an animal's ability to detect the head may be more difficult when the predator's body is serpentine (thus having little distinguishing factors between the head and tail.) This study explored the ability of tufted titmice (Baeolophus bicolor) and Carolina chickadees (Poecile carolinensis) to distinguish the body orientation of predator snakes. A balanced, repeated measures design was used such that each bird flock was exposed to a snake model where the head or tail was facing the feeder during different sessions. Observers recorded the bird species, latency of the first bird to take seed, and the number of visitations by birds to the feeder during each session. The results showed that significantly fewer visitations took place when the head of the snake model faced the feeder compared to when the tail faced the feeder. This supports the notion that the birds are able to distinguish between the head and tail of a snake-like predator. Therefore head and body orientation may be an important factor that animals use to assess predation risk even when those orientation cues are hard to discriminate.

13. Kelsey Richards

Tennessee Technological University
Faculty Mentor: Jesse Carrick

Investigation of 1,2,4-triazinyl Complexants for Cadmium Extraction

Electronics and clean energy technology use rare earth metals in production more each year, but remediation of these materials is not being taken advantage of to the fullest extent possible. Cadmium is used as the target metal for remediation in this study due to its extensive use in common electronics and detrimental environmental and health effects. Using specialized complexants and liquid-liquid solvent extraction techniques, a system for efficient extraction of cadmium will be designed and then validated with other transition metals. Three complexant scaffolds with varied numbers of coordination sites will be utilized with assorted side chain groups attached to modulate electron-withdrawing or donating ability as well as solubility. Preliminary synthesis of complexant scaffolds and distribution studies have been initiated to determine optimal conditions for extraction of cadmium in a biphasic, acidic, aqueous environment. Initial synthesis, solubility, and distribution results will be presented.

14. Houston Howard (Mason Cullen, Alex Clark)

University of Tennessee, Martin
Faculty Mentor: Alton Coalter

Virtual Campus Tour

Virtual Campus gives prospective students a taste of the UT Martin experience. A virtual model of a campus can have many practical uses. It may eventually be used to guide students to their classes or other points of interest around campus. It will also help some students to feel more comfortable as they go about their day by letting them feel like they have been to their classrooms before they have to actually physically step foot on campus. A 3D model may also be used by administration to allow them to visualize future building additions.

Using Google SketchUp, buildings from the campus are painstakingly recreated to allow the user to feel like they are actually there. The 3D models and their textures are exported from SketchUp in the .FBX format and imported into Unity. After importing the buildings into Unity the users can walk around the campus, entering individual buildings and explore individual rooms. Other models such as trees, sculptures are made using Blender. The virtual campus can be placed on the Internet for anyone to view using WebGL or downloaded for offline use on Windows and OSX.

15. Mariam Boules (Shyretha Brown)

Tennessee State University
Faculty Mentor: Margaret M. Whalen

Role of ERK1/2 and p38 MAPKs in Tributyltin-Stimulated Interleukin 1 Beta Secretion and Production from Human Immune Cells

Tributyltin (TBT) contaminates the environment and is found in human blood samples. We have demonstrated that TBT alters the secretion of several pro-inflammatory cytokines from immune cells, including interleukin 1 beta (IL-1β). IL-1β regulates cellular growth and immune responsiveness. Elevated levels of IL-1β have been shown to increase the invasiveness of tumors. Our recent studies showed that TBT exposures of 5-25 nM (levels that are seen in human blood samples) caused increased secretion of IL-1β from immune cells. In this study we examine the roles of the ERK1/2 and p38 MAPK pathways in TBT-induced increases in IL-1β secretion, protein production, and mRNA levels. Immune cells were treated with the ERK1/2 pathway inhibitor PD98059 or the p38 inhibitor SB202190 for 1 h prior to exposure to 25, 10, and 5 nM TBT for 24 h. Results indicated that the TBT-induced secretion of IL-1β requires the ERK1/2 pathway. The increases in secretion are accompanied by increased protein levels in TBT-exposed cells and this increase in protein production also utilized the ERK1/2 pathway. These data suggest that increased production accompany the increases in secretion of IL-1β seen in human immune cells exposed to TBT and these increases are dependent on MAPK pathway activation.

16. Lauren Heusinkveld (James Hayes)

Middle Tennessee State University
Faculty Mentors: Erin McClelland and David Nelson

Cryptococcus Neoformans Evades Host Immune Response through Subversion of Macrophage Inflammatory Signaling

Cryptococcus neoformans (Cn) is a ubiquitous pathogenic fungus. Although up to 80% of people are exposed to Cn during early childhood, cryptococcal spores typically remain latent in the respiratory system. However, Cn can cause life-threatening meningitis in immunocompromised individuals, and it is estimated that Cn causes >600,000 deaths/year. Increased usage of immunosuppressive medical therapies coupled with high costs of effective treatments for Cn infections suggest it may become a growing burden for healthcare systems worldwide.
Normally host macrophage immune cells engulf and destroy Cn by a process called phagocytosis. However, Cn is capable of evading destruction and even multiplying inside macrophages. In essence, Cn uses host macrophages as a "Trojan horse," stealthily hiding from the immune system and gaining entry to the brain, where it triggers meningitis and encephalitis.

Cn has been shown to alter host signaling pathways such as NF-κB, which controls the ability of macrophages to mount an inflammatory immune response. However, the mechanism by which this occurs is unclear. Using macrophages engineered to express fluorescent NF-κB proteins, we have demonstrated that phagocytosed Cn dramatically alters the behavior of this pathway, which may impair the ability of these cells to muster an effective response to Cn infections.

17. Elisabeth Stansberry (Elizabeth Roof, Hailee Hunt)

Tennessee State University
Faculty Mentor: Elisabeth Dykens

The Effect of Time on Food Choices in Children with Prader-Willi Syndrome

Prader-Willi syndrome (PWS) is a genetic disorder resulting in physical, developmental, and social difficulties, and is a genetic cause of obesity. Hyperphagia and abnormal satiety effect individuals with PWS causing them to over eat. In order to prevent over eating and obesity, food intake must be limited and controlled to healthy choices and portion sizes. The current study looks at the interaction between a child with PWS, and their parent, in planning their birthday party menu. The birthday party task was completed twice with approximately two year's in-between. The birthday menu included six healthy options and twelve not so healthy options. The only directions given were to work together with five minutes to complete the task. The children in this study ranged from ages 4-18 on the first visit and 6-20 on the second visit. There were 30 male and 28 female participants. We hypothesized that the parent and child will make healthier food decisions at their second visit then they did at their first visit. The amount of healthy, unhealthy, and total foods chosen stayed very close to the same amounts at both visits. Thus, time was found to have no significant effect on better food choices.

18. Nicholas Lee

Austin Peay State University
Faculty Mentor: Linda Barnes

The Fool According to Gratiano

Throughout the works of Shakespeare, the character of the Fool has played an important role. He comments on the action of the play, serving as the "in between" man for the audience, and he is also the "in between" for many of the characters within a play. In The Merchant of Venice, Gratiano postulates type of person, Sir Oracle, who is a puritanical, somber hypocrite, seeking only to appear wise for his grave expression. Gratiano juxtaposes the Fool and Sir Oracle, and shows how, despite the appearance of both, the Fool is the wiser, and has more to grieve for than Sir Oracle. The Fool moves up and down throughout the social hierarchy of a Shakespearian play, aiding and sometimes manipulating those around him. Because of the many roles he must play, he has no single, true self. Every other character in a Shakespearian play has a single voice, they are each a "somebody". But the Fool, constantly varying his person, is a nobody.

19. Caitlyn Clifford (Amina Darbashi)

University of Tennessee, Chattanooga
Faculty Mentors: Loren Hayes and Hope Klug

Behavioral Effects of Habitat Enrichment on the Bald Eagle, Haliaeetus Leucocephalus

Enrichment is a mechanism that improves an animal's well-being by providing a mental as well physiological stimulation within its environment. This type of enrichment is essential to the welfare of captive animals. Evaluating the effectiveness of enrichment requires controlled studies in which the effects of enrichment on behavior are measured. The bald eagle, Haliaeetus leucocephalus, at the Chattanooga Nature Center is contained in a stimulus-limited environment and does not frequently exhibit species-specific behavior. We implemented and examined the effect of habitat enrichment by adding a water body and a model of a mallard duck, thus modifying Haliaeetus leucocephalus' habitat to something closer to what it would encounter in the wild. Behavior attributes of Haliaeetus leucocephalus were measured through ad libitum sampling using an ethogram to identify species-specific behaviors. Specifically, we took initial behavioral measurements without enrichment and then recorded behavior after the introduction of only the pond, which allowed us to determine whether the novelty of an inanimate item changed behavior. We then added the model duck, which we hypothesized, would stimulate the eagles since it mimics an animate object and recorded behavior again. Zoos, Aquariums, and Nature Centers strive to display a variety of species and the results of this research will potentially benefit avian enrichment at other facilities.

20. David LeVine

University of Memphis
Faculty Mentor: Yongmei Wang

Molecular Dynamic Simulations of Nucleic Acid-Polycation Complexation and Decomplexation

Gene therapy is a promising technique for the treatment of disease with therapeutic nucleic acids. Many emerging gene therapy treatments rely upon short small interfering RNA (siRNA), double stranded RNA molecules that are typically 20 to 25 base pairs long, to promote healthy gene expression in a patient's cells by silencing the expression of disease-causing genes. Despite its promise, gene therapy, including treatments based on siRNA, is currently limited by a lack of vectors that can safely and efficiently package the therapeutic nucleic acids and deliver them to cells. Positively charged polymers (polycations), such as polyethylenimine (PEI), have become of great interest as non-viral vectors, due to their ability to bind and condense the negatively charged nucleic acids; however, the complexation process is not fully understood. Here, we used molecular dynamics simulations to study the formation and structure of complexes composed of a single DNA or siRNA duplex and several linear PEI chains. We investigated how features such as the charge of the complex and the ion atmosphere surrounding the nucleic change as PEI chains are sequentially added to the simulation system and bind to the siRNA. We also have begun simulations to see how higher salt concentrations may induce de-complexation of our structures.

21. Bridget Sellers

University of Tennessee, Knoxville
Faculty Mentor: Benjamin Lee

Vocal Chords & Coding: The Poetics of Performance & Digital Form

My research efforts focused on two branches of contemporary poetry: spoken word and digital poetry. As a field of creative practice, poetry evolves constantly, resulting in new poetic forms that stand in stark contrast to those produced even a few decades ago. In order to study spoken word, I attended the Southern Fried Poetry Slam in Little Rock, Arkansas as well as the Knoxville Poetry Slam. To follow up, I studied videos of poets performing, focusing on winners of the National Poetry Slam. My results include a twenty-video archive of those spoken word performances I deemed exceptional as well as a ten- page paper. Ultimately, I concluded that the spoken word community and the academic community, while mostly separate at this current time, would both learn and grow from more frequent collaboration. My methods for studying digital poetry involved more reading of source material and criticism, as well as an in-depth study of the various facets of digital poetry--including micropoetry, post-internet poetry, metamodernism, and alt lit. Though the field remains remarkably diverse, I concluded that much of the most innovative digital poetry written today has been produced by and reflects the particular sensibilities of the millennial generation.

22. Kallie Curtis

Tennessee Technological University
Faculty Mentor: Y. Jane Liu

Torsional Property Measurement for Polycarbonate Using DIC Technique with 3D Printed Specimens

Digital Image Correlation (DIC) technique is an optical measurement method for displacements and strains. DIC is increasingly used in real-world engineering applications. At the same time, the newly emergent technology of 3D printing or Additive Manufacturing has been considered as the most significant breakthrough of the twenty-first century. A combination of both has been employed in a research project involving ULA aerospace engineers and the Tennessee Tech University (TTU) engineering mechanics research team. The main objective of the effort was to measure the shear properties of a polycarbonate materials using VIC-3D DIC software and 3D printed specimens based on a set of torsional experiments. The torsional material properties, such as shear modulus and stress-strain relations, obtained by using a conventional ASTM method and the DIC technique are compared. The test specimens were printed in various orientations with different cross-sectional areas at the STEM center of TTU, which allowed the team to examine and demonstrate the geometric effects and failure conditions. Observations concerning determination of shear stresses and angles of twist under extreme geometrical non-linearity are reported as well.

23. Sean O'Brien

University of Tennessee, Martin
Faculty Mentor: Anderson Starling

Using Spending Preferences as Policy Preferences to Support Partisanship and Ideology

In the United States, Republicans and Democrats are fundamentally different, and what makes them tick has been a question since the inception of the modern political party system. Policy preferences must determine the partisanship of individuals. On a +11 to -11 scale, different policy preferences are compared to respondent's beliefs on federal government budget spending preferences. More federal spending on a policy favored by liberals indicates support for a Democrat, and vice versa for a conservative agenda and Republican affiliation. Linking federal spending preferences on a measure taken by the government to support, as in more federal spending on the initiative, or opposition, as in less federal spending, we articulated individuals' ideology based off of their policy preferences. Comparing these results across different independent factors, such as race, age and income, the results indicated a significant indicator of partisanship, along with an ideology, as Moderate, Liberal and Conservative values. Although both signified the same leaning on the political spectrum, ideology was more applicable with the individuals' responses on the +11 to -11 scale of partisanship and core party platforms.

24. Gerald Nwosu (Jennifer Huynh)

Tennessee State University
Faculty Mentor: Catia Sternini

Opioid Receptor Induced Amelioration of Intestinal Inflammation in a Mouse Model of Ischemia Is Mediated by Ho-1 and Bcl-xl Mechanisms

Activation of Mu opioid receptors (μORs) with selective agonist, DAMGO, reduces inflammation in animals with intestinal ischemia followed by reperfusion (I/R). We hypothesized that DAMGO effects on I/R-induced inflammation involve activation of the stress-responsive protein, Heme-Oxygenase-1 (HO-1) and upregulation of the antiapoptotic factor, Bcl-xL. I/R was induced in C57BL/6 mice by occluding the superior mesenteric artery (45 min) followed by 5 hours (I/R5) or 24 hours (I/R24) reperfusion. Sham operated (SO) mice underwent laparatomy without artery occlusion (control). DAMGO (0.02 mg/kg) was administered 20 min before and 2 hours after ischemia in I/R mice and SO mice with or without HO-1 inhibitor (Zinc Protoporphyrin), or selective Bcl-2 inhibitor (ABT-737). Mice with I/R5 and I/R24 had increased myeloperoxidase activity assay (MPO), index of neuotrophil infiltrates, NF-kB and TNF-□, markers of inflammation, caspase 3, marker of apoptosis, and reduction of tight-junction protein, occludin, indicator of barrier function compared to SO mice. DAMGO reduced MPO, NF-kB and TNF-□, and caspase 3 in I/R5 and I/R24 and increased expression of occludin Bcl-Xl and HO-1. The effects of DAMGO on I/R-induced inflammation and tissue injury were prevented by HO-1 and Bcl inhibitors, suggesting that HO-1 and BCl-Xl, mediate beneficial effects of DAMGO on I/R inflammation.

25. Alesha Hicks

Middle Tennessee State University
Faculty Mentor: Stuart Bernstein

Analysis of the Efficacy of a Health Literacy Intervention in Middle Tennessee

Following a 2013 needs assessment, an intervention was conducted using a high readability children's health manual and training program for parents of pre-schoolers (n= 76) in low SES school programs in Rutherford County. The first goal of the study was to assess the effectiveness of the intervention in changing knowledge, behaviors, and skills using books to help care for acute childhood health conditions. The second goal of the study was to study the effect on empathy with the college students (n= 30) who provided the training as a component of experiential learning courses. Self-reported behavior showed a decrease in the number of times participants went to the emergency room for common childhood illnesses and an increase in the use of a book as a first source of information. Comprehension measures showed high levels of accuracy using the healthcare book to look up what to do when children are sick. Trainer outcomes showed that there was no difference between the trainers and a control group (n = 220) before treatment, but that participation in service-learning through a children's health program produced a significant increase in empathy.

26. John Jarrett

East Tennessee State University
Faculty Mentor: Abbas Shilabin

Synthesis and In Vitro Cell Viability/Cytotoxicity Studies of Novel Pyrrolobenzodiazepines

Pyrrolobenzodiazepines (PBDs) are a group of naturally occurring compounds that were discovered in the culture of Streptomyces species in the 1960s. Some natural PBDs discovered in these cultures, such as anthramycin and sibiromycin, were shown to possess a broad spectrum of anti-tumor activity. The PBD monomers were evolved by the Streptomyces species as a form of chemical defense; however, scientists have made use of their antibiotic properties for the treatment of cancer. By optimizing the chemical substituents of the PBD compounds, their DNA binding affinity can be enhanced, resulting in a much greater in vitro cytotoxicity. Currently, a continuing effort is being directed in our research lab towards the exploration and lead optimization of the PBD class of compounds and its closely related analogs. Further synthesis and structure-activity relationship (SAR) studies of the parent natural product and its tetracyclic analogs will lead to the discovery of established drug candidates.

27. Nicole Santoyo

Austin Peay State University
Faculty Mentor: Paul Collins

Southern Epic: Addressing Contemporary Tennessean Life

Since prehistoric times, humans have been depicting scenes and events from their daily lives via the activity of painting. More recently, the American Regionalist painters of the 1930s made an attempt to depict the natural beauty of small town living. However, many of these works are decidedly romanticized attempts to harken back to a "simpler time", replete with stereotypical characters or settings that piece together a narrative – often a story of imagined pleasures of country living. This project arises from a dissatisfaction with American Regionalism and how it continues to represent small town American life with whitewashed sensibilities. Paintings are being executed that deal with un-glamorized regional themes, focusing on Tennessean experiences and locales. Instead of attempting a more realistic approach to painting scenery, vibrant, glowing colors and blocky textures are used to create cliffs, trees, humans, and more, which mesh together as otherworldly interpretations of familiar scenes in middle Tennessee.

19. Amina Darbashi (Caitlyn Clifford)

University of Tennessee, Chattanooga
Faculty Mentors: Loren Hayes and Hope Klug

Behavioral Effects of Habitat Enrichment on the Bald Eagle, Haliaeetus Leucocephalus

Enrichment is a mechanism that improves an animal's well-being by providing a mental as well physiological stimulation within its environment. This type of enrichment is essential to the welfare of captive animals. Evaluating the effectiveness of enrichment requires controlled studies in which the effects of enrichment on behavior are measured. The bald eagle, Haliaeetus leucocephalus, at the Chattanooga Nature Center is contained in a stimulus-limited environment and does not frequently exhibit species-specific behavior. We implemented and examined the effect of habitat enrichment by adding a water body and a model of a mallard duck, thus modifying Haliaeetus leucocephalus' habitat to something closer to what it would encounter in the wild. Behavior attributes of Haliaeetus leucocephalus were measured through ad libitum sampling using an ethogram to identify species-specific behaviors. Specifically, we took initial behavioral measurements without enrichment and then recorded behavior after the introduction of only the pond, which allowed us to determine whether the novelty of an inanimate item changed behavior. We then added the model duck, which we hypothesized, would stimulate the eagles since it mimics an animate object and recorded behavior again. Zoos, Aquariums, and Nature Centers strive to display a variety of species and the results of this research will potentially benefit avian enrichment at other facilities.

28. Kendall Major

University of Memphis
Faculty Mentor: Jennifer Mendall

Genetic Diversity and Population Structure in the Clonal Trillium recurvatum

Trillium recurvatum is an herbaceous perennial plant found in the central and eastern United States. It is currently threatened in Michigan and rare in Wisconsin. Threats include: forest management practices, land-use conversion, habitat fragmentation, and pollen limitation. The species is clonal and self-incompatible; therefore, pollination could be difficult if there are few different genetic individuals in a specific area. My research project aims to explore the genetic diversity of T. recurvatum at the University of Memphis Meeman Biological Station. This study will provide the first population genetic analysis of it and any Shelby County population of T. recurvatum. In March 2014, 220 T. recurvatum leaf samples were collected from the Meeman Biological Station. The DNA was extracted from leaves and used in PCR reactions to amplify 10 microsatellite loci. These loci were then analyzed using capillary electrophoresis and visualized using the software package GeneMarker. Measures of genetic and clonal diversity were calculated and findings were correlated with previously collected demographic data for this population. Based on the data analyzed, the genetic diversity of T. recurvatum was higher than expected. Furthermore, genetic individuals are not necessarily clustered in their spatial distribution within the population as many clusters consisted of multiple genotypes.

29. Coral Thayer

University of Tennessee, Knoxville
Faculty Mentor: Erin Darby and
Bethany Howard (Vanderbilt)

Exploration of the Roman Military Bathhouse Complex at 'Ayn Gharandal

This poster presents the Roman bathhouse uncovered during the 2015 season at 'Ayn Gharandal, a Tetrarchic Roman military fort located in the Wadi Araba just north of Aqaba, Jordan. Sitting underneath the loose desert sands, the fort's bathhouse has been remarkably well-preserved providing invaluable information about the technology of Roman building techniques, the management of natural resources at the site, and hinting at the interaction between the Roman military and local traders in a period of imperial expansion and power-consolidation. In the 2015 season, two squares were opened in the bathhouse: one investigated the heating systems of the cauldarium (hot room) and tepidarium (warm room), and the other strove to uncover the graffiti on the walls of the frigidarium (cold room). While working to achieve these goals, new rooms were found: a praefurnium (furnace), a courtyard, and an additional room of unknown use that was dense with artifacts including coins and cooking pottery. Through examining the structures of these rooms and the artifacts found within them, this poster will aim to explain these rooms' ancient uses, reconstruct human activity in and around them, and contribute to our understanding of the cultural significance of a Roman bathhouse on the Arabian frontier.

30. Rachel Stewart

Tennessee Technological University
Faculty Mentor: Tania Datta

An Evaluation of Simultaneous Biological Nitrogen and Phosphorus Removal in Full Scale Wastewater Treatment Facilities

Eutrophication of surface water bodies has become a forefront environmental issue faced by the world today. The process of eutrophication occurs when a water body receives excess amounts of nutrients, such as nitrogen (N) and phosphorus (P), from point and nonpoint sources. Point source discharges, such as those from wastewater treatment facilities (WWTFs), can reduce the ecological impacts of eutrophication by reducing the concentration of N and P loads through biological nutrient removal (BNR). The process of BNR utilizes several different groups of microorganisms that are able to remove N and P from wastewater under different reaction conditions. Conventional BNR designs require separate anaerobic, anoxic, and aerobic tanks to promote successful removal, however incorporating this design in existing facilities that are currently not meeting effluent N and P limits can be very expensive. Investigating operational conditions that could accommodate all three processes within a single tank will be of value. The primary objective of this research is to evaluate simultaneous N and P removal under anoxic-aerobic conditions using full-scale wastewater secondary treatment processes already in place. Currently the City of Cookeville WWTF uses an oxidation ditch where microorganisms remove only organic carbon compounds and ammonia. The goal of this study is to investigate possible configurations of existing infrastructure and operational changes by analyzing various operational parameters.

31. Melanie Patterson

University of Tennessee, Martin
Faculty Mentor: Ajit Korgaokar

Whole-Body Vibration Training on Knee Osteoarthritis

Knee osteoarthritis (KOA) is the most frequent form of lower extremity locomotor disability of the elderly population age 60 or older. Knee osteoarthritis is considered to be a degenerative disease that represents joint failure due to the destruction of articular cartilage and subchondral bone remodeling. Primary factors of female sex, obesity, and repetitive use of joints lead to the biomechanical link to severe pain and restriction of joint mobility found in the development of KOA. While there is no cure for KOA, Whole-Body Vibration (WBV) training has been shown to be an effective treatment by stimulating the quadriceps femoris muscles which may reduce inflammation in the knee joint. Whole-body vibration training has the potential to prevent fractures in vulnerable weight-bearing joints compared to resistance training. In addition, WBV training has been designed to excite the muscle spindles and produce muscle contractions that places pressure on bones to stimulate bone growth. In conclusion, WBV training has been shown to prevent the progression of KOA by increasing bone mineral density, step length, proprioception, leg strength, and peripheral blood circulation.

32. Carsyn Snagg (J. Prinsen, L. Yermalitskaya, T. Sidorova, J. Barnett, O. Boutaud)

Tennessee State University
Faculty Mentor: Katherine T. Murray

Mutant Atrial Natriuretic Peptide Causes Cellular Mitochondrial Dysfunction in Atrial HL-1 Cells

Atrial fibrillation (AF) is an "abnormal heart rhythm characterized by rapid and irregular beating" according to the CDC. Treatments are largely unsuccessful due to a lack of understanding of the factors that cause AF. AF was linked to a mutation in the gene encoding atrial natriuretic peptide (ANP), a hormone that regulates blood volume. We recently showed that the mutant ANP (mANP) implicated in familial AF, forms oligomers much more readily than wild-type ANP and that a mouse model of mANP contains oligomers in the atria. Therefore, given that oligomers in the brain cause cell damage, we hypothesized that oligomers are cytotoxic in atrial cardiomyocytes. Data indicated that oligomer treatment reduced ATP production by atrial HL-1 cells compared to vehicle-treated (control) cells. Thus, oligomer-treated cells were unable to produce the same amount of energy as control cells. Preliminary results suggest that this effect may be mediated by a reduction in the coupling efficiency of ATP generation, with increased proton leak back across the inner mitochondrial membrane. Overall, mutant ANP oligomers cause cytotoxicity by altering mitochondrial function. Based on our data and evidence from the literature, this detrimental effect on atrial cells could lead to increased arrhythmia susceptibility to promote AF.

33. Samuel Hulsey

Middle Tennessee State University
Faculty Mentor: Doug Heffington

Blame it on the Weather: Challenges to Climate Change Adaptation in the Callejón de Huaylas, Ancash, Peru

Climate change affects a variety of natural resources, but its impact on water availability warrants the most concern. This issue draws attention to the fact that our planet is changing and that the systems we have developed to allocate water resources have a low capacity to adapt. Nowhere are issues of water management more pressing than mountainous areas such as the Cordillera Blanca region of northern Peru where subsistence agriculture, hydro-electric projects, and coastal commercial farms compete for seemingly dwindling water resources provided by high-altitude glaciers. Although hydrological systems are changing in the Andean region, is the claim that there exists a water deficit valid? How do perceptions of what drives a water deficit impede adaptation action? Through the use of qualitative interviews with actors in the water governance network of the Callejón de Huaylas region, I compare the perspectives of how climate change is impacting water availability. I demonstrate how inconsistencies in these perspectives impede adaptation by failing to address root systemic issues. As climate change highlights problems within infrastructure and policy, it becomes clear that a deficiency is not solely a function of changes in natural processes, but rather, internal systemic weaknesses in the governance of water.

34. Josie Klepper

East Tennessee State University
Faculty Mentor: Jennifer Pealer

Examining the Relationship between Prior Abuse and Mental Illness of Female Inmates

Females are becoming a prominent population within America's correctional facilities, which has led to incarcerated females progressively becoming the popular subjects of more recent research. According to Minton and Zeng (2015), along with the growing rates of female inmates in general, the rates of sexual and physical victimization reported by incarcerated females is rapidly approaching 75%. Given the significant amount of female inmates that have mental health concerns and their reported histories of physical and sexual abuse, this project seeks to evaluate the link between physical and sexual abuse in adolescents and the mental health diagnoses for female inmates. In addition, the aim of this project, and the surrounding required research, is to establish and evaluate the correlation between incarceration, mental health diagnoses, and the prior physical and/or sexual abuse of female inmates within the custody of the North Carolina Department of Public Safety. This project will create the ability to better understand the mental health issues and potential psychological needs of the female inmate population within their individual correctional facilities and to work towards an improved rehabilitation process.

35. Lane Parmely

Austin Peay State University
Faculty Mentors: Randy Wadkins and Tracy Brooks (Ole Miss)

Investigating The Effects of Ligand-Binding to Loops in DNA I-Motifs

Secondary DNA structures pose a viable opportunity to affect the expression of genes that are either over-expressed or under-expressed in biochemical systems. By finding molecules that can both selectively target these structures and interact with DNA translational machinery, gene expression can be therapeutically modified. This is perhaps most important in the field of oncology. Most hallmarks of cancerous activity can be traced to growth factors and other proteins regulated by genes; if a secondary DNA structure could be identified and characterized in the promoter region of a gene, and if a molecule could be proven to selectively target that structure, then the expression of that gene could theoretically be altered and observed. However, more research must be done to identify different types of secondary DNA structures, to prove their existence in vivo, and to find molecules that exclusively interact with these structures. In this experimental set-up, the conformational changes of the cytosine-rich DNA i-motif were explored using ligand binding to different sequence loops within the structure.

36. Elliot Newell

University of Tennessee, Chattanooga
Faculty Mentor: Morgan Cooley

Examining the Importance of Social Support for Foster Parents

This research first investigates whether social support is related to confidence and satisfaction in fostering. Second, it addresses whether foster parents' perception of child behavioral problems is related to their confidence and satisfaction with fostering. Last, it examines whether social support is a moderator in the relationship between foster parent perception of behavioral problems and their confidence and satisfaction. A survey was distributed to licensed foster parents (n = 155) who were currently fostering or had fostered within the past year. It asked questions about their child's behavior, challenges they faced, and the amount of social support they received. A linear regression showed that social support has a significant, positive effect on foster parents' confidence and satisfaction. It was also found that the more foster parents perceive behavioral problems, the less confident and satisfied they feel. Perceived intensity of child behavior has a significant, negative effect on parents' perceived challenging aspects to fostering. While social support did not influence the explored relationship, it was found that social support did influence the relationship between behavioral problems and perceived challenges to fostering. In this respect, social support served as a buffer against the negative effects of problem behaviors.

37. Maggie Renshaw

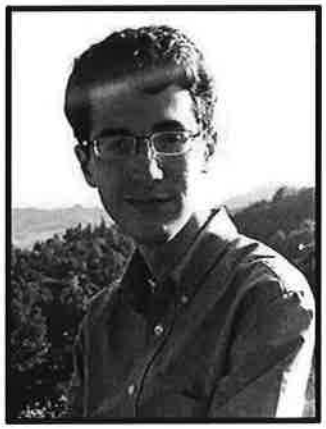
University of Memphis
Faculty Mentor: Cheryl Bowers

Reading Speed and Accuracy of Dyslexic and Non-Dyslexic Adults in Response to Visual Inversion

In the beginning of the visual perception process, the visual system inverts the incoming stimulus scene. We perceive the scene in an upright position because it is reoriented before the brain perceives it. Stratton (1896) studied visual inversion by wearing goggles that eliminated the eye's natural inversion and, thus, caused him to see everything upside down. Although his vision was altered, it eventually adapted to the inversion. Similarly, this project explored visual inversion and its effect on reading abilities. Visual inversion was hypothesized to affect reading speed and accuracy. Additionally, dyslexic participants were hypothesized to perform better than non-dyslexic individuals in reading speed and accuracy. Participants completed a computer-based reading task in three conditions of visual manipulation (180° rotation, 90° rotation, no rotation). In each condition, participants viewed a list of words one at a time and spoke the words aloud. Speech recognition software recorded recognition speed and accuracy. A multivariate analysis of variance was computed, and the interaction between variables sheds light on how different individuals adapt differently to visual manipulation. From this study, conclusions may be drawn about how the human visual system adapts to its environment, and conclusions can be applied to educational settings and artificial intelligence.

38. Louis Varriano

University of Tennessee, Knoxville
Faculty Mentors: Yuri Kamyshkov



Neutron-mirror Neutron Oscillations in a Residual Gas Environment

Both mirror matter, a candidate for dark matter, and ordinary matter can have similar properties and self-interactions but will interact only gravitationally with each other, in accordance with observational evidence of dark matter. Although mirror matter does not couple to ordinary matter by Standard Model interactions, some additional interactions might exist, providing small mixing of ordinary matter neutral states, like the neutron, with mirror components. Three separate experiments have been performed in the last decade to detect the possibility of neutron-mirror neutron oscillations. In the analysis of the data of these experiments, the effect of the presence of residual gas (due to an imperfect vacuum) was not considered. This work provides a formalism for understanding the interaction of the residual gas in an experiment with ultra-cold neutrons. This residual gas effect that was previously considered as negligible can have a significant impact on the probability of neutron to mirror neutron transformation. This formalism is used to evaluate the three previous experiments and can provide a framework for the future mirror matter search experiments.

39. David Richards

Tennessee Technological University
Faculty Mentors: Deborah Ballou and Thad Perry

Improving Risk Prediction for Self-Insured Health Groups: Identifying Health Claims Cost Drivers

An investigation of chronic conditions as cost drivers for a self-insured health plan was based on two years of data that included 1,035,506 claims for this employer group. Hierarchical Condition Categories were used to identify the claims costs associated with employees and dependents whose codes indicated that they had chronic conditions. These claims accounted for a third of the total healthcare costs for this self-insured group. The most costly chronic conditions were identified and quantified. The top ten chronic condition cost drivers in this data set were various forms of cancer, septicemia/shock, major complications of medical care or trauma, nephritis, vascular disease, congestive heart failure, specified heart arrhythmias, and inflammatory bowel disease. These descriptive statistics will help build reliable predictive risk models for self-insured groups.

40. April Jones (Liz Lillge, Jonathan Wilson)

University of Tennessee, Martin
Faculty Mentor: Paula Gale

The Effects of Cover Crops on Soil Hydraulic Conductivity in Soybean Production Systems

In crop production systems cover crops are used to help prevent soil erosion and nutrient losses from soils. The purpose of our experiment was to find out if cover crops have any significant effects on the hydraulic conductivity of the soil. During our research, we used an Amoozemeter to measure the hydraulic conductivity of the soil in specified plots. This test is useful in that it shows how well water moves through different soil layers. We collected samples from each plot and analyzed them in the laboratory for pH, phosphorus, potassium and soil organic matter. We will present the results of our first year of data collection.

41. Matthew Edwards (Ranjita Thapa)

Tennessee State University
Faculty Mentor: Matthew Blair and Tim Johnson (Seed Savers Exchange)

Morphological Evaluation of Grain Amaranth Accessions Obtained from Seed Savers' Exchange

Amaranths are members of Amaranthaceae family of plants, which are considered to be photo-synthetically efficient because of their C4 metabolism. Grain amaranth is a pseudo-cereal rich in lysine which is also gluten free. The goal of our project was to evaluate a set of 34 grain amaranth genotypes for morphological traits and diversity. Morphological traits were evaluated including: i) blade pigmentation, ii) blade shape, iii) petiole pigmentation, iv) branching index, v) inflorescence density, vi) inflorescence shape, vii) terminal Inflorescence height (plant height). The panicles of all different accessions were cut at harvest and kept in separate bags to dry in a hoop house. Yield components of all the accessions were collected. Amaranth growth in Tennessee was very prolific. Many of the genotypes had normal green leaves while a few had either marginal or vein pigmentation. Leaf blades went from green to purple. Most of the genotypes had oval leaves while a few had oblong, elliptical or ovate leaves. Stem colors were solid red, pink or green at the base of the stem. In conclusion, many good varieties are available from the Seed Savers Exchange collection.

42. Trang Huynh

Middle Tennessee State University
Faculty Mentor: Stephen Wright

Assessment of Traditional Chinese Medicine Herbal Extract's Potential to Inhibit Herpes Simplex Virus Type 1

Herpes simplex virus type 1 (HSV-1) is associated with oral and genital lesions as well as more serious infections in immunocompromised patients and infants. HSV-1 has a seroprevalence of 60 to 95% in various places. Currently, there is no cure or preventative vaccine available for HSV. Acyclovir is used for treatment of HSV infections but resistance against this drug is common. These factors demonstrate the need for more effective treatment measures. Many studies have demonstrated the effectiveness of Traditional Chinese Medicine (TCM) plants against various illnesses, but little has been done to evaluate TCM plant extracts against HSV-1. This study tested 51 TCM extracts from 13 different plants for their potential to inhibit HSV-1. Extracts were diluted to non-toxic levels prior to anti-viral testing. We report cytotoxicity of all extracts and early results of antiviral activity. To date, multiple extracts are found to exhibit anti-HSV-1 and merit future investigation.

43. Susan Olmsted

East Tennessee State University
Faculty Mentor: Beverly Smith

Star Formation in Ring Galaxies

Ring galaxies are specific types of interacting galaxies in which a smaller galaxy has passed through the center of the disk of another larger galaxy. The intrusion of the smaller galaxy causes the structure of the larger galaxy to compress as the smaller galaxy falls through, and to recoil back after the smaller galaxy passes through, hence the ring-like shape. In our research, we studied the star-forming regions of a sample of ring galaxies and compared to those of other interacting galaxies and normal galaxies. Using UV, optical, and IR archived images in twelve wavelengths from three telescopes, we analyzed samples of star-forming regions in ring and normal spiral galaxies using photometry. To measure the star formation rates of the star forming regions, we used computer software that picked out the regions and measured their luminosities in all twelve wavelengths, before comparing the luminosities in these wavelengths to determine the absolute luminosity. We will present statistics comparing the star formation rates of the regions in ring galaxies to those in spiral galaxies and other interacting galaxies.

44. Amber Kearns

Austin Peay State University
Faculty Mentors: Tim Winters and Karen Meisch

Bridging the Two Disciplines

Education for learning's sake is a lofty policy to adhere to; however, the reality is that college is a stepping stone necessary to enter even higher education or to obtain a desired career. For many, this means pursuing a subject with wide opportunities for employment post-graduation, whether it involves all their interests or is in what field they are the most skilled. Furthermore, focus in one field is encouraged to the point where pursuing multiple subjects is a financial and temporal strain for students. Generally, humanities and the sciences are kept segregated in the college setting. Other than a handful of core requirements that all students must take, science students are rarely required to take humanities, and humanities students are seldom asked to take extra science courses. These two branches are seen as completely autonomous, which, according to a train of thought explained by C.P Snow in The Two Cultures, is a dangerous and limited view. Without one, the other is two dimensional, without any real impact on the student or their future actions. I propose that students who pursue the humanities, with a specific emphasis being put on Classical studies, achieve more grants, opportunities, and publish more articles post-graduation. By doing so, I hope to encourage a greater integration of humanities and science in the undergraduate setting.

45. Heather Murray

University of Tennessee, Chattanooga
Faculty Mentor: Morgan Cooley

Through Their Lens: Experiences of Foster Parents within the Child Welfare System

The purpose of this study is to explore foster parent satisfaction and resources. This qualitative study probed for information on satisfaction as a caregiver, foster parent intent to continue fostering, and what resources are needed to help the subjects provide the best foster care possible. This study included 155 licensed foster parents who were currently fostering or had fostered within the past year. Thematic analysis was identified as the appropriate means for data analysis in this study given the exploratory nature of the study. Researchers intended to use a grounded theory approach which would allow the themes to emerge through the iterative process of this form of qualitative data analysis (Braun & Clark, 2006). Five major themes resulted from the analysis: (a) system-level problems or concerns, (b) balancing the rewards and challenges related to sustaining motivation to foster, (c) love for children and concern for best interests of the child, (d) barriers and aids to developing skills and knowledge related to fostering, and (e) challenges and benefits to collaborating with others in the child welfare system. This poster will identify future implications for research, practice, and policy.

46. Hunter Rhodes

University of Memphis
Faculty Mentor: Brad McAdon

The Apostle, the Rock and the Resurrection

One of the traditions in Christianity is the idea that the early followers of Jesus were united in their ideology and mission; since the nineteenth century, however, scholars have studied the New Testament texts while considering what appears to be opposition between the early followers of Jesus, particularly between two of the most well-known leaders, Paul and Peter. This opposition, known as the Pauline-Petrine Controversy, is evident not only from Paul's letters, but also from the Synoptic Gospels' resurrection accounts. By combining the evidence of the controversy from Paul's letters alongside various conceptions of resurrection, I conduct a rhetorical analysis of the Synoptic Gospel's resurrection accounts to determine how the authors interpret the Pauline-Petrine Controversy and apply this interpretation alongside their own ideology in their unique resurrection narratives. From this, I argue that Mark follows the Pauline tradition, Matthew the Petrine, and Luke uses his narrative to whitewash the controversy altogether, blending elements from the two sects to make them appear more united than they actually were. In so doing, I contend that we cannot afford to ignore the Pauline-Petrine Controversy because to do so not only overlooks the historical and textual evidence, but also limits our own religious literacy.

47. Stephanie Eddy

University of Tennessee, Knoxville
Faculty Mentors: Hollie Raynor

Food Choices in Healthy Weight Women

This study examines differences in habituation to foods high in sugar and fat content versus those that are not, in normal weight women in comparison to their level of food addiction (FA). It is hypothesized that those scoring higher in FA will have the slowest habituation rate to foods high in fat and sugar. This study uses a one-group, repeated measure design, with the within-subjects factor being food (dried apricots and chocolate cake). All participants play a computer task to earn points to eat dried apricots in one session and chocolate cake in another session. The computer task is divided into 12, 2-minute trials, during which participants can earn points towards access to 75 kcal portions of the food that is being measured. The computer task is programmed at a variable interval of 120 ± 42 seconds (VI-120) reinforcement schedule, so that participants are rewarded one point for the first mouse button pressed after approximately 120s have passed. The dependent variables are the number of consecutive two-minute time blocks before responding ceases and the overall pattern of mouse button responses in the computer task.

48. Jonathan Abbotoy

Tennessee Technological University
Faculty Mentor: Ann Boyd Davis

Development of Interdisciplinary Student Innovation Team

Over the past decade, we have experienced periods of global economic recession. Entrepreneurship activities are often touted as the solution to these recessions due to the economic and employment outcomes. College graduates face the challenge of a portfolio career including paid employment, non-work, and self-employment. Acquiring an innovative and entrepreneurial mindset prepares students for this portfolio career and the changing economic environment. The goal of this study is to aid the student body in better utilizing the innovative and entrepreneurial resources that Tennessee Tech has to offer. An analysis of student awareness and involvement in innovation and entrepreneurship will be conducted to gauge students' needs. As an initial part of the analysis, a student survey was sent to the entire student body at Tennessee Tech with over 1,000 responses recorded. The data is currently being analyzed to assess Tech's landscape and the appropriate efforts that might increase innovation and entrepreneurship awareness. Ultimately, providing greater marketability for college students in their given career fields. Overall, this study extends the current research by addressing the outcomes of entrepreneurship education when it occurs outside the traditional classroom in an experiential learning setting.

49. Nick Morgan

University of Tennessee, Martin
Faculty Mentor: Chris Karmosky

Surface Ice Melt Driven by Föhn-Like Winds at the Base of the Transantarctic Mountains

West Antarctica has experienced one of the largest temperature increases on Earth over the last few decades, thus the need to understand the climate dynamics of Antarctica has become increasingly more urgent. This work focuses on passive microwave-detected surface melt events occurring at the base of the Transantarctic Mountains at the southernmost ice shelf in the world—Ross Ice Shelf. These particular melt events are thought to be generated by adiabatic warming as air descends roughly three kilometers from the Antarctic Plateau to the ice shelf, similar to Föhn winds in Alpine environments. Föhn winds are warm, dry, downslope winds that occur on the leeward side of a mountain and in these case studies air is forced downward by a pressure gradient between the Antarctic Plateau and a polar low in the Ross Sea. Three case studies are examined and by using NCEP/NCAR reanalysis, weather patterns near the base of the Transantarctic Mountains are analyzed to determine if surface melt could be caused by Föhn-like winds. Factors that are examined are vector winds, surface temperatures, temperatures at 850mb heights, and relative humidity.

50. Danelle Solomon (Hung-Wei Ho)

Tennessee State University
Faculty Mentor: De'Etra Young and Tom Byl

Using GIS to Assess Groundwater Flow and Geochemistry

Groundwater geochemistry is influenced by geology, residence time, microbiology and land use. Four wells on the TSU research farm, Nashville, TN, were sampled and monitored in 2015. The purposes of this research were to provide an overview of the change in water chemistry through time, characterize the spatial distribution of groundwater quality parameters including specific conductivity, water level, pH, and temperature, and determine potential hydraulic connections between wells. High concentrations of sulfide (>1 mg/L) were detected in three wells but the source was unknown. Water quality data, geophysical logs, and GPS coordinates were collected at each well. During the sampling period, specific conductivity in the four wells varied by 5 to 1750 µS/cm, and water levels varied by 0.47 to 1.65 m in the wells. Small bedrock openings were found in two wells. Water elevation, chemistry and geophysical logs were used in the Arc Hydro Groundwater tool to determine potential flow paths.

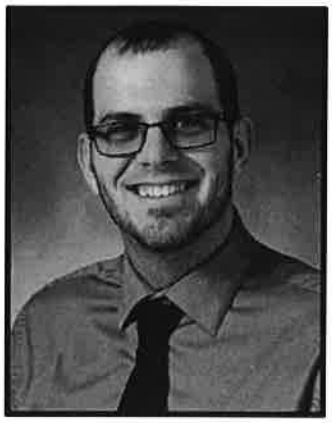
51. Mary Poss

Middle Tennessee State University
Faculty Mentor: Heather Brown

What is an Effective Way to Rehabilitate a Deteriorating Coral Reef System in the Dominican Republic?

The decline of coral reef systems in the coastal areas of the Dominican Republic has contributed to increased rates of beach erosion, a significant decrease in reef-dependent fisheries, a decrease in reef tourism, and has had a negative impact on the biodiversity of these systems. By installing artificial reef systems in these impacted areas, it is our hope that new coral will grow and provide an expanded habitat for the declining wildlife population. This summer a group of 10 CIM students constructed 19 fiber reinforced concrete prisms in Sosua, DR. We evaluated various form options and opted to build our own rectangular form using plywood. In doing this we were able to cut form material costs by 25%. Another advantage to this shape is the ability to stack the prisms into a pyramid, creating more interior space for the wildlife to inhabit. Since installing these prisms, we have observed a variety of wildlife occupying the interior of our artificial reef. Underwater photos and videos will continue to be taken in order to observe how the wildlife and coral is reacting to their new environment.

52. Alex Pilkinton



East Tennessee State University
Faculty Mentor: Kimitake Sato

Investigation into Barbell Back Squat Comparing Weightlifting Shoes to Barefoot Conditions

This study investigated muscle activation patterns throughout the barbell back squat to determine if changes in electromyography (EMG) activity occurred among individuals wearing weightlifting shoes compared to barefooted conditions. EMG patterns from six superficial lower extremity muscles were recorded from 12 subjects (means: 22.67 ± 2.39 age, 172,28 ± 14.04 cm height, 74.88 ± 16.11 kg mass). Data collection occurred over three visits to determine one repetition maximum [1RM], conduct maximal voluntary contraction tests, and finally to perform squat tests with the footwear conditions. EMG activity at 80% of the participants' 1RM with weightlifting shoes and barefooted were recorded for analysis. A series of 2X2 ANOVA (footwear vs. phases) were used to determine if any significant changes occurred among footwear in the eccentric and concentric portions of the barbell back squat. The study had two major findings: several muscles displayed significant differences between eccentric and concentric phases in regards to EMG activity, and none of the observed muscles showed significant differences in regard to the footwear effect on EMG activity. These results indicate that changes in footwear do not alter muscle activation; although, kinematics in the squat has been shown to differ in past studies based on footwear.

53. Shelia Johnson

Austin Peay State University
Faculty Mentor: Brenda Jarvis (Vanderbilt)

The Expression of Collagen IV and Laminin V in Mammary Epithelium

Breast cancer is the second leading cause of death of women in the U.S., with HER2 positive breast cancer being one of the most aggressive forms of breast cancer. The HER2 oncogene is an Epidermal Growth Factor Receptor, which is normally overexpressed in patients diagnosed with breast cancer. In these experiments, the expression of Collagen IV and Laminin V were evaluated in MCF-10A (normal) and MCF-10A-HER2 (oncogenic) cells. The cells were grown in a three-dimensional organoid culture using Growth Factor Reduced Matrigel, allowing us to recapitulate the growth of normal mammary epithelial cells and oncogenic mammary epithelial cells in vitro. The expression of Collagen IV in cells overexpressing HER2 was significantly less than the expression of Collagen IV in the MCF-10A cells. The expression of Laminin V was significantly greater in the MCF-10A HER2 cells compared to the MCF-10A cells. This data suggests that the presence of the HER2 oncogene transforms the deposition of Collagen IV and Laminin V in mammary epithelium. Patient data from The Cancer Genome Atlas was also analyzed for RNA Expression of the genes associated with Collagen IV and Laminin V.

54. Anqi Wang

University of Memphis
Faculty Mentors: Eun-Kyong Choi and Carol Silkes

Selection Criteria of Hospitality Programs: A Comparison of Undergraduate and Graduate International Students

Globally, the hospitality and tourism industry generated almost $7 trillion of total economic activity worldwide (WTTC, 2014). This phenomenal growth in the United States has created demand for talented globalized hospitality students and in turn has resulted in an increased demand for international students to be involved in hospitality programs in the United States. In addition, U.S. colleges and universities enrolled almost 900,000 international students for the 2013-2014 school year in all majors (Paulson, 2014). Hospitality programs are not exempt from this trend. Existing studies indicate that the type of student influences the different factors' important to that student's choice of a school or a major. However, some hospitality programs have more international students in different degree programs than others. Therefore, the purpose of the study are to: (1) identify the factors that affect international students' decisions on choosing a hospitality program, and (2) compare the similarities and differences between the factors that affect undergraduate international students and graduate international students when choosing a hospitality program. The findings in this paper will provide useful information to enable hospitality programs to attract more international students.

55. Daniel Enciso

University of Tennessee, Knoxville
Faculty Mentor: Rajasekar Karthik (ORNL)

Developing Rich and Interactive User Interfaces for the Analysis of Strategic Materials

In this volatile global economy, securing the supply of strategic materials is a major national security interest of the United States. Supply chain decomposition requires locating and researching the mines, facilities, and companies associated with the production of that material. Analysts face two major challenges in decomposition: (1) vast quantity of data (i.e. "Big Data") and (2) constantly changing supply chains. Analysts utilize a multitude of sources. Such sources used are commercial databases, products information, mining news, events, financial information, etc. for the decomposition of one supply chain. The visual presentation and physical accessibility of this knowledge becomes crucial in order to identify information with new insights and high impact factors. Strategic Materials Analysis & Reporting Topography (SMART) is an analytic information system developed at ORNL to provide situational awareness of strategic material production and supply chain as well as supporting analysis of potential future outcomes. In this project I developed various technical components: (1) rich and interactive user interface for easy and fast visualization of the above information, (2) database schema for data storage, and (3) helper utilities such as extract-transformation-load (ETL) and feed aggregation processes. This project was completed successfully and will be integrated into the SMART software.

56. Alexis McWilliams

Tennessee Technological University
Faculty Mentors: Ismet Anitsal and Meral Anitsal

How Self-Service Technology Has Affected the U.S. Retail Industry: A Review of Perspectives of Customers Versus Employees In Using Technology-Based Self-Service Options

Self-service technologies are the newest additions to many public service venues, most commonly with banks, retailers, and grocery stores, within the past two decades. These recent discoveries are becoming more customary as consumers and employees find themselves dependent on machines like ATMs and self-checkouts. To better understand the two different perspectives of how self-checkouts are viewed from the public and service sectors, certain factors concerning these machines must be assessed. This work is a conceptual overview of how customers and employees view the implementation of self-checkouts in grocery stores. The factors that influence a consumer to choose to either use or avoid self-checkouts are evaluated while the reasons that employees like or dislike those very same machines are assessed in detail. A discussion of whether customers and employees are satisfied despite being treated like employees and machines, respectively, will follow.

57. Marné Helbing

University of Tennessee, Martin
Faculty Mentor: Lionel Crews

Development of Three Dimensional Metal Crystal Models for Educational Applications

The pattern of atoms in a crystal, such as table salt, is called a crystal structure. The unit cell is the smallest repeated pattern within a crystal. Commercially available models of the four basic types of unit cells (Simple Cubic, Face-Centered Cubic, Body-Centered Cubic, and Hexagonal-Close Packed) are relatively expensive, heavy, and not easy to pull apart to demonstrate crystal structure features. The first aim of this project is to correctly model the four basic types of metal unit cells utilizing the 3D software Autodesk Inventor. The second aim is to apply a fused filament deposition 3D printer to construct the models. These models will be taken up as a visual learning aid in geology, chemistry, and engineering classrooms at UT-Martin. Feedback that professors provide will be used to make any modifications necessary to the models. They will be a scientifically accurate, and cost effective solution to illustrating various crystal structure features.

58. Brittaney Hogan (Calandrea Williams)

Tennessee State University
Faculty Mentor: De'Etra Young, Tom Byl and William Sutton

Streamside Salamanders as Indicators of Environmental Stress: Impacts of Acid-Rock Drainage on Headwater Stream Integrity

Globally, amphibian populations are declining at alarming rates. Multiple factors, including pathogens, environmental pollution, climate change, and habitat destruction play major roles in these declines. Environmental pollution in the form of acid runoff through road construction (i.e., Acid Rock Drainage [ARD]), serves as an important, but understudied threat to stream integrity. We completed streamside salamander surveys on two streams (Carter's Creek Tributary and Wolf Creek tributary) impacted by ARD in middle Tennessee (Williamson and Fentress Counties). We monitored streamside habitats upstream and downstream of ARD disturbances via two 1m2 quadrats and one 15m X 3m transect at each sampling location. We used a combination of rock turning and dipnet surveys to capture adult and larval salamanders. Collectively, these data can be used as a proxy of stream quality and conservation in the face of rapid urbanization and habitat alteration.

59. Ryan Tilluck

Middle Tennessee State University
Faculty Mentor: P. Gregory Van Patten

Incorporation of Zn2+ in PbS Quantum Dots via Cation Exchange

Cation exchange provides a method to synthesize altered quantum dots (QDs) that can otherwise be difficult to produce. The introduction of transition metal ions to a system offers possibilities for manipulation of the structural, optical and magnetic properties of the QDs. With previous success in cation exchange with PbS QDs, we here report the reactions of Zn2+ cations. Optical and structural properties are analyzed via electronic spectroscopy, elemental analysis and TEM imaging. The incorporation of zinc cations is evident in very small amounts at 100°C. The reaction progresses rapidly within the first minute; but slows down dramatically over the course of the remainder of the reaction time. The small percent incorporation of zinc cation drastically changes the size and shape of the QDs, as depicted by TEM imaging. Further experimentation will yield a more detailed description of the process.

60. Vladi Razskazovski

East Tennessee State University
Faculty Mentor: M. J. Pecaut & X. W. Mao (Loma Linda University) and Alan Forsman

Effects of Radiation on Mucin Production in Mouse Uteri

Due to increasing time spent in space, the need to study the effects of spaceflight on organismal systems is greater than ever. Of interest are the effects of spaceflight on uterine mucin production, as changes in these mucins can affect reproductive success. A previous study indicates that mice exposed to a spaceflight environment exhibit significant increases in uterine mucin thickness. However, that study did not separate the effects of microgravity from those associated with ionizing radiation. To begin to address this, ground-based studies were conducted in which 54 female mice were divided into 3 groups of 18: Wildtype-control, Apocynin-treated, and NADPH-Oxidase-2-Knockout. Each group was further subdivided into 3 subgroups: control, proton irradiation at 0.5 Gy, and proton irradiation at 2 Gy. 7 days following irradiation, the mice were sacrificed, their uteri excised, embedded in paraffin, mounted, and stained with Alcian Blue PAS to allow acidity-based mucin differentiation. The apical thickness of the uterine mucin layer was measured using a randomization grid, and the groups were compared using one-way ANOVA. Data from this study suggest that radiation exposure had no significant effects on either the acidity or the thickness of the apical uterine mucin layer.

61. Travis Powell

Austin Peay State University
Faculty Mentor: John Steinburg

Genocide and its Socio-Economic Origins

During WWII, Jewish people were targeted specifically because of their faith and systematically murdered. But religion was not the underlying cause of the hatred that caused genocide. The mass murder of millions was the result of a myriad of social, economic, and political influences. During the historical period when religion formed the basis for government, Christian conquerors planted the seeds of hate by making the Jews the "other." Social Darwinism legitimized the hatred, facilitating the transition from traditional anti-Semitism to the modern, secular anti-Semitism found after the Enlightenment. Emancipation and industrialization sewed the seeds of resentment and distrust towards the Jews. Political instability and economic turmoil created the need for a scapegoat that was filled by capitalizing on the resentment towards Jews. Skilled use of propaganda placed the Nazis in power and created the "Jewish problem." Eugenics provided the justification and the Nazis provided the solution. This study further investigates the Nazi genocide and its socio-economic origin.

62. Shikha Amin

Tennessee Technological University
Faculty Mentor: Dan Swartling

Dehydration of Alcohols by Solar Irradiation

Over 700 million people in the world live without electricity. The sun is a viable means to perform chemical reactions without a source of power. Sunlight was used to thermally drive the dehydration reaction as a green chemistry and alternative energy procedure. Sunlight can be reflected off of a parabolic mirror (satellite dish covered with metallic tape) to heat a reaction. Solar irradiation was used to dehydrate alcohols to from alkenes. The alkenes were distilled using a simple distillation set up. The produced alkenes were extracted from water and analyzed via gas chromatography. Many things can affect the rate of reaction, such as UV index, weather forecast, wind speed, and angle of focal point. The purpose of my research is to explore the use of more environmentally friendly methods for this process to make the procedure more environmentally sustainable. My data suggests that solar irradiation is an efficient and effective method for dehydrating alcohols. This research will aid people who lack electricity to run chemical reactions in a green way.

63. April Golatt

University of Tennessee, Martin
Faculty Mentor: Rachna Tewari

Reducing Deforestation: A Global Perspective

Deforestation is a significant anthropogenic activity contributing to global greenhouse gas emissions, and has reduced approximately half of the world's forest resources. The world currently has about ten billion acres of forest, which comprises one-third of the earth's surface. Several factors lead to deforestation which include but are not limited to activities that lead to exploitation of natural resources. A major concern is clearing forests for the production of biofuels which has been found to exert significant negative impact on the global forest cover. Intergovernmental organizations have yet to create a consistent, efficient solution to the problem from a global perspective. This project attempts to study the various successful deforestation reducing efforts across countries, and to evaluate public perception for protecting environment versus economic growth in the countries of interest using information from the World Values Survey. Public perception forms an integral tool in the shaping of environmental policies, and is always a topic of interest for policy makers. The results from this study will create a background for future studies that will be aimed at inspiring countries to individually create their own specific solutions, and promote alternatives to using forests for products, services and other economic activities.

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