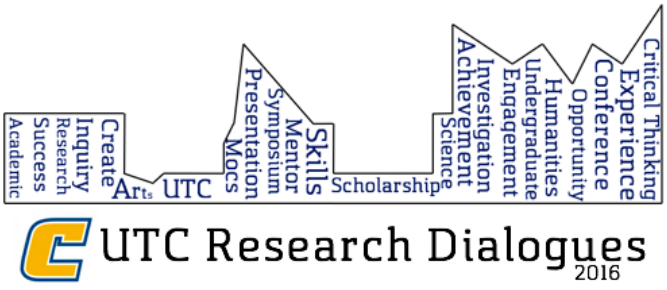
THE UNIVERSITY OF TENNESSEE CHATTANOOGA

RESEARCH DIALOGUES 2016

THE UNIVERSITY CENTER

APRIL 13 & 14, 2016

9:00 AM – 5:00 PM



UTC Research Dialogues 2016

UTC Research Dialogues
Undergraduate Research Symposium

Wednesday, April 13, 2016

8:00 AM – 6:00 PM

Schedule of Events

8:00 AM – 9:00 AM

Registration and Poster Setup

UC Chattanooga rooms

9:00 AM

Opening comments

UC Auditorium

Chancellor Steve Angle

9:30 AM - 4:00 PM

Poster Presentations (p. 5-21)

UC Chattanooga Rooms

9:30 AM – 4:00 PM

Podium Presentations (p. 22-26)

UC Ocoee and Heritage Rooms

11:00 AM

The Bridge and Mirror Project (p. 27)

Theatrical performance by UHON 3540

UC Atrium level 1

11:30 AM

Test Prep Seminar Luncheon

UC Tennessee Room

Stephanie Kiefer

4:00 PM – 6:00 PM

Plenary Talk and Reception (p. 27)

UC Chickamauga Room

Dr. David O'Hara

Dr. Salvatore Musumeci

TOMORROW

April 14, 3:00 – 5:30

Research Day Senior Forum, Speech Department (p. 50)

UC Auditorium

Jeannie Hacker-Cerulean

UTC Research Dialogues

Graduate Research Symposium & Faculty Showcase

Thursday, April 14, 2016

8:00 AM – 7:00 PM

Schedule of Events

8:00 AM – 9:00 AM

Graduate Registration and Poster Setup

UC Chattanooga rooms

9:00 AM

Opening comments

UC Auditorium

Dr. Joanne Romagni • Provost Gerald Ainsworth

9:30 AM – 12:00 PM

Graduate Poster Presentations (p. 28-45)

UC Chattanooga rooms

9:30 AM – 12:00 PM

Graduate Podium Presentations (p. 46-48)

UC Ocoee and Heritage Rooms

10:00 AM

3-Minute Thesis Competition (p. 49)

UC Auditorium

Kirk Englehardt

12:00 PM

Council of Scholars Research Panel Discussion Luncheon

UC Chickamauga Room

12:30 – 2:00 PM

Faculty Registration & Poster Setup

UC Chattanooga Rooms

2:00 PM – 5:00 PM

Faculty Research Elevator Speech Competition

UC Raccoon Mountain room

Nicole Brown

2:00 PM – 5:00 PM

Faculty Poster Presentations

UC Chattanooga rooms

5:00 PM – 7:00 PM

Faculty & Graduate Reception

Library 4 th Floor

Clarinet Ensemble (Niki Tejero) • Saxophone Quintet (Clint Schmitt)

UTC RESEARCH DIALOGUES
UNDERGRADUATE RESEARCH SYMPOSIUM
POSTERS
CHATTANOOGA ROOM, APRIL 13, 9:30 – 4:00

COLLEGE OF ARTS AND SCIENCES

Baker, Lyssa

Biology, Geology, & Environmental Science

David Giles, PhD

Polyunsaturated fatty acids (PUFAs) impact antimicrobial peptide resistance in Pseudomonas aeruginosa and Klebsiella pneumoniae and cause reduced motility in P. aeruginosa

Pseudomonas aeruginosa and Klebsiella pneumoniae are world-renowned for being 'superbugs'. There is an urgent need for the development of new methods for treating these multidrug resistant bacteria. Previous studies in our laboratory have observed Gram negative bacterial assimilation of exogenous polyunsaturated fatty acids (PUFAs) into membrane phospholipids, a phenomenon that alters membrane permeability and susceptibility to environmental stresses. The purpose of the present study was to examine the effect of polyunsaturated fatty acids on i) antimicrobial peptide resistance and ii) swimming motility. P. aeruginosa exhibited a two-fold increase in minimum inhibitory concentration (MIC) to polymyxin B (PMB) when grown in the presence of linoleic acid (18:2) and eicosapentaenoic acid (20:5). Strikingly, arachidonic acid (20:4) elicited an 8-fold increase in MIC, indicating a significant protective effect conferred by a fatty acid associated with eukaryotic membranes and inflammatory processes.

Carroll, Mike; Koti Nordy; Brittany Auguer; Ben Bishop; Carson Kicks; Nicole Charitat

Biology, Geology, & Environmental Science

Preston Foerder, PhD; Sarah Farnsley; Hope Klug, PhD; Loren Hayes, PhD

Animal Enrichment: Otters

Six undergraduate students from Biology and Psychology disciplines participated in a summer research project to study the behavior of a group of six North American River Otters at the Tennessee Aquarium in Chattanooga. Our research goal was to create environmental enrichment for the otters to enhance their behavioral welfare. We decided to create a raft that the otters could interact with in their pool. In the first week, we observed the otters' behavior without the raft using a scan sampling observation method, noting the otters' behavior every 30s. The following week we introduced the enrichment raft and we observed the otters' interactions with it. We focused on studying the effects that the enrichment structure had on the otters' behavior. The results of the data collected show that engaging the otters with an enrichment device (the raft) increased the otters' activity as well as the frequency of the otters being visible to the aquarium visitors, since the new enrichment was located close to the front of the enclosure. We determined that the raft is an effective enrichment device. The aquarium has continued to use it as part of their environmental enrichment protocol.

Clifford, Caitlyn

Biology, Geology, & Environmental Science

Hope Klug, Phd; Sarah Farnsley

Behavioral effects of habitat enrichment on the bald eagle, Haliaeetus leucocephalus: Evaluating the effectiveness of enrichment requires controlled studies in which the effects of enrichment on behavior are measured.

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.

Collier, A. Grace

Biology, Geology, & Environmental Science AND Physical Therapy

Henry Spratt, PhD; David Levine, PT, PhD, DPT, OSC, CCRP, Cert. DN; Julie Bage, PT, DPT, OSC

Potential role of lotions used in soft tissue mobilization and massage in outpatient rehabilitation clinics in the spread of nosocomial infections.

The purpose of this study was to determine the incidence of bacterial contamination in lotions utilized in soft tissue mobilization and massage in rehabilitation clinics. In August 2015 our group sampled 22 different outpatient rehabilitation clinics in southeastern Tennessee and northwestern Georgia. Five types of lotion were found (Deep Prep, Palmers Cocoa Butter, Free Up, Prelim Balm, and Prelim 27 Cream), with 81 jars sampled. Three sites on each jar were sampled via sterile swabs: threads, the inner lip of the jar, and lotion obtained from the center of the jar. Within six hours the swabs were used to inoculate Tryptic Soy Agar, Mannitol Salt Agar, Pseudomonas Isolation Agar, and Eosin Methylene Blue Agar. Of the 81 containers sampled, 27 (33.3%) tested positive for some type of bacterial growth. Bacterial contamination was found in all brands sampled, and in all sampling locations. The majority of contamination (22 out of 27, 81.5 %) was found on the jar threads, with only two, and three jars having contamination on the inner lip, or in the lotion itself. Eight of the jars (threads) were contaminated with Staphylococcus species, with four identified as S. aureus (one culture was determined to be methicillin resistant S. aureus MRSA).

Dempsey, Margaret; Alexandra Korshun; Ashton Mitchell; Erin Schrenker; Richard Schwartz

Biology, Geology, & Environmental Science

Thomas P. Wilson, PhD; Brad Reynolds EdD,

The Development and Implementation of a Natural Science Living and Learning Community Utilizing the Biological Field Stations at the University of Tennessee at Chattanooga

UTC's Natural Science Living and Learning Community (NSLLC) will be a residentially based research opportunity that focuses on a particular aspect of natural science. In 2004, UTC officials began drafting a plan to acquire properties to be used as biological field stations (BFS) so that faculty could better engage students in education, research, outreach and conservation. UTC's BFS are pivotal for this NSLLC because they provide the frame work for students to better understand wildlife-habitat relationships in urban systems. By using existing elements of the curricula and university infrastructure, we have devised a plan to integrate the BFS into a four semester curriculum so that students can gain hands-on experience in scientific research. The NSLLC will be tied to the current research being performed at the BFS because it provides an excellent jump-off platform that dovetails flawless within a realistic problem based learning environment. The NSLLC will build capacity for undergraduate research, facilitate partnerships among community stakeholders, and foster active yet collaborative learning by studying the urban ecology of the Chattanooga area.

DeGroot, Max; Gayle Tyree; Molly Arnold; Stephanie Sisson; Sabrina Ferrando; Ceresia Ridner; Swetlana Iwanowa

Biology, Geology, & Environmental Science

Preston Foerder, PhD; Sarah Farnsley; Hope Klug, PhD; Loren Hayes, PhD

Animal Enrichment: Coyotes

Captive animals may suffer from stereotypical behaviors, which are generally considered abnormal behaviors that are caused by captivity. One way to combat these stereotypical behaviors is by implementing environmental enrichment. Enrichment is a vital part of all zoo programs that aims to stimulate animals both mentally and physically. The Chattanooga Zoo houses two coyotes, one male and one female. The coyotes exhibit stereotypical behavior in the form of pacing, as shown by a worn path in the enclosure. We looked at how to decrease the pacing and possibly engage the coyotes in other activities by implementing enrichment by placing a ball containing food in the enclosure. The coyotes could obtain the food through a small hole in the ball. We observed the coyotes for a week prior to implementing the enrichment and gathered data on the coyotes' behavior. The following week, we placed the ball in the enclosure and once again recorded our observations. There was a slight decrease in pacing overall for both coyotes following the introduction of the enrichment. In this research we showed that even a small enrichment can decrease stereotypical behavior in a short period of time.

Dudley, Dylan; Hayley Bietel

Biology, Geology, & Environmental Science

Amy Brock-Hon, PhD

Mineralogical Study of Petrocalcic Soils at Mormon Mesa, NV

Soils from the Mormon Mesa landform in southern Nevada are of interest to geologists and soil scientists because of the unique soil-formed minerals and features that provide clues to its development over the past 4 million years. Previous investigations into the mineralogy of these soils reveal possible distinct differences in silicate clay minerals between the massive and transitional horizons. Preliminary work indicates palygorskite, a Mg- and Al-rich silicate clay, is predominant in the massive horizon and sepiolite, a Mg-rich and Al-poor, silicate clay is abundant in the transitional horizon. This study tests the hypothesis that the primary and pedogenic mineral content differs between these soil horizons and that these mineralogical differences are due to the weathering of different parent materials. Mineral differences between the massive and transitional horizons were evaluated in petrographic thin-sections and with X-ray diffraction of both the sand and clay fractions.

Elmore, Joanna

Biology, Geology, & Environmental Science

Yukie Kajita, PhD

Understanding spread patterns of invasive hemlock woolly adelgids (Hemiptera: Adelgidae, Adelges tsugae) in the North Chickamauga Watershed System

The invasive Hemlock Wooly Adelgid (HWA) is an insect that feeds on the phloem of hemlock trees, greatly reducing the hemlock's fitness. The substantial damage of invasive HWA on hemlock population health is primarily seen in the eastern statessoutheast, where large populations of hemlocks are dying. As a foundation species, this decline in the hemlock population has a significant impact on surrounding ecosystems. Ecologically, the eastern hemlock provides habitat for many communities, reduces streamside erosion, and affects forest floor composition. The eastern hemlock is also important economically, due to its effect on property values. For these reasons, the untreated spread of HWA across the southeast would have considerable ecological and economic consequences. OurMy project goal is to understand the current invasive spread pattern of HWA in the North Chickamauga System (NCC system) in order to create the most effective conservation plan. In the NCC system, I we will collect data from several research sites. I will used ArcGIS collector, a mobile application, to collect geographic information including latitude and longitude, the infestation level of HWA in the eastern hemlock, along with tree health status, and width diameter of each tree at breast height.

Frey, Stephen; Gayle Tyree

Biology, Geology, & Environmental Science

James Hiestand, PhD; Jennifer Boyd, PhD

Collaborative construction: Building a calorimeter to expand plant ecophysiological research at UTC

Species Distribution Models (SDMs) have been widely used as predictive models of climate change effects on species, but their large-scale, species-wide approach creates the potential to mask variation in climate change responses within species. Mechanistic models that consider traits influential to species distributions have the ability to consider population- and individual-level responses at local scales, and thus may be an avenue toward models that are more detailed and accurate. Physiological traits have been highly successful for predicting how individuals respond to climate change; traits related to energy acquisition, demand, and use are particularly informative. Energy fundamentally influences plant form, function, and performance and is the most basic unit that can be used to compare organisms at various levels of biological organization. As such, studies investigating the response of energetic properties of plant species to climate change have tremendous potential to provide a mechanistic explanation for observable responses with broad applicability across plant species, life forms, and functional types. Construction cost can be estimated from heat of combustion measurements obtained by calorimetry. We built an efficient and inexpensive Phillipson microbomb calorimeter system to be used in ongoing investigations at UTC to measure energetic responses of a suite of Appalachian plant species.

Grillo, Sara; with Biol. 4999 and ESC 5010 Students

Biology, Geology, & Environmental Science

Loren Hayes, PhD

A re-evaluation of artiodactyl social organization

Animal social organization "size and composition of groups " plays an important role in social interactions and affects the reproductive success of individuals. Most books and databases on mammals report a single type of social organization for each species. This is problematic because intraspecific variation in social organization occurs in many mammals. Understanding intraspecific variation helps us to understand the types of social interactions at different life history stages and environments, which has significance in evolutionary and conservation theory. Using Web of Science and Google Scholar databases, UTC students taking Behavioral Ecology (Biol 4999, ESC 5010) are conducting primary literature searches to determine intraspecific variation in social organization of even-toed ungulates (Order Artiodactyla). Students will present preliminary results of this study.

Hearn, Erik

Biology, Geology, & Environmental Science

Eric M. O'Neill, PhD; Yukie Kajita, PhD; John J. Obrycki, PhD

An examination of ecological rules on phenotypic variation in Coccinella septempunctata (Coleoptera: Coccinellidae) - a comparison between environmental factors and elytra spot size variation

Introduced species often encounter environments that are similar to those in the native range. Whether they evolve similar phenotypes in these environments may depend on both genetic and environmental factors. Coccinella septempunctata is an invasive species that was introduced as a biological control agent from Eurasia to North America to manage agricultural pest insects. Elytra spot size was examined because it was known to vary in the native range and it was likely important for the physiology of the species. We examined whether spot size variation in C. septempunctata of native and introduced populations followed the ecological patterns called Gloger's rule and thermal melanism hypothesis. We also compared a correlation between environmental factors (e.g., temperature and precipitation) and the spot size variation between native and introduced ranges. A total of 1,457 individuals of C. septempunctata were collected from 63 locations from native and introduced ranges. Our results showed a positive correlation between precipitation and spot size in native range, but not in introduced range. In addition, results showed a negative correlation between temperature and spot size in introduced range, but not in native range.

Kropp, Robert; A. Grace Collier

Biology, Geology, & Environmental Science

Henry Spratt, PhD; David Levine, PhD

Potentially Pathogenic Bacterial Contamination in a Hospital's Neonatal Intensive Care Unit

The Clinical Infectious Disease Control (CIDC) group at UTC was asked by officials at a local hospital to investigate possible causes of high rates of infections in babies in their neonatal intensive care unit (NICU). The CIDC sampled 46 sites, replicated in three NICU pods (containing 8-10 babies each) in December 2015. A total of 142 individual sites were sampled using sterile transport swabs. Swabs were placed on ice and returned to a microbiology lab at UTC, where within three hours they were use to inoculate Mannitol Salt Agar, CHROMagar MRSA, Pseudomonas Isolation Agar, Eosin Methylene Blue, and Tryptic Soy Agar. Of the swabs collected 69/142 (48.6%) supported some type of growth, with 15/142 (10.6%) growing S. aureus, 7/142 (4.9%) growing MRSA, and 20/142 (14.1%) growing some sort of enteric. Based on sampling areas in the NICU, 36 out of the 46 areas sampled (78%) had bacterial contamination. The most contaminated sites were the return air ducts (3 out of 3 swabs growing S. aureus and enterics) and the floor near pod sinks (3 out of 3 swabs growing S. aureus, with 2 of the swabs growing MRSA, as well as enterics).

Lehman, Kelly

Biology, Geology, & Environmental Science

Yukie Kajita, PhD; Eric O'Neill, PhD

Comparative wing morphology in invasive ladybird beetles.

Invasive species, introduced to a new environment with novel pressures, provide a unique opportunity for the study of adaptation. Rapid adaptive evolution in phenotypic traits associated with range expansion has been repeatedly reported in invasive species. For example, Huey et al. found that within two decades a latitudinal cline in wing length developed in the fruit fly species Drosophila subobscura in the introduced range. Similarly, Phillips et al. found that the invasive cane toad species Bufo marinus showed rapid adaptive evolution toward longer legs in introduced populations. Longer legged cane toads could cover more ground in a shorter period of time, an adaptation which favors dispersal. The seven-spotted ladybird beetles are a globally distributed species. They have a widespread native range across Eurasia. They were introduced into the USA in the 1950's as biological control agents to manage agricultural pests. Since then, C. septempunctata has expanded their range through much of the USA. We tested whether the wing size and shape of the seven-spotted ladybird beetles changes in the introduced range compared with the native range. To test the hypothesis, we used Adobe Photoshop to measure the length, width, and total area of the wings of about 1,500 ladybird beetles.

Marlowe, Maxwell

Biology, Geology, & Environmental Science AND Chemistry & Physics

Ethan Carver, PhD; Margaret Kovach, PhD; Gretchen Potts, PhD

Alkaloids in Electronic Cigarette Refill Solutions: Their Effects on Cell Growth and Gene Expression

E-cigarettes have become increasingly popular in the past decade and are marketed as smoking cessation aids. However, these products are not well regulated or researched with respect to health concerns and safety issues. A number of toxic compounds have been discovered in refill solutions. However, the long-term effects of e-cigarette use are still largely unknown. Nicotine is one of the primary alkaloids within e-cigarette refill solutions. Nevertheless, other tobacco alkaloids are present including; cotinine, myosmine and anabasine. These compounds are not disclosed on the packaging. This study uses known amounts of tobacco alkaloids, in an in vitro culture system, to test of the effects of these chemicals on the growth of human lung cells. Cell viability was measured as a function of metabolic ATP activity, using the Cell-Titer Glo Luminescent assay. Preliminary results from single alkaloid trials indicate decreased cell growth in culture, in comparison to a control. Changes in gene expression may be linked to the development of tobacco-related diseases in humans. To address this issue, we used qRT-PCR to analyze gene expression for multiple markers, to search for variations between control and exposed cultures.

Ray, Katherine

Biology, Geology, & Environmental Science

Eric O'Neill, PhD

Differentiating between two cryptic species of salamander utilizing molecular genetic techniques

The Dusky Salamander (Desmognathus fuscus) species complex includes two cryptic species whose ranges are not well characterized: the Spotted Dusky Salamander (D. conanti) and the Northern Dusky Salamander (D. fuscus). Their distributions are thought to overlap within the state of Tennessee, but thorough sampling has not previously been performed to determine the exact range of either species within the state. To begin to identify the distributions of these two species, we collected tissue samples from salamanders in the southern end of the Cumberland Plateau. This area has not been well sampled in previous studies and includes the Tennessee River, which may serve as a barrier to gene flow between these species. To determine which species the samples belong to, we amplified and sequenced a 400 bp region of mitochondrial DNA and compared our unknown samples with known samples from previous studies. We have also designed species-specific primers, which may allow species identification through PCR, without the need for sequencing. We are currently analyzing sequence data from our first samples, which includes several known and unknown samples and populations from both sides of the Tennessee River. We expect to be able to assign these populations to one of the two species.

Wilder, Lily; Kalen Foster

Biology, Geology, & Environmental Science

Jennifer Boyd, PhD

An ecophysiological investigation of climate change impacts on the imperiled eastern hemlock

The decline of eastern hemlock (Tsuga canadensis) due to the invasive hemlock woolly adelgid (HWA; Tsugae aldegis) is an ecological issue of increasing concern. Within the context of climate change, outcomes of this species interaction will be influenced in part by the direct responses of eastern hemlock to rising atmospheric CO2 and associated warming. Positive responses of trees to increased CO2 via its fertilization effect on photosynthesis have been well established, and warming also has been associated with generally positive photosynthetic responses; however, such responses are species-specific. To date, limited research has examined the effects of CO2 or temperature on eastern hemlock, and no studies have examined these factors in combination. Yet, interactions of CO2 and temperature are important to consider given their concurrence in climate change scenarios. We are using a common garden approach in controlled-environment growth chambers to explore the response of eastern hemlock individuals sampled from a population in northern Georgia, USA to interacting CO2 and temperature treatments. We hypothesize that these individuals will respond positively to increased CO2 but negatively to warming since they were sampled near the high temperature range limit of this species.

Wilson, John; Gayle Tyree; Justin Stamper

Biology, Geology, & Environmental Science

Jennifer Boyd, PhD

Exploring the role of local adaptation in plant species responses to climate warming

Climate conditions have been associated with considerable local adaptations within species, which could complicate projections of species range shifts in response to climate change. We used a common garden approach in controlled-environment growth chambers to investigate potential local adaptations in growth and physiological responses to warming of Solidago caesia (blue-stemmed goldenrod) propagated from field-sampled populations along a latitudinal temperature gradient across its range in the Appalachian region. The main and interactive effects of location of origin with temperature on growth and physiology were assessed with analysis of variance (ANOVA) to determine the role of local adaptation in responses to warming. Across temperature levels, individuals from the southern S. caesia population were characterized by significantly earlier germination and greater productivity than individuals from the northern population. Southern individuals also exhibited significantly greater rates of photosynthesis than their northern counterparts. Temperature was associated negatively with several growth measures when considered across species, but physiological variables were not significantly influenced by temperature as a main effect. Significant interactions of location of origin and temperature revealed southern S. caesia individuals generally responded negatively to warming when compared between their current and future conditions. In contrast, northern plants either exhibited neutral or positive responses to warming.

Zeglen, Susan

Biology, Geology, & Environmental Science

Hope Klug, PhD

Arapaima Training

There are currently 41,415 species on the International Union for Conservation of Nature red list of threatened species. One of these species is a large freshwater bonytongue belonging to the genus Arapaima and native to the Amazon basin. Their relative inaccessibility has left them largely neglected in freshwater fish awareness, conservation, and scientific study. As a result of this under representation and lack of study, the Tennessee Aquarium implemented a project with the goal of following the development of each of the five juvenile arapaima currently at their facility. In order to accomplish this end, the fish are being trained to voluntarily swim into a stretcher to undergo measurements, weighings, etc. as needed. The training is conducted on a food motivation basis: when the Arapaima participate in the desired behavior of swimming through the mesh structure, they are rewarded with food. A target stick is used to direct the fish through the structure and as their performance improves the device will gradually expand and eventually hold a stretcher. Their progress and participation is recorded and the data is analyzed to determine when they are ready to move to the next step.

Booker, Mary E.; Charles Thomas

Chemistry & Physics

Jisook Kim, PhD; Titus Albu, PhD

Cyclic Voltammetry of Quinones in Buffered Aqueous Solution at pH 7

Our laboratory studied the electrochemical properties of selected quinones using cyclic voltammetry. Each quinone was solubilized at varying concentrations in an aqueous solvent of phosphate buffer (pH 7) using tetrabutylammonium tetrafluoroborate as an electrolyte. We focused on documenting both the formal reduction potential values and the ratio between peak current values. When subjected to a potential, tetra-chlorobenzoquinone was calculated to have the lowest formal reduction potential under our experimental conditions. 2-hydroxy-1,4-naphthoquinone (HNQ) exhibited the highest calculated formal reduction potential value. A 1:1 ratio between the peak current values, as seen with HNQ, indicated a fully reversible system, whereas non 1:1 ratio, as in 2-methyl-1,4-benzoquinone indicated a less than reversible reaction. These results signified that quinones with a lower formal reduction potential value exhibit higher electrochemical reactivity than those with higher formal reduction potential values. Therefore, our findings correlated to previous documentation of quinone biological reactivity in inducing protein modifications.

Cecil, Rebekah

Chemistry & Physics

Robert Mebane, PhD

One-Pot Sequential Conversion of Aldehydes to N-Alkyl Amides

Building on our facile conversion of aldehydes to nitriles using hydroxylamine hydrochloride we have successfully coupled this reaction with the well-known Ritter reaction to prepare N-tert-butyl amides when using t-butanol as the solvent in the Ritter reaction. This one-pot sequential reaction yields hindered amides in moderate to good yields and has proved more successful with aliphatic aldehydes. Work continues to optimize the conditions to convert aromatic aldehydes into hindered amides.

Frye, Connor

Chemistry & Physics

Tom Rybolt, PhD

Nanostructures based on Carbon Nanotubes and Molecular Linkers

Molecular mechanics, a computational technique that can predict molecular structures and interactions, was used to study the noncovalent (no chemical bond) interactions between carbon nanotubes and various molecular linkers. Carbon nanotubes are a special form of carbon, and they have a wide variety of applications in many fields of material science due to their unique properties. They are better conductors than copper, while also being stronger than steel. Groups of carbon nanotubes have the tendency to form tight, parallel bundles. Molecular linkers were introduced into our models to stabilize nanostructures with carbon nanotubes held in perpendicular orientations. Molecular mechanics makes it possible to estimate the strength of noncovalent interactions holding these structures together and to calculate the overall binding energy of the structure. Different molecular linkers were studied. Early emphasis was placed on a previously synthesized C80H30 saddle-shaped nanographene molecule. Focus shifted to a set of linkers we designed and built around a cyclooctatetraene with two pairs of "arms" •that extend in opposite directions from this central portion. These molecular linkers were modified so that the "hand" portions of a pair of "arms" can close together to grab and hold a carbon nanotube.

Hixson, Andrea; Robert Kropp

Chemistry & Physics AND Biology, Geology, & Environmental Science

Manuel F. Santiago, PhD; Yukie Kajita, PhD

Understanding the defensive chemical profile and the dynamics of the chemical production throughout the life stage in predatory ladybird beetles

Many insects sequester defensive chemicals, including alkaloids, from their diet, or synthesize these compounds de novo. Identification of alkaloids in predatory ladybirds (Coleoptera: Coccinellidae) has been investigated extensively, and it is known that the defensive chemicals are important for determining the interspecific relationship among predatory insects. However, it is not known how variable the amount of defensive alkaloids is throughout their life stages. We will identify and quantify the defensive alkaloids from eggs, 1st to 4th instar larvae, pupae, and adults in invasive Harmonia axyridis Pallas and Coccinella septempunctata L., and native Hippodamia convergens Gurin-Mneville, using UV-Vis, fluorimeter, HPLC, and GC-MS. The identification of estradiol and cholesterol standards have been accomplished using the novel protocols.

Makwana, Ajay

Chemistry & Physics

Kyle Knight, PhD

Assessing the Feasibility of a One-Pot, Tandem Olefin Metathesis and Isomerization Sequence to Synthesize Conjugated Aromatic Olefins

The synthesis of substituted phenylpropene dimers using a one-pot, tandem olefin metathesis/isomerization sequence has been studied. This sequence relies on the facilitated, in-situ conversion of a ruthenium carbene species (Ru=CH2) to a ruthenium hydride species (Ru-H) upon addition of an inorganic hydride source. Three separate reactions occur within one reaction flask: 1) cross metathesis of the starting phenylpropene to yield phenylpropene dimer via Ru=CH2 catalyst, 2) conversion of Ru=CH2 to Ru=H via addition of an inorganic hydride source, 3) isomerization of phenylpropene dimer via insertion and 2-hydride elimination to yield conjugated product. We have discovered that each reaction in the sequence poses a unique challenge to overcome. The presence of dimerization and isomerization products in the crude reaction mixture has been consistently detected via 1H NMR spectroscopy under various experimental conditions. As it stands, determining the optimal conditions for the conversion of Ru=CH2 to Ru-H remains the greatest challenge and priority for the success of the proposed metathesis-isomerization sequence.

Thomas, Charles; Mary E. Booker

Chemistry & Physics

Titus Albu, PhD; Jisook Kim, PhD

Fluorescence and UV-Vis studies of protein modifications induced by quinones

Quinones belong to a class of chemicals known as polycyclic aromatic hydrocarbons. These chemicals have been found to be toxic in the environment, especially when interacting with certain proteins. In this study, we investigated the modification of lysozyme and ribonuclease A by substituted p-benzoquinones (pBQs) as well as substituted naphthoquinones (NQs). Fluorescence spectroscopy was used to measure the degree of modification of lysozyme and ribonuclease A when incubated with pBQs and NQs at differing concentrations and times. All reactions were carried out in a phosphate buffer (pH 7.0) at 37°C to mimic physiological conditions. The fluorescence intensity of modified protein was shown to be less than that of unmodified protein, and substituent effects were examined. UVVis spectroscopy was also utilized to show adduct formation and other protein modifications. This study adds to our understanding of the effects of quinones on biological systems.

Watts, Jeremy

Chemistry & Physics

Joshua Hamblen, PhD

The n-3He Experiment

The n-3He experiment is a high-precision measurement of the hadronic weak interaction (HWI) via the reaction n + 3He -> p + T + 765 keV. The correlation between the spin of incident cold neutron and the momentum of the resultant proton has a handedness and thus breaks the symmetry of mirror reflections. From the standard model, this is a clear signature of the weak force buried in a process that is dominated by the strong force. Filtering on this unambiguous signature of the weak interaction, we can gain sensitivity to effects 107 times smaller than the standard interaction. The n-3He experiment will be performed at the Fundamental Neutron Physics Beamline (FnPB) at the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory (ORNL) in Tennessee. We took physics data for two beam cycles during the entire calendar year 2015. Our goal is to measure an asymmetry in the reaction to a precision of 1.6 x 10-8, which we expect to be a relative uncertainty of 15%. This will be the lowest relative uncertainty measured in any few-body hadronic weak reaction.

Zdunek, Patrick

Chemistry & Physics

John Lee, PhD

Synthesis, characterization, and reactivity of ruthenium(II) complexes involving tris(2,2,2-trifluorethyl)phosphite and electron-rich arene ligands and extension to N-heterocyclic carbene ligand

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.

Perrott, Kylea; Garrett Jennings

Political Science & Public Service

Amanda Wintersieck, PhD

How Survey Question Wording Affects the Political Attitudes of College Students

Although research has shown the level of individual interest in politics to be extremely low, low levels of political knowledge are still able to maintain a well-functioning democracy. To measure political knowledge and the political attitudes of a democracy's citizens, public opinion surveys are conducted. The way in which questions in these surveys are worded has the ability to significantly influence survey responses, which in turn leads to distorted views of the reality of political attitudes. By using the response data from multiple surveys conducted with a potential sample of 119 students in an Introduction to American Government class at the University of Tennessee at Chattanooga, we argue that the wording of questions on euthanasia laws will lead to major variations in survey responses for political attitudes among college students. We predict that the stronger a UTC college student associates themselves with a Conservative ideology and a Republican Party partisan affiliation, the more likely they will be to not support euthanasia laws, regardless of the way in which the question is worded and that they will be less likely to support euthanasia laws the more harshly the question is worded.

Thomas, Hannah; Will Watson

Political Science & Public Service

Amanda Wintersieck, PhD

Do college students political values align with their political identification?

Do college student's beliefs align with their political party's ideology and do college students know what their political beliefs are or do they simply associate with their parent's party of choice? To test our theory we measure 135 students at the University of Tennessee at Chattanooga, who are enrolled in either an Introduction to American Government class as two senior level psychology classes. We ask them to identify their thoughts on different liberal or conservative ideals, and compare this to their party identification and their parent's party identification. We hypothesize that students will generally associate themselves as Republican, due to the area of Tennessee in which the students live and that the students will not generally know what beliefs the Republican party holds. We find that the majority of UTC Students are Republican, the majority of students' parents are also Republican, and that the majority of students either do not agree with Republican ideology, or do not know what Republican ideology is.

Gray, Rachael; R. Christopher Branson; Kaila Rogers; Lauren Powell

Psychology

Amanda Clark, PhD

Detecting Poor Effort in Undergraduate Research Participants: The Utility of Embedded Measures

Effort is an important component of neuropsychological testing as it can have a serious impact on the validity of findings. Therefore, using embedded measures to identify patterns of poor performance on clinical and experimental tests can provide insight into when an individual may be putting forth poor effort. The present study identified and compared possible patterns of performance with a standard clinical neuropsychological assessment, the Wisconsin Card Sorting Test (WCST), and an experimental assessment, the Slip Induction Task (SIT). One hundred and eleven undergraduate students were randomly assigned to a Simulating Brain Injury (SBI) group or a Do Your Best (DYB) group and completed a battery of assessments. Our preliminary analyses indicate significant group differences on the WCST and the SIT, and patterns of performance on both assessments distinguish SBI participants from DYB participants.

Hacker, Jessica; Trevor Slayton

Psychology

Jill Shelton, PhD

Climactic Interruptions and their effects on Prospective Memory and Shopping Decisions

This research involves studying the effect of climactic interruptions on consumer decision-making and prospective memory. Prospective memory is defined as memory for executing future intentions (Dodhia & Dismukes, 2009; Einstein & McDaniel, 2005). A climactic interruption is operationalized here as a distraction from an ongoing task that does not reach its logical conclusion before an individual is made to return to the ongoing task (Kupor, Reich, & Shiv, 2015). Our hypotheses are as follows: (1) People who experience climactic interruptions during an online shopping task will subsequently spend more money in the online shopping task than people who only experience non-climactic interruptions; (2) People who experience climactic interruptions will more often use the same decision-making strategy (e.g. decisions based solely on cost or solely on quality) to purchase different items in an online shopping task compared to people who experience non-climactic interruptions. (3) People who experience a climactic interruption during a shopping task will experience more prospective memory failures when they return to their shopping task compared to individuals who experience a non-climactic interruption. Participants will be given instructions to remember to purchase specific items in a computerized shopping task while considering the cost and the quality of items.

Rogers, Kaila; R. Christopher Branson; Rachael Gray; Lauren Powell

Psychology

Amanda Clark, PhD

Undergraduate Research Participants and their Level of Commitment to Simulating a Brain Injury

Measuring participant effort on research tasks is of high importance when it comes to the validity of one's research. Poor effort can greatly affect the outcome of the results, possibly leading researchers to make inaccurate conclusions about overall performance. The purpose of this study was to examine the effectiveness of several psychological assessments in detecting poor effort in participants who were instructed to simulate a brain injury for the purposes of self-gain. More specifically, the focus is on the participants' level of commitment to simulating a brain injury and how level of commitment and effort affected performance on a variety of clinical and experimental assessments. The participants in the study are undergraduate students from the University of Tennessee at Chattanooga. The research is currently ongoing and results have yet to be analyzed.

Scott, Iain A.

Psychology

Jill Shelton, PhD

Memory Strategies and Decision Making

The completion of future intentions plays an integral role in daily functioning. These intentions can range in importance from remembering to take a vital medication to sending an email to a colleague. There is controversy regarding the cognitive processes that support one's ability to remember to execute future intentions, referred to as prospective memory (Einstein & McDaniel, 2005; Einstein et al. 2005; Smith 2011). The majority of prospective memory research focuses on the ability and underlying mechanism that support executing an intended action at the correct time. Recent studies have been interested in memory errors within the field of prospective memory (Bugg & Scullin, 2013; Ping & Dodson, 2013; Scullin & Bugg, 2013). Responding to a previously completed prospective memory task that is no longer relevant, referred to as a commission error, can occur when there is a failure to forget the already completed intention. Making a commission error can have severe consequences in everyday life, such as accidentally taking two doses of the same medication. To date, there are no known studies on how to reduce the likelihood of commission errors.

Swanson, Sally; Robert B. Arrowood

Psychology

Ralph W. Hood Jr., PhD

Death Awareness, Decreased Creativity, and Intrinsic Religiosity

This exploratory investigation is part of a larger study testing the assumptions of defense mechanisms in Terror Management Theory (TMT). Based off of the works of Ernest Becker (1963), TMT asserts that the awareness of death creates the potential for anxiety. Within this framework, anxiety associated with confronting one's own mortality is mitigated by defenses such as religion and creativity, suggesting that religion and creativity can be used as a worldview defense mechanism to shield against anxiety associated with death. The present study examined creativity scores, measured by the Remote Associates Task, between high and low intrinsic religious following a mortality salience task. Creativity scores were lower in those with a high intrinsic religiosity score and in those who underwent a mortality salience task. A downward trend of creativity scores can be seen in both religiosity and condition groups, but these variables do not interact. By exploring the impact of death awareness and religiosity tied to scores of creativity, we contribute to the replication of previous research with significant results. Additionally, research can be improved upon by paying close attention to trends in this data and assessing other relationships present in TMT.

Vorwerk, Thomas; Allen Nida; Iain Scott; Tyronne James

Psychology

Jill Shelton, PhD

Context and Decision Making: the effect of context on implementation intentions for prospective memory

An implementation intention is a cognitive strategy that has been demonstrated to improve memory for tasks to be completed in the future, otherwise known as prospective memory tasks. The purpose of this research was to examine the role that context plays in implementation intentions' beneficial role in prospective memory. Participants were randomly assigned to one of three groups: a standard encoding group, an implementation intention group, and an implementation intention group that received extra contextual information about the prospective memory task. Each participant completed a novel eye-tracking prospective memory task. During this task, participants were asked to count images that contained a living object within a collage, while also remembering to complete a prospective memory task: to click the left mouse button when a particular image appeared just outside of the collage. Preliminary results suggest that extra context added onto an implementation intention might actually decrease prospective memory performance.

York, Jessica; Katherine A. Pendergast, BS; William Heaton, BS; Robert Gormley, MS; Naomi Whitson, BA

Psychology

Irene N. Ozbek, PhD

Finding the Lower Limits for Olfactory Detection of Vanilla Using the Wheeler-UTC Odor Threshold Test (WUTC)

Previous attempts to establish a lower limit for olfactory detection of vanilla using the Wheeler-UTC odor threshold test (WUTC) have been difficult for healthy participants; thresholds for this odorant appear to be much lower and more variable than initially anticipated. To identify a significant threshold for vanilla, 19 participants were given an extended version of the WUTC, which consists of a range of step-wise concentrations for vanilla among other odorants. Initially this test included 9 steps of vanilla, but had to be extended to 17 steps, and finally 30 steps to reliably find a threshold for this odorant. The concentrations were administered to each participant twice in a double-blind randomized order by a trained research assistant. A threshold was established for vanilla in 17 participants on the 30-step test. Median vanilla threshold was 13.52 ppm with a standard deviation of 53.10 ppm (skewness = 1.94). The thresholds ranged from 0.75 ppm to 182.56 ppm. A more accurate range was established for vanilla detection thresholds. Significantly more steps, therefore lower concentrations, were needed to find a lower limit for vanilla than other common odorants used in olfaction sensitivity tests; these comparisons will be discussed further.

Newell, Elliott

Social Work

Morgan Cooley, PhD, LCSW; Heather Thompson, PhD, LCSW

Examining the Influence of Social Support on the Relationship Between Child Behavior Problems and Foster Parent Challenges

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.

Brock, Jonathan

Sociology, Anthropology, & Geography

Amy Brock-Hon, PhD; Ann E. Holmes, PhD

Cathodoluminescence Study of San Salvador, Bahamas' Stratigraphy to Support the Inclusion of the Dixon Hill Member

This research focuses on revising the stratigraphy of a modern – Pleistocene Bahamian carbonate platform. The regional stratigraphy is comprised of deposits from several transgressions and regressions. The existing stratigraphic framework was developed by Carew and Mylroie, who produced the most widely used stratigraphic column. While a majority of their framework is agreed upon, there is some disagreement with regard to the Grotto Beach Formation and its uppermost facies. Other researchers have proposed a third member of the Grotto Beach Formation, using such methods as morphostratigraphy and amino acid racemization that supports the addition of a third member, however it has not been widely accepted due to the imprecise nature of those techniques. The incongruent coupling of reef faces and overlying regressive facies is addressed with cathodoluminescence (CL). Carbonate cements were analyzed with a CL to provide a more precise method of viewing facies cementation histories. The initial efforts included a feasibility study to see if CL could be used to support the identification of a third member in the Grotto Beach Formation. CL was used on thin-sections of samples obtained in the field from the oldest Owls Hole Formation and the youngest Rice Bay Formation.

Conder, Ginger; Kyle Elliot; Dani Hazelhurst; Abbey Vander Sluis

Sociology, Anthropology, & Geography

Pamela Ashmore, PhD

Establishing Biological Profile Based on Human Skeletal Remains

Unlike what is portrayed on popular CSI television shows, the work of a forensic anthropologist is extremely rigorous, detailed, tedious, and scientific. This work is not always as expedient or easy as portrayed. As part of a required project for a Forensic Anthropology course, we have been assigned human skeletal remains and required to establish a biological profile for our individual. This requires us to collect data to determine the sex, age at time of death, ancestry, stature, and evidence of any pathology or trauma for our individual. We will describe the methods used and present the data collected that was used to create a biological profile. Our research questions are: is the individual male or female, how old was this person at the time of death, what ancestral group (ethnicity) did this individual represent, how tall was this person, and did this person experience any sort of trauma or pathology? Methods used for this project include anthroposcopic observations and anthropomorphic measurements of skeletal elements. Data tables will be presented to support the conclusions that we have reached. This project will detail the steps taken by forensic anthropologists to establish a biological profile of an individual.

Davis, Rachel

Sociology, Anthropology, & Geography

Makiko Hori, PhD

Student and Faculty Knowledge of UTC's Policy on Sexual Misconduct, Relationship Violence, and Stalking

Sexual assault on college campuses is prevalent, with 19 percent of female college students in the United States reporting being victimized by sexual assault committed using either physical force or incapacitation by drugs or alcohol. Campus sexual assault is complex, encompassing a wide range of issues such as violence against women, excessive drinking, drug use, and institutional sexism, yet most people, including researchers, characterize it in an overly simplistic way. For instance, the most recent report on campus sexual assault, funded by the U.S. Department of Justice, failed to acknowledge sexual assault that was not committed using either physical force or incapacitation by drugs or alcohol (Krebs, et al., 2007). My research will seek to determine the extent of the knowledge that University of Tennessee at Chattanooga (UTC) students and faculty members have of the university's Policy on Sexual Misconduct, Relationship Violence, and Stalking. My research will determine whether students and faculty members at UTC can recognize and correctly label instances of stalking, sexual harassment, and various forms of sexual assault, including non-rape sexual assault and rape committed using physical force, incapacitation by drugs or alcohol, verbal or emotional coercion, and lack of affirmative consent.

Haire, Stefanie; Emily Noyes

Sociology, Anthropology, & Geography

Nicholas Honerkamp, PhD

2015 UTC Archaeological Field School

One of the important tasks that the 2015 UTC Field School set out to accomplish was to establish the bounds of the historical component that is present on the North end of the Couper Plantation at Cannon's Point Preserve (9GN21) with a systematic archaeological survey. The season was not only successful in this objective, but was also afforded the opportunity to celebrate unexpected finds at the site such as previously unknown tabby structure remains and a distinct presence of St. Simons Plain pottery. The 2015 Archaeological Field School came across these discoveries by way of field survey, which resulted in 77 shovel tests on a grid layout. Other advantages to this field season were the new recommendation direction that was discovered for potential archaeological work at the site in the future, in addition to the essential volunteer attendance that proved to be educational for all those involved. The antebellum period plantation is located on St. Simons Island, Georgia and a group of seven UTC undergraduate students accompanied Dr. Nicholas Honerkamp during this project, along with the field supervisor Marie Meranda.

Newell, Elliott

Sociology, Anthropology, & Geography

Makiko Hori, PhD

Examining Transphobia at UTC: Who is Most Likely to be Prejudiced?

Utilizing data collected at the University of Tennessee at Chattanooga, the current study examines which demographic groups are most likely to be transphobic, and determines if students support transgender policies on campus. Transphobia is defined as "emotional disgust toward individuals who do not conform to society's gender expectations" •(Hill and Willoughby, 2005). Previous research indicates that transphobia may be higher among men, heterosexuals, and individuals with conservative religious and political beliefs (Norton & Herek, 2013, Nagoshi, Adams, Terrell, Hill, Brzuzy, S., & Nagoshi, 2008). This study will be conducted through a survey distributed to undergraduate students at the University of Tennessee at Chattanooga. In the current study, multiple hypotheses are tested: (1) Male students are more transphobic than female, transgender, and non-binary students; (2) heterosexual students are more transphobic than homosexual or bisexual students; (3) political conservatism positively correlates with transphobia; (4) religiosity positively correlates with transphobia; (5) high levels of transphobia negatively correlates with support for transgender policies. Obtaining this data is important to establish the student population's acceptance of transgenderism and transgender policies.

Noyes, Emily; Stefanie Haire

Sociology, Anthropology, & Geography

Zibin Guo, PhD

Perceptions on Southeastern Mortuary Archaeology

Archaeologists have often struggled to reconcile scientific inquiry with traditional belief in excavating culturally significant mortuary sites in the Southeastern United States. This has become increasingly important, as minority groups such as African Americans and Native Americans, who have a wealth of culturally significant burial sites in the Southeast, have come forth in protest of insensitive scientific practices on these sites. This study aims to explore some of the complex ideas and feelings that these groups have towards archaeologists and archaeological practices. By gaining a better understanding of these beliefs, archaeologists will be able to work in cooperation with these groups rather than against them, leading to more successful academic pursuits in Southeastern archaeology overall.

Patel, Meera; Natalie Thacker

Sociology, Anthropology, & Geography

Zibin Guo, PhD

Patterns of Cell Phone Usage among a Sample of College Students

The purpose of this research project is to explore cell phone behavior and frequency among a small sample of students at the University of Tennessee at Chattanooga. Many studies have been conducted in order to understand how college students' cell phone usage and frequency may be linked to a variety of health and behavioral related issues. Research has shown that excessive daily cell phone use is common among university students, and that this phenomenon may be associated with a number of negative outcomes. These include, but aren't limited to, a decline in academic performance, decreased mental health, increased sedentary behavior, and reduced life satisfaction (Barkely, Lepp, & Li, 2015; Barkley, Karpinski, & Lepp, 2014). Additionally, the activities a student performs on their phone may also play a role in influencing these variables. In light of these implications, this research project will seek to assess cell phone behavior as it relates to a sample of ten males and ten females at UTC. Through free-listing, rank-ordering, and application of Smith's salience, data will be collected in order to shed light on students' most frequently performed cell-phone activities. Afterward, an in-depth interview will explore the underlying motivations surrounding these behaviors.

Swartwood, Katherine

Sociology, Anthropology, & Geography

Makiko Hori, PhD

Effectiveness of Sexual Assault Education and Prevention Programs on College Campuses

Universities across the country have implemented a diverse range of programs that strive to reduce sexual assault on college campuses and educate their students on common rape myths and understanding what defines consent. This project aims to evaluate what factors contribute to effective collegiate sexual assault education and prevention programs/. A group of factors shared by successful programs was compiled through examination of peer review articles. By comparing these features to UTC's sexual assault education and prevention program we seek to determine the effectiveness of the university's programs. Successful student education was measured by surveying current students' responses to basic rape myths and their awareness of sexual assault resources on campus. Through analysis of the identified effective programmatic factors and student survey responses, this study will identify which type of program would best suit UTC and its students.

Lauren Dunn; Ashlyn Pack; Alex Schwartz; Emily Sherman

University Honors

Dawn Ford, PhD; Ann Holmes, PhD

An Examination of Hurricane Joaquin's Impact on Red Mangrove Prop Root Biota of Oyster Pond in San Salvador, Bahamas

Research was conducted in Oyster Pond on San Salvador Island, Bahamas, to study Hurricane Joaquin's impact on the biota of red mangrove (Rhizophora mangle) prop roots, with a focus on macroalgae and invertebrates. We hypothesized that there would be a decrease in the number and variety of organisms attached to the mangrove prop roots. Two transect lines were used to observe 16 samples using a 0.25 m2 quadrat to study the biota. Surface water grab samples were also collected to analyze water chemistry. Previous data for pH, salinity, and nutrients (nitrate, nitrite, and ammonia) showed little to no change in water chemistry 6 months after the hurricane. The dominant invertebrate species found on the prop roots was the black mangrove oyster (Isognonzen alatus) which contrasts with previous studies reporting burnt mussels (Brachiodontes exastas) as the dominant species. Dominant macroalgae on the prop roots were Batophora oerstedii and Acetabularia (crenulata and calyculus), and previous studies reported a larger variety of macroalgae with a more even distribution. This study provides evidence that the red mangrove prop root biota is recovering, and is currently less diverse and less abundant than pre-hurricane conditions.

Jack Bogenschild; Mirel Crumb; Ashton Mitchell; Waverly Rushing

University Honors

Dawn Ford, PhD; Ann Holmes, PhD

A Biotic Survey of Outcroppings in Oyster Pond after Hurricane Joaquin on San Salvador, Bahamas

On San Salvador, Bahamas, there are a series of inland ponds across the island. Oyster Pond, a marine pond with underground conduit connections to the oceans, hosts an array of algae, small fish, and invertebrates. In March 2016, we studied the effects of the October 2015 Hurricane Joaquin on the biota present on pond outcroppings. We surveyed outcroppings that occurred along three parallel transect lines, each starting on the Northeast coast going towards the Southwest coast. We also collected water samples for analysis. We hypothesized that Hurricane Joaquin caused a decrease in species richness in outcropping biota and a change in water chemistry. We found a slight decrease in pH and a slight increase in salinity in comparison to 2015 data. We observed many of the same invertebrate species from pre-hurricane studies and the same Oyster species were present in altered quantities. However, algae populations shifted after the hurricane with an absence of the previously observed red algae: Dasya crovaniana, Polysiphonia subtilissima; and in green algae: Anadyomene stellata and Pedobesia lamourouxii. This study showed a slight change in water chemistry, a decrease in algal species richness, and an increase in scaly pearl oyster population and gestation on the pond outcroppings.

Luke Black; Alexandra Durham; Sara Leach; Charlie Stansberry

University Honors

Dawn Ford, PhD; Ann Holmes, PhD

The Effects of Hurricane Joaquin on the Sediment of Inland Ponds on San Salvador, Bahamas.

We conducted research in March 2016 to test for evidence of the Fall 2015 Hurricane Joaquin's impact on six ponds on San Salvador, Bahamas through the collection and analysis of pond cores. This study documents evidence of Hurricane Joaquin's effects on the sediment and biota of the inland ponds through the analysis of grain size changes and species distribution, especially in comparison to pre-storm studies. While we expected to find tempestites, there were none present. However, we attribute the autochthonous shell hash layers to the unusually high water energies present during the storm. In Reckley Hill Pond, we found shell hash without mud. In Pain Pond and Osprey Lake we found shell hash with mud; in Moon Rock Pond we found lime mud without shell hash, and in Crescent Pond we found no mud, only flocculant and shell hash. Oyster Pond was similar to Crescent Pond, with the exception of a single core of hash, mud, and more hash collected at the mouth of a conduit. Sixteen species of mollusks (gastropods and bivalves) and two species of algae were encountered in the cores. The ponds varied in salinity, with hypersalinity found in Reckley Hill Pond and Osprey Lake.

Jones, Paula; Christopher Barnett

UTC STEM Education

Jennifer Ellis, PhD

Enhancing Conceptual and Visual Understanding of Nuclear Chemistry in High School General Chemistry Courses

The purpose of this project is to evaluate curriculum centered on enhancing students' conceptual and visual understanding of nuclear chemistry (specifically TSSS standard SPI 3221.3.8) as well as enhance teacher pedagogical and content knowledge with respect to this concept/standard. The curriculum evaluated will provide an overview of radioactivity, balancing nuclear equations and an analysis of the half-life concept while simultaneously addressing student misconceptions regarding the hazards of nuclear energy. The data collected will help researchers better understand the barriers teachers and students have in understanding and teaching nuclear chemistry. The results of this project will provide teachers the pedagogical strategies, resources and materials needed to more effectively teach nuclear chemistry.

COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

Clavin, Michael; Braulio Ferrando; Ben Irven; Peter Hills

Civil, Chemical, & General Engineering

David Giles, PhD; Bradley Harris, PhD

Bacterial Utilization of Exogenous Lipids: The Effects of Various Fatty Acids on Vibrio cholerae

Previous work has shown that the Gram-negative bacterium Vibrio cholerae can uptake a much wider array of fatty acids than other Gram-negative organisms, thus enabling it to exploit exogenous lipids for environmental adaptation. As the bacterium responsible for the acute intestinal infection known as cholera, V. cholerae provides a model case for the study of the various mechanisms by which bacteria handle fatty acid molecules, as well as any potential implications for the prevention and treatment of diseases caused by pathogens with fatty acid uptake ability. Here, we report on our study of the effects of various fatty acids on the growth, membrane permeability, and motility of V. cholerae. The results indicate that these properties are discernably affected by supplementing the growth medium with various omega-3 and omega-6 fatty acids. Enhanced growth was observed with all fatty acids except arachidonic acid, a polyunsaturated omega-6 fatty acid. Cell membrane permeability, as measured by an ethidium bromide uptake assay, was affected based on the supplemented fatty acid. Furthermore, swimming motility tests revealed both increased and decreased motility depending upon fatty acid availability. Most notably, both the membrane permeability and motility of V. cholerae were significantly decreased by exposure to arachidonic acid.

Orr, Ryan; Husam Alkushiban; Bader Alshammari; Megan Downs

Civil, Chemical, & General Engineering

Soubantika Palchoudhury, PhD

Cost-effective Synthesis of Iron Oxide Nanoparticles Towards Sustainable Nanotechnology

There has been an immense interest in the synthesis of nanoparticles with engineered properties over the last decade for improved practical applications. In particular, nanoparticles like iron oxide have been used as contrast agents in magnetic resonance imaging, therapeutics, fuel cell catalysis, and environmental remediation. To exploit the benefits of nano-sized materials in a sustainable fashion, systematic analysis of the production method is required. Using iron oxide nanoparticles as a model system, a comparative cost and environmental effect based analysis of the lab-scale synthesis is reported in this project. In this work, water-soluble dextran and polyvinyl pyrrolidone coated iron oxide nanoparticles are synthesized via a modified polyol method without the use of complex equipment or inert gas protection. Compared to other reported synthesis methods for iron oxide nanoparticles like co-precipitation and thermal decomposition, our engineered protocol is facile, cost-effective, environment-friendly, and easily scalable for practical application. In addition, we report a detailed cost comparison of our product with the iron oxide nanoparticles available commercially. This work will be highly beneficial in developing sustainable synthesis routes for nano-sized materials for large scale applications.

COLLEGE OF HEALTH, EDUCATION AND PROFESSIONAL STUDIES

Holt, Fallon A.

Center for Community Career Education

Sandy Cole, Joanne Cook, Jonathan Brocco

PAWS (Post-Secondary Awareness With Success)

We are a program with a mission to mentor children to achieve their dreams by being better students, friends, and citizens so that they can successfully graduate from any postsecondary institution to lead the future of our communities, country, and world. Program Goals: Successful mentor/mentee matching; Effective monitoring of mentor/mentee relationship; Decrease in juvenile delinquency; & Increase postsecondary awareness

Eastlick, MaryBeth; Jacob Hardin

Health & Human Performance

Andrew Bailey, PhD

Understanding Climbing Advocates in Chattanooga, Tennessee

Chattanooga is a popular climbing destination whose resources are primarily maintained by nonprofit organizations. Little is known about the advocates responsible for such maintenance. The purpose of this study was to explore the relationships between the climber's experience, perceived responsibility, advocacy, and site preferences. Student researchers distributed surveys to both local and nonlocal participants at a well-known bouldering competition. A total of 278 surveys were collected using a randomized-stint sampling method (100% response rate). This survey included items related to their level and preferred type of climbing, organizational involvement, and location preferences. The data were analyzed to explore descriptive information and Pearson correlations through SPSS. The data showed that the perceived level of responsibility for maintenance placed on the land manager (i.e. state forest) was negatively correlated to the perceived responsibility of climbers (r =- .260), but positively related to perceived responsibility of nonprofit organizations (r= .648).There was also a positive correlation between "traditional" •climbers' experience and level of perceived personal responsibility (r= .154).

McDowell, Amanda

Health & Human Performance

Andrew Bailey, PhD

Assessing the Economic Impact on Climbing in Chattanooga, Tennessee

While the Chattanooga area is often highly regarded for its climbing resources, little is known about how much this has an effect on the local economy. Thus, there is little evidence to support the necessity of funding for climbing preservation from the city. The purpose of this study was to document the impact climbers have on the local economy and better understand the clientele and their travel behaviors. During the fall of 2015, groups of researchers traveled to a popular climbing competition and conducted surveys of the participants, both local and nonlocal. Researchers used a randomized-stint sampling method to collect a total of 278 surveys with a 100% response rate. Questions on the survey consisted of demographics, socio-economic status, travel information, spending patterns, and climbing experience. Economic data were analyzed with the use of IMPLAN software. Descriptive statistics, Pearson correlations and linear regression were conducted using SPSS. Based on the self-reported spending level of competitors, the total economic impact was $201,580, with the average duration of their stay being 2.2 days. Age had the highest correlation with total spending, at r=.237, followed closely by age at r=.189.

Brown, Emma; Rachel Dean; Adrienne Martin

Interior Design

Tonya Miller, MFA

A Calming Environment for Veterans

This project explores how interior design can be used to help ROVER, a non-profit organization aimed at providing assistance to veterans in need, succeed in their mission to better serve the veteran community in our region. The final interior design solution was inspired by research into the physical, psychological, and social needs of veterans. The concept of the resulting design aimed to incorporate nature and serenity through the space and increase relaxation. Colors and textures that reflected nature were chosen for the design. Greens, blues, and grays were incorporated for a natural feel. Wood accent walls add texture and interest in the space. In the reception and nurse's station there is a water fall which serves as a center piece and adds a calming feel in the environment. The social area provides a space for people to spend time together and feel at ease. Overall, this design will help veterans feel safe and calm.

Chanatry, Ryder; Aubrey Moorhead; Kelsey Smith

Interior Design

Tonya Miller, MFA

A Biophilic Approach to Veterans Facility Design

This project explores how interior design can be used to help ROVER, a non-profit organization aimed at providing assistance to veterans in need, succeed in their mission to better serve the veteran community in our region. The final interior design solution was inspired by research into the physical, psychological, and social needs of veterans. The ultimate goal was to provide a calm and inviting environment for all who come to use the provided services. It has been scienti-fically proven that incorporating Biophilic design in a space can improve a person's overall mood and outlook, so we wanted every usable space to showcase this type of design. We accomplished this type of environment through integrating a soothing color palette of blues and greens, water features, plants, and gentle lighting. Overall, we believe our veterans facility accommodates the specific needs of the ROVER organization in a way that is functional and also sustainable.

Dent, Jacquelene; Allison Kroninger; Abigail Mittler

Interior Design

Tonya Miller, MFA

Coming Alive: A Lively Environment for a New Generation of Veterans

This project explores how interior design can be used to help ROVER, a non-profit organization aimed at providing assistance to veterans in need, succeed in their mission to better serve the veteran community in our region. The final interior design solution was inspired by research into the physical, psychological, and social needs of veterans. The concept of the resulting design is intended to encourage veterans and their families to "come alive" •and enjoy the space with other veterans. This mission was achieved with the use of the bright and lively colors of red and green, provoking feelings of rejuvenation, excitement, and passion about life. The concept of "coming alive" •is also incorporated by creating spaces that not only meet the new generation of veterans' needs, but leave occupants with a lasting impression of community.

Martin, Adrienne; Aubrey Moorhead; Ryder Chanatry

Interior Design

Jessica Etheredge, MID

Building Exposure: Researching the Industrial YMCA

Every year Senior Interior Design students enroll in a Senior Thesis course which exposes them to historic research, adaptive reuse, and community economic viability studies through critical thinking and hands-on learning. The UTC Interior Design Department partners with Cornerstones, Inc, a Chattanooga non-profit historic preservation organization, to select an endangered building in Chattanooga for the Senior Thesis Project. This year we were given the Industrial YMCA located in what is known as Southside Chattanooga. The students are also required to select a mentor within the design profession to guide them through their research and design solutions. After site visits and historic research, each group prepares a Historic Structures Report, a Historic Board and a video summarizing their research.

Mittler, Abigail; Allison Kroninger; Rachel Dean

Interior Design

Jessica Etheredge, MID

Endangered Building: Researching the Industrial YMCA

Every year Senior Interior Design students enroll in a Senior Thesis course which exposes them to historic research, adaptive reuse, and community economic viability studies through critical thinking and hands-on learning. The UTC Interior Design Department partners with Cornerstones, Inc, a Chattanooga non-profit historic preservation organization, to select an endangered building in Chattanooga for the Senior Thesis Project. This year we were given the Industrial YMCA located in what is known as Southside Chattanooga. The students are also required to select a mentor within the design profession to guide them through their research and design solutions. After site visits and historic research, each group prepares a Historic Structures Report, a Historic Board and a video summarizing their research.

Smith, Kelsey; Emma Brown; Jacquelene Dent

Interior Design

Jessica Etheredge, MID

Connecting Students to the Past: Researching the Industrial YMCA

Every year Senior Interior Design students enroll in a Senior Thesis course which exposes them to historic research, adaptive reuse, and community economic viability studies through critical thinking and hands-on learning. The UTC Interior Design Department partners with Cornerstones, Inc, a Chattanooga non-profit historic preservation organization, to select an endangered building in Chattanooga for the Senior Thesis Project. This year we were given the Industrial YMCA located in what is known as Southside Chattanooga. The students are also required to select a mentor within the design profession to guide them through their research and design solutions. After site visits and historic research, each group prepares a Historic Structures Report, a Historic Board and a video summarizing their research.

Depelteau, Anna; Elyse Newland; BJ Grayson

Occupational Therapy

Susan McDonald, EdD, OTR/L

Comparative Analysis of 3D vs. Pre-fabricated Adaptive Equipment

Prefabricated adaptive equipment can be costly. Three dimensionally (3D) printed adaptive equipment presents a solution to this problem. The purpose of this study was to determine if 3D printed adaptive equipment provided a comparable alternative to prefabricated equipment in occupational therapy. This study was a comparative analysis of 3D printed and prefabricated adaptive equipment. Inclusion criterion for this study was that participants were between the ages of 18 and 65. A convenience sample of 49 participants were asked to use prefabricated and 3D printed adaptive equipment. After each use, participants were asked survey questions regarding item preference, cost, and color. This study found that 83.7% of participants preferred the prefabricated cardholder, 46.9% preferred the 3D printed shopping bag holder, 63.3% preferred the prefabricated bottle opener, and 42.9% preferred the prefabricated cup holder. The results of this study indicate that participants preferred prefabricated equipment because of its ease of use, better quality, and better design. Further research should be conducted to explore the quality, design, and usability of 3D printed adaptive equipment in occupational therapy.

Steward, Kathryn

School of Nursing

Kelli Hand, DNP, RN

SBAR, Communication, and Patient Safety: An Intergrated Literature Review

Communication errors are a common cause of adverse patient safety events in the healthcare field. The Situation-Background-Assessment-Recommendation (SBAR) communication tool was introduced in 2002 to guide the communication of critical patient-care information. The purpose of this integrated literature review was to determine how the use of the SBAR tool during handoff of critical information affects communication between healthcare providers and patient safety. The combined search terms of "SBAR", "Communication", and "Patient Safety" were entered into PubMed, the Cumulative Index of Nursing Research, and Cochrane databases to find English language, peer reviewed articles published within the last 10 years. The resulting articles were then analyzed for recurring themes. The SBAR tool creates a common language for communication, increases the confidence of users, results in more effective and efficient communication, improves patient safety outcomes, and promotes a culture of patient safety in healthcare organizations. The benefits of SBAR can be divided into primary and secondary benefits. Primary benefits result from characteristics unique to the SBAR tool, while secondary benefits result from the standardization process of communication. The primary benefits may make SBAR more advantageous than other standardized communication tools. Communication errors are a systemic problem in healthcare, often resulting in patient harm.

Abu-asaba, Aisha; Jeanette Dethero; Andre Hitchcock

Social Work

Amy Doolittle, PhD, LCSW

After School Programs and the effects on Academic Performance

The purpose of this project is to find out what the effects of after school programs are on a child's academic performance. Data will be analyzed using existing parent survey satisfaction results created by the Northside Neighborhood House, TCAP scores, and report card scores. Several research questions will be addressed concerning how after school programs effect certain aspects of academics. These questions include the impact on TCAP scores, Math and Language grades, homework completion, and overall report card scores. All information will be obtained from the years 2012-2014 using grades K-12 with a total of 40 children all of whom are under the age of eighteen and who have attended after school programs. All data will include age, race, ethnicity, and sex and information will be kept confidential.

Blevins, Sierra; Le'Darius Tate; Stacey Ridgell

Social Work

Amy Doolittle, PhD, LCSW

Expanding Community Services: Exploring Reasons for Domestic Violence Shelter Denial.

Domestic violence is a significant issue for communities. Many victims leave their abusers and seek help with community shelters. Domestic violence shelters provide essential, life-saving resources for many victims of domestic violence (e.g., 30-60 days of shelter, support groups, other types of physical and emotional supports), and they can be a first step to accessing resources for long-term stability as well. The downside to domestic violence shelters is that they are often full. Standard homeless shelters do not offer the same resources as domestic violence shelters. If the victims are homeless because of the violence and a shelter is not available, the victim is more likely to return to the abuser for financial stability and housing, living with the abuse and putting their lives in continued danger. The purpose of this research proposal is to identify reasons for denial to a domestic violence shelter. Researchers will review existing call logs documented by the shelter and do a content analysis to determine the most frequently cited reasons for denial. A form is completed for each call, noting the services requested, level of danger, and if the services were denied. If the services were denied, another form is completed, explaining why.

Brewer, April; Michelle Williams; Sarah Conn

Social Work

Morgan Cooley, PhD, LCSW; Amy Doolittle, PhD, LCSW

Differences in Health Outcomes by Race: Examining a Population of Vulnerable Adults

The purpose of this research proposal is to present a study comparing the mental health, physical health, substance abuse, and comorbid mental health and substance abuse diagnoses of white adults with minority adults. Researchers hypothesize that among this vulnerable population, minority adults will have poorer outcomes. The focus of this research will be to determine if there is an advantage associated with "whiteness" • even among those living in poverty. There are many adverse effects of poverty including the prevalence of chronic disease and comorbid disorders. The association between low socioeconomic status and health problems appears throughout past research. Some of the conditions linked to low income or poverty include coronary disease, hypertension, gastrointestinal disease, respiratory disease, diabetes, and arthritis just to name a few. In addition to chronic disease, vulnerable populations can have a higher rates of substance abuse or misuse. Additionally, minority and economically disadvantaged populations experience higher instances of adverse mental health, including depression and anxiety, due to stressors associated with low economic status, social isolation, cultural stigma, and language barriers. This proposal will present a secondary data analysis utilizing data collected from a primary care clinic in Florida that serves low income individuals.

Brown, Emily G.; Heather Rowell

Social Work

Amy Doolittle, PhD, LCSW

Why I Volunteer, What Keeps Me Here

Research into the motivations for why individuals volunteer with hospice care facilities.

Cakor, Selma; Savannah Ammans

Social Work

Amy Doolittle, PhD, LCSW

Refugee Resettlement Process: What Variables Matter?

This poster will showcase our study of the resettlement process that refugees encounter when applying for refugee status. The purpose of this study is to answer the following research question: What affects does country of origin have on the length of time it takes for refugees to resettle?" We will be using existing data from Bridge Refugee Services that was collected between the fiscal years of 2012 to 2014. A chart review form will be used to collect data from fifty cases chosen through systematic random sampling which will then be added into SPSS. Our poster will display our findings from this study. "

George, Lea; Elizabeth Ayers; Channing Phillips

Social Work

Amy Doolittle, PhD, LCSW

A Relationship with Christ Changes Everything: How Faith Affects Adolescent Behavior

This proposal represents a secondary data analysis examining the relationship between spirituality and youth's problematic behavior among current foster children and recently discharged residents of a temporary group home in Southeast Tennessee. The purpose of this research is to explore if there is an impact on adolescent behavior when there is a profession of faith or belief in God. Previous researchers have identified that there is a correlation between religious involvement, resiliency, and overall wellbeing in youth while living in and being discharged from group homes. In addition, religious beliefs have been shown to be a buffer against negative external factors, such as poor academic performance and family problems, for children living in group homes. In this study, well-being is represented by a measure of youth behaviors, assuming that fewer behavioral problems equates to better well-being. Researchers used SPSS and correlational data analysis to assess whether there was a change in behaviors following a profession of faith. Behaviors were previously measured using the Behavior Assessment System for Children, 2nd edition (BASC-2), upon acceptance to the group home, every six months, and upon discharge. The researchers used the Self-Assessment Scoring Scale to measure behavior.

Morgan, Autumn; Jodi Barriga; Kristin Woods

Social Work

Amy Doolittle, PhD, LCSW; Morgan Cooley, PhD, LCSW

Exploring Foster Parent Characteristics and Their Experience Fostering

The purpose of this study is to examine multiple questions related to a foster parent's experience with the child welfare system (i.e., satisfaction as a foster parent, intent to continue fostering, perception of child behaviors, supports or protective factors, and demographic factors). This study will use a secondary data set to examine the following questions: 1. Do the demographic characteristics of foster parents relate to their satisfaction as a foster parent and intent to continue fostering (e.g. age, years fostering, income, support group participation, etc.)? 2. Does foster parent perception of child behaviors relate to their satisfaction as a foster parent and intent to continue fostering? 3. Do the demographic characteristics of foster parents relate to their level of supports or protective factors (e.g. age, years fostering, income, support group participation, etc.)?

Murray, Heather

Social Work

Morgan Cooley, PhD, LCSW

Reviewing Foster Parent Satisfaction: A Qualitative Study

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.

Sharp, Mariah; Savannah Gable; Alicia Payne

Social Work

Amy Doolittle, PhD, LCSW

An Exploration of the Demographic Predictors of Lethality

In this research project, the purpose is to explore the relationship between the ACE survey and the Lethality scale. The Partnership, a crisis shelter, administers this survey and scale during their assessments with clients coming into their shelter.The Adverse childhood experiences (ACEs) are potentially traumatic events that can have negative, lasting effects on health and well-being (Sacks, V., Murphey, D., & Moore, K., 2014, July). Interventions targeting the early childhood origins of adult health disparities may be more effective than attempting to modify health behaviors or improve healthcare access in adulthood (Shannon M. Monnat & Raeven Faye 2015; Shonkoff et al. 2009), The Lethality scale is a research instrument designed to assess battered women in danger of being murdered or seriously injured by their intimate partner or ex-intimate partner (Campbell, Webster, & Glass, 2008). We are going to examine the results collected by the shelter to examine the connection between these two assessments.. The names will be removed from the surveys before we have access to them. Then, we will code each case with a number and enter the data into SPSS, a computer program that will allow us to sort the data.

UTC Research Dialogues
Undergraduate Research Symposium
Podium Presentations
Ocoee and Heritage Rooms, April 13, 9:30 – 4:00

Ocoee Room Presentations

9:30 – Michael Schoonover • Biology, Geology & Environmental Science
9:50 – Jason Weber • Biology, Geology & Environmental Science
10:10 – Erik Hearn • Biology, Geology & Environmental Science
10:30 – David Kotval • Mathematics
11:30 – Andie Qualls • Art
11:50 – Erin Hall • Art
12:10 – Shelby Turner • Art
12:30 – Meredith Wright • Art
12:50 – Leah Hoffman • Art
1:10- 2:00 – UHON Student Panel

Heritage Room Presentations

10:10 – Kemba Walker • Spanish
10:30 – Ambreen Sohani • Religion
10:50 – Sally Swanson • Psychology
11:10 – Andi Griner • Political Science
1:10 – Brandon Jones • Philosophy
1:30 – Emily Gray • English
1:50 – Kris C. Jones • Mass Communications
2:10 – Logan Clem • Writing Center
2:30 – Katherine Adorati • Chemistry & Physics
2:50 – Cooper Thome • Chemical Engineering

The Presentations

Hall, Erin
Art
Christina Vogel

The Artistic Process of Repetition

Utilizing the use of repetition, chance, and experimentation through my artistic practice, I create art that often incorporates a scientific process.

Hoffman, Leah
Art
Christina Vogel

Visualizing the Psyche

In my body of work I am creating visual interpretations of the continual effects that anxiety has on the human psyche via examining the stimuli and psychological functions in motion that contribute to how humans perceive information. There is no universal definition that explains why we psychologically respond to information in different ways. The nature of any individual's respective psyche effects how that individual perceives information. It varies from person to person, then subsequently from situation to situation. Not only is perception subjective; its effects are unavoidable. Everything we experience in our day to day life is essentially different types of information that our brain has to process. The psychological state I am examining sometimes leads to information becoming repressed. Something triggers a part of the person who originally processed the information to render it inaccessible to themselves. Simultaneously, other information is being subjected to hyper emphasis and scrutiny. The two maintain a perpetually precarious relationship that lives in the human psyche. The dysfunctional relationship between the two contending forces results in confusion and tension that wears on its host. Psychological states are intangible and differ for the respective person they are affecting.

Qualls, Andie
Art
Christina Vogel

Andie Qualls: Bodily Eruption

Rough synopsis of the development of my work over the past four years, primarily concerning the body, death, what happens to us after death, and the lack thereof.

Turner, Shelby *Art* Christina Vogel	**Writing a Memory** The human memory is constantly evolving and working within the mind, attempting to organize and store information from various moments in time. An inevitable disconnect occurs between the amount of information received and the amount of information recollected in the mind as time progresses and context changes. Arising from this disconnect is a desperate want to navigate the space in between the happenings of then and now.
Wright, Meredith *Art* Christina Vogel	**#Female** This semester I intend to explore human interactions within figurative work. Living in a highly digital time has lead to the ability to meet, view, and even build relationships without physical interaction. These online interactions belong to their own quasi world which you can log in or out of at any given time. My work explores the current culture of social media while using it as a lens to examine the uncertainty of the female gender and the culture of prescribed femininity that we as women are subjected to. Fueled by the internal conflict that arises from this precarious exploration of the current symbol of woman I have amassed a body of work ranging from paintings and sketches to large, sculptural installation works. By talking through the process of both creating and critiquing within the knowledge domain of popular culture and art history I hope to explain why the absurd imagery and compositions I have created are relevant to the generational habits that I have observed.
Hearn, Erik *Biology, Geology, and Environmental Science* Eric M O'Neill, PhD; John J Obrycki, PhD; and Yukie Kajita, PhD	**An examination of ecological rules on phenotypic variation in Coccinella septempunctata (Coleoptera: Coccinellidae) - a comparison between environmental factors and elytra spot size variation** Introduced species often encounter environments that are similar to those in the native range. Whether they evolve similar phenotypes in these environments may depend on both genetic and environmental factors. Coccinella septempunctata is an invasive species that was introduced as a biological control agent from Eurasia to North America to manage agricultural pest insects. Elytra spot size was examined because it was known to vary in the native range and it was likely important for the physiology of the species. We examined whether spot size variation in C. septempunctata of native and introduced populations followed the ecological patterns called Gloger's rule and thermal melanism hypothesis. We also compared a correlation between environmental factors (e.g., temperature and precipitation) and the spot size variation between native and introduced ranges. A total of 1,457 individuals of C. septempunctata were collected from 63 locations from native and introduced ranges. Our results showed a positive correlation between precipitation and spot size in native range, but not in introduced range.
Schoonover, Michael *Biology, Geology, and Environmental Science* David K Gile, PhD	**Shining A Light on What's Hiding in the Dark: Bacterial & Lipid Analyses of Subterranean Sediments** Research concerning microbes in the subterranean oligotrophic environment is sparse; identifying microorganisms in different locations inside Raccoon Mountain Caverns has the potential to define and expand our taxonomic knowledge of organisms in these environmental niches. Furthermore, our approach involved identification of cultivable bacteria and analysis of lipid profiles from four collection types of cave samples: mud, dirt, water, and areas that experience high human traffic. Utilizing traditional microbiological techniques, each sample was streaked for isolation of individual colony types. Pure cultures were prepared for genomic extraction, amplification of the 16s rRNA gene using universal primers, and Sanger sequencing for identification. Several Gram negative and Gram positive bacteria were identified, including Bacillus, Acinetobacter, and Pseudomonas species. Concurrently, each sample was analyzed for lipid content using quadrupole mass spectrometry following direct injection electrospray ionization in both positive and negative modes. Lipid profiles of fatty acids, lysophospholipids, and glycerophospholipids among sample sites were similar, providing a lipid signature that may hold potential for characterizing biomarkers that are indicative of cave health and floral composition.

Weber, Jason

Biology, Geology, and Environmental Science & University Honors

Hope Klug, PhD

Perceptions of Scientific Controversies Among the General Public and Scientific Community

We conducted a large-scale survey of UTC students and faculty to explore perceptions of scientific controversies among the general public and scientific community with various demographic considerations. Specifically, we aimed to improve understanding of how people view the controversial nature of well-known scientific issues within the context of their trust of scientists, appreciation for scientific discovery, and knowledge of the scientific method. A survey was developed to investigate and these questions, and data were collected from students and faculty members to better understand their views of science. Preliminary results suggest that overall most students and faculty trust and value the scientific findings. However, not all respondents trust or value science, and there were significant differences in perceptions of science and scientific controversies between students and faculty, and education, expertise, and personal beliefs are related to such perceptions. Our findings are unique in their consideration of people's perceptions of scientific controversies among both the general public and the scientific community, focusing the nature of the controversy itself rather than on the controversial issues.

Adorati, Katherine

Chemistry and Physics

Gretchen Potts, PhD

Effects of Cigarette Butts on Coastal Waters

Improperly discarded cigarette litter can have damaging effects on the environment. Within seawater, trace elements that are present in the cigarettes could leach into the ocean having damaging effects on the marine ecosystem. The goal of this research is to investigate if contaminants leached from cigarette litter, specifically focusing on differences in elemental concentrations, is significant in samples of seawater collected near St. Simon's Island at both high and low tides. This project also explores a gallium coprecipitation methodology for elemental isolation in order to determine the chemistry behind why gallium is beneficial in the precipitation process. Samples of seawater were mixed with a gallium standard, and the pH of the solutions were increased to 10 with sodium hydroxide. The precipitates that formed were filtered and collected and redissolved with concentrated nitric acid. The concentrated samples were then diluted for elemental analysis by inductively coupled plasma optical emission spectrometry (ICP-OES). The different elemental concentrations that were gathered underwent independent sample t-test to determine if a significant difference in the samples collected was present.

Gray, Emily

English: Literature and Language

Salvatore Musumeci, PhD

From Devoted to Disillusioned: A Character Analysis of Annie Allerton

In the world of fiction, authors often voice their personal opinions through their characters; Dave Eggers is no exception. In his novel The Circle, Eggers communicates his views concerning the detrimental effects of advanced technology via the confident, outspoken character of Annie Allerton. This paper asserts that by tracking Annie's character development throughout the course of the story, it is easy to see her transition from a young, passionate, in-the-know member of the all-powerful Circle into a skeptical, emotionally scarred outcast. This dramatic transformation serves to illustrate the effect rapidly progressing technology, and by extension unhindered knowledge, is capable of having on consumers. Eggers also provides commentary on the dangers of an overstimulating technological world through Annie's relationships with other characters, namely Mae. The relationship between these two characters functions as a depiction of the alluring power seemingly omniscient technology possesses. Annie guides Mae deeper into the culture of the Circle in the same way modern technology guides its users into the digital world.

Kotval, David

Mathematics

Boris Belinsky, PhD

Optimal Design in Accordance with the Spectrum of a Sturm-Liouville Problem

Optimal forms are of great interest to many application in engineering. In this talk, we investigate the optimal form, with respect to cross-sectional area, of a cylinder of given mass such that it most efficiently resists destructive mechanical resonance. To carry out the optimization, we analyze the modeling differential equation by investigating the corresponding the SturmÃ¢Â€Â“Liouville problem with generalized boundary conditions that contain the spectral parameter.

Jones, Brandon

Philosphy

Brian Ribeiro, PhD

Increasingly Diminished: Moral Progress and the Material Basis of Moral Dilemmas

Where does moral progress lie? Are our moral dilemmas something to be solved, perhaps by changing ourselves into highly disciplined and principled people, or is it more effective to eliminate them altogether by altering our environment to remove the basis for our moral dilemmas in the first place? This paper explores these questions through the works of different socialist thinkers and in the context of modern day issues. In Simone de Beauvoir's "The Ethics of Ambiguity" she writes that, through a Hegelian paradoxical displacement, "moral consciousness can exist only to the extent that there is disagreement between nature and morality" so that "if moral action is the absolute goal, the absolute goal is also that moral action may not be present." This gives us a philosophical framework for understanding that moral dilemmas exist in the discord between how we think things ought to be and how things are. In "The Soul of Man Under Socialism" Oscar Wilde further explores de Beauvoir's principle by arguing that "the proper aim is to try and reconstruct society on such a basis that poverty will be impossible."

Griner, Andi

Political Science: International and Comparative Studies

Irina Khmelko, PhD

Conference Experience of an Undergraduate Student

Andi Griner will talk about her experiences doing research with a faculty member and traveling to participate in a major conference, sharing some of the findings of her research. Andi will leave time for questions and discussion with students.

Swanson, Sally B.

Psychology

Ralph Hood, PhD

6 Billion People Can't Be Wrong: The Psychology of Religion, Politics, and the Structure of Attitudes

Roughly six billion people in the world identify as being religiously affiliated. This roughly translates to 80% of the population. Further, 92% of Americans identified as having belief in God or a universal spirit. Many people who identity as religious would likely say that their beliefs about God or a higher power impact their perceptions, behaviors, ideological beliefs, and attitudes. The psychology of religion attempts to answer questions revolving the impact of religious beliefs on psychological constructs. By empirically studying religion through the lens of psychology, we can continue to develop an understanding about how attitudes and behaviors are impacted by religious belief. Continuing research in Psychology of Religion is a necessity in order to understand behavior that is structured by belief that impacts the majority of people in the world. The current research will examine the formation of beliefs, attitudes, and behaviors as they are relevant to current events, religious movements, and political causes. Specifically, how religious groups form attitudes towards one another and how attitudes impact interactions between religious groups will be examined.

Sohani, Ambreen

Religion

Stephen Eskildsen, PhD

Understanding Quran: The Ethico-Intellectual Perspective

Quran, the revealed text of Muslims, is word of God and first sign of divine knowledge. In Quran, Allah mentioned that human beings are bestowed upon the gift of intellect over the creation and have been given the status of best of creation. It confers upon believers to use intellect properly in their temporal, spiritual, and intellectual lives. The ethical and kind relationship of a believer with other fellow beings is one of the principal teachings of Islam and a prerequisite to their righteousness, Taqwa (Arabic word in Quran) towards God. In this regard, the understanding of intellect in Islam calls for enlightened behavior through ethical underpinnings. In Quran, there are numerous verses for mankind to reflect upon their actions. Moreover, understanding cosmopolitan ethic Ã¢Â€Â“ the value of tolerance towards Ã¢Â€Â˜the otherÃ¢Â€Â™ is a pressing need in recent, socio-political occurrences and context. My research would focus on the relationship of ethical and intellectual perspectives in Quran to emphasize that use of intellect to uphold moral teachings and ethical action is a central theme in Quranic teachings.

Walker, Kemba

Spanish

Jose-Luis Gastanaga. PhD

Misogyny in La Celestina and in Spain's Castilian Literature in the Middle Ages

La Celestina is considered one of the best master, literary works of Spanish literature and is a signal of the end of the Middle Ages and the start of the European Renaissance. In addition, the work touches on many very important themes which reveal many social and culture tendencies. One of the most important themes for today's readers is the theme of women, especially the treatment of the woman and the misogyny that is so evident in the all the literature of this particular time period. La Celestina was written by Fernando de Rojas in Spain at the end of the fifteenth century. Rojas was a law student and studied at the University of Salamanca in Toledo. While he studied law he wrote his dramatic, theatrical work known as La Celestina, which was originally titled the Comedy of Calisto and Melibea and published in 1499. In this paper the theme of misogyny in La Celestina, something brought up to both men and women, and how it relates to the end of the Middle Ages and the beginning of the Renaissance.

Thome, Cooper

Chemical Engineering

Frank Jones, PhD, P.E.

Heterogeneous Catalysis in Microreactors

In response to widespread need for alternative fuels that are environmentally friendly and sustainable, the world is turning to biomass for solutions. This project is a study of the production of biodiesel fuels using microfluidic devices and heterogeneous catalysis. Previous researchers have used vegetable oil and ethanol as a renewable feedstock to make biodiesel using homogenous catalysts such as sodium hydroxide and potassium hydroxide. However, this process is problematic; the creation of unwanted side-products and a long processing times both make the process expensive and ultimately noncompetitive in comparison to traditional fuels. In this study we use microreactors and heterogeneous catalysis. The benefits of this system are that micro-scale dramatically reduces the processing time, and the heterogeneous catalysis does not create unwanted byproducts. Because oil and alcohol do not mix, we may look to use a co solvent to make the process fluid one phase. The co solvent, a mixture of free-fatty acids, is generally considered waste and is a contributor to unwanted products in standard homogenous catalysis. However, with our catalyst, the free-fatty acid is converted directly to biodiesel.

Jones, Kris C.

Mass Communication

Elizabeth Gailey, PhD

Intrapersonal Reflexivity in Nicolas Roeg's 'The Man Who Fell to Earth' (1976)

The cult 1976 film 'The Man Who Fell to Earth' is an essential entry in the career of musician David Bowie, not only as his acting debut, but as a media artifact which provides a keen viewpoint into the 1970s mileau, the performer persona, and the fan/star relationship in pop culture. My analysis has been gained from scholarly research and interviews which I have conducted over the past year. A rare combination of synchronicity, reflexivity, and cunning self- mythification in the making and promotion of 'The Man Who Fell to Earth' made it a keystone in creating and continuing the Bowie enigma.

Clem, Logan

Writing Center

Margaret Herb, PhD

Lessons from the Students We've Never Met: A peer tutor-led study on who does NOT use the writing center

The types of data that many writing centers collect can help us to address and explore the question of students whose needs are not being met. At our newly opened and rebranded Writing and Communication Center, for instance, each student who visits completes an exit survey in which they rate their experience, describe what they learned, and offer general feedback and suggestions. However, this data does not tell us anything about the students who do not or cannot use the writing center. As we discuss inclusivity of all students at our center, we must not simply consider the student writers that we serve, but also those we do not, and why. In this presentation, we will exhibit the results of a peer tutor-led study in which we surveyed students who do not use our center. We will discuss how our writing center might use such knowledge, not only to improve outreach, but to better achieve true inclusivity.

UTC Research Dialogues

The Bridge and Mirror Project

UC Atrium, April 13, 11:00 – 11:30 am

Please join the students of "UHON 3540 – Collaborative Creation: Theatre Offstage" in the UC Atrium, lower level, for a dramatic performance titled "The Bridge and Mirror Project" created by the following students:

Alea Coble
Lauren DeGennaro
Myranda Demailly
Abigail Edwards
Lindsey Layman
Kate Mobley
Josiah Motok
Hannah Rials
Liana Rodrigues
Caroline Smith
Haley Talley
Tamarah Taylor

UTC Research Dialogues

Undergraduate Reception

UC Chickamauga Room, April 13, 4:00 – 6:00 pm

Speaker:

Dr. David O'Hara, Associate Professor of Philosophy and Classics & Chair, Department of Religion, Philosophy, and Classics
Augustana University, Sioux Falls, SD

UTC RESEARCH DIALOGUES
GRADUATE RESEARCH SYMPOSIUM
POSTERS
CHATTANOOGA ROOM, APRIL 14, 9:30 – 12:00

COLLEGE OF ARTS AND SCIENCES

Bakland, Paul-Erik

Biology, Geology, & Environmental Science

Thomas P. Wilson, PhD

Prevalence and Severity of Batrachochytrium dendrobatidis in Natural Wetlands and Urban Retention Ponds in Southeast Tennessee

In light of the biodiversity crisis currently facing amphibian populations around the world, studies investigating the amphibian fungus, Batrachochytrium dendrobatidis (Bd), and the disease, chytridiomycosis, are a foremost priority for biologists. Understanding the link between various habitat conditions with the prevalence and severity of Bd infected amphibians is important for identifying populations that are most at risk and can help to inform management decisions. Using American Bullfrogs (Lithobates catesbeianus) and Green Frogs (Lithobates clamitans) as study organisms and qPCR for sample analysis, the goal of this research is to investigate how prevalence and severity of Bd varies between natural wetlands and urban retention ponds across three different watersheds in Hamilton County, Tennessee. Additionally, this research seeks to address whether interspecific variation patterns in Bd infection between L. catesbeianus and L. clamitans observed by Wilson et al. 2015 at a single wetland in Hamilton County hold true at a larger spatial scale and in different habitat types.

Dillard, Mark J.; Jeremy W. Hooper;

Biology, Geology, & Environmental Science

Thomas P. Wilson, PhD

Home range, habitat use, and movement patterns of the Eastern Box Turtle in a fragmented landscape in southeast Tennessee

The landscape throughout the range of the box turtle (Terrapene carolina carolina) has changed drastically over the last few centuries. Consequently, populations appear to be in an overall state of decline. Habitats are fragmented and the microclimates are altered when roads, telephone and power lines transect them or when they are clear-cut. In this study, the spatial ecology and seasonal movement patterns of the box turtle in contrasting habitat and management types are investigated. Home range size, daily movement patterns, and habitat use areas were investigated to determine how box turtles use fragmented or anthropogenic disturbed habitats. We monitored a total of 15 radio-tagged turtles (3 males and 3 females) from August 2013 to November 2016 and (8 males and 1 female) from May 2014 to January 2015. Turtles were located at least two times per week throughout the active seasons and bi-weekly during the winter months. Turtles emerged from hibernation in late April each season and exhibited extensive movement through hardwood forests and early successional habitat in a power-line right-of-way.

Dillard, Mark J.

Biology, Geology, & Environmental Science

Thomas P. Wilson, PhD

The Spatial Ecology of the Eastern Box Turtle in Urban and Fragmented Landscapes of Southeast Tennessee

The landscape throughout the range of the box turtle (Terrapene carolina carolina) has changed drastically over the last few centuries. Consequently, populations appear to be in an overall state of decline. Habitats are fragmented and the microclimates are altered when roads, telephone and power lines transect them or when they are clear-cut. In this study, the spatial ecology and seasonal movement patterns of the box turtle in contrasting habitat and management types are investigated. Home range size, daily movement patterns, and habitat use areas were investigated to determine how box turtles use fragmented or anthropogenic disturbed habitats. We monitored a total of 15 radio-tagged turtles from August 2013 to January 2015. Turtles were located at least two times per week throughout the active seasons and bi-weekly during the winter months. Turtles emerged from hibernation in late April each season and exhibited extensive movement through hardwood forests and early successional habitat in a power-line right-of-way. During both monitoring seasons, turtles were located at sites with moderate to heavy canopy cover and woody debris often present at the microhabitat level, suggesting that canopy cover may be an important attribute for box turtles when selecting suitable habitat and thermoregulation or other life history needs.

Hunt, Nyssa R.; Andy Carroll

Biology, Geology, & Environmental Science

Thomas P. Wilson, PhD

Land Cover Trends in Hyla gratiosa Presence at Watershed Scale in Tennessee

Anthropogenic development has shaped landscapes to where distributions of certain taxa groups may be influenced or affected. Amphibians, for example, can be sensitive to disturbance and may not be able to reside in areas that have been heavily altered. As landscapes change with ongoing development, monitoring where certain amphibians still occur is important for conservation purposes, especially for species that may be threatened/endangered or rare. In the state of Tennessee, the Barking Treefrog (Hyla gratiosa) is a rare species that seems to have potential to disperse to new areas, although little is known about the mechanisms affecting dispersal. By utilizing land cover summarization by HUC 12 and collectively analyzing NAAMP data and TDEC's "rare species by watershed" •data, it is possible to increase understanding of the habitat proportions suitable for this anuran species and to fill in data gaps for its selective distribution. If shown to be accurate, this method of landscape analysis could be used in the future for other rare amphibian species, as we continue to understand habitat connectivity and how amphibian populations function on the landscape.

Parker, Sarah

Biology, Geology, & Environmental Science

Jennifer Boyd, PhD

The influence of light and soil moisture availability on the rare terrestrial orchid Platanthera integrilabia

Platanthera integrilabia is a rare terrestrial orchid species typically associated with semi-open, forested seeps in the southeastern U.S. It has been suggested that P. integrilabia has restrictive abiotic resource requirements; however, these requirements have not been implicitly studied. To inform its management and conservation, we investigated the influence of light and soil moisture availability on P. integrilabia at landscape and local scales and population and organismal levels across and within four occurrences with different canopy openness. We also evaluated the potential for adaptation and plasticity of leaf-level physiological responses of this species to light and soil moisture to influence its optimal habitat and rarity. At landscape scales, light and soil moisture availability were not associated with P. integrilabia density or the size of individuals. When compared across sites, photosynthetic light-response and water-use efficiency measurements indicated that P. integrilabia is generally adapted to shady, moist environments, but also capable of utilizing greater light availability and tolerating drier conditions. At the organismal-level, minimal associations of these measures with local-scale variations in light and soil moisture within sites suggested that plasticity of photosynthetic traits may be limited. The preservation of seep habitats generally associated with P. integrilabia is obviously warranted.

Strom, Madeline; Sara Grillo; Megan Taig-Johnston; Dr. Luis Ebensperger

Biology, Geology, & Environmental Science

Loren Hayes, PhD

Habitat specific fitness consequences of sociality in Octodon degus

Theory predicts that social group living, a form of sociality in which individuals live in relatively long-lasting, stable groups should persist if individuals living together gain greater net benefits compared to individuals living alone. To fully understand the adaptive significance of sociality, it is crucial that we examine how individual direct fitness responds to variation in group size and composition within the same populations and between populations. The objective of this study is to describe the sociality-fitness relationships of degus (Octodon degus) in two ecologically and geographically distinct populations, determining the adaptive significance of sociality in different environments. The degu is a social, caviomorph rodent endemic to central Chile with populations living in varying environments with major differences in climate, elevation, vegetation cover, food abundance and predation risk. Given the ecological differences between sites, such as food abundance, vegetative cover and predation risk, there are likely differences in the net costs and benefits of group living for each population. My aim is to determine the extent to which ecological (food abundance, predation risk) and social variation (group size, group composition) predict the reproductive success of degus within and between sites. Results will be discussed.

Reyes, Elijah; Patsy Thrasher

Biology, Geology, & Environmental Science

Hope Klug, PhD

Parental Care and Mate Choice in the Giant Water Bug (Belostoma lutarium)

Parental care and sexual selection are highly interrelated. Understanding the evolution of sex-specific patterns of parental care and sexual selection is a major focus of current evolutionary ecology research and requires empirical studies that simultaneously quantify components of both parental care and sexual selection in a single species. In this study, we quantify the dynamics of paternal care and sexual selection in the giant water bug Belostoma lutarium. Specifically, we examined (1) which sex potentially experiences sexual selection, (2) which traits, if any, are associated with attaining a mate by males and/or females (i.e. which traits are potentially under selection), and (3) which male and female traits, if any, relate to paternal care and offspring survival. Our findings suggest that (1) males are likely the choosier sex and that heavier females are more likely to mate than smaller females, (2) that female body weight is under selection if female weight is a trait that is stable within a given individual and (3) body size is sexually dimorphic, with females being the larger sex in this species. There was no evidence of male or female traits being linked to offspring survival in this species.

Bennett, April; Elizabeth Twitty

Criminal Justice

Tammy Garland, PhD

Mass Shootings and Media Misconceptions: an analysis of Mass shooting incidents in 2015

Mass shootings are defined as the shooting of "four or more people without a cooling off period." In 2015, there were 330 mass shootings in the United States. The media often ignores these events due to lack of public interest and the loss of life involved, which is often characterized in mass killings. While mass killings are a form of mass shootings, the fact remains that these are not as prevalent. It is only when events are high profile do they make national attention. Thus, this research will examine how mass shootings are characterized, the factors involved, and what makes them newsworthy at a national level.

Green, Carson; Joseph Blake Ketron

Criminal Justice

Tammy Garland, PhD

Depictions of Crime and Justice in Post-Apocalyptic Comics

Social constructionist literature suggests a relationship between media and public attitudes toward crime and the criminal justice process. However, much of the existing research on fiction is focused on the portrayals of crime found in television and film. Comic books have historically allowed for moral engagement with crime issues through narratives of superheroes and villains (Phillips & Strobl, 2006). Post-apocalyptic settings define a popular genre of modern fiction across a wide spectrum of media. For the purpose of content analysis, this study utilizes a convenience sampling of five post-apocalyptic comics including Lazarus, Wasteland, and The Walking Dead. The methodology of this study involves extracting crime data from events within the comics and categorizing justice outcomes of victims and offenders. We hypothesize the nature of both crime and justice will be depicted as predominantly violent. A subversion of due process is hypothesized to occur with utilitarian justifications for the punishments carried out by characters in positions of authority. Research findings and additional discussion will be provided.

McCullaugh, Laysha; Leah Adams; Michael Cathey

Criminal Justice

Tammy Garland, PhD

Gender Issues in Comics

This article will showcase gender issues in comics by examining several first edition comics featuring female superheroes.

Sissom, Brandon; David Sherritt

Criminal Justice

Tammy Garland, PhD

Examining Ebola Through a Moral Panic Perspective

During August 2014, the Ebola outbreak of West Africa resulted in a worldwide moral panic. This panic reached heightened proportions within the United States when infected medical personnel were treated at Emory Medical Center and later an infected immigrant died from complications. Media coverage of the virus became extensive often evoking pandemic-like reactions even though the actual threat towards American citizens contracting the disease had always been unlikely. Using a content analysis of newspaper articles from the New York Times and the Washington Post between August of 2014 and January of 2016, this analysis examines the moral panic associated with the Ebola virus and the factors responsible for the panic.

Arrowood, Robert B.; Thomas Coleman III; Sally Swanson; Jason Weber; Allen Nida

Psychology

Ralph Hood, PhD

Dead Tired: Too Depleted for Worldview Defense

Humans possess the ability to engage in complex and reflective thought which according to Terror Management Theory can lead individuals to contemplate their nonexistence. This self-reflective thought should terrorize us; however, this type of thought can be used to suppress anxiety by boosting self-esteem through worldview defense. Research into the self-regulatory resource model, however, suggests that cognitive resources are limited and can be depleted (i.e. ego depletion). In light of both lines of research, we hypothesized that following mortality salience, those who were ego depleted would not display typical worldview defenses due to the additional cognitive drain caused by the depletion measure. The results revealed that for those participants who were ego depleted, they lacked the ability to manifest worldview defenses. Those participants who were not depleted, however, did display defenses being moderated by negative affect. Thus, our results are congruent with TMT in which worldview defenses require higher order thought to shield against death awareness.

Arrowood, Robert B.; Sally Swanson

Psychology

Ralph Hood, PhD; Jill Shelton, PhD

From the Eulogy to the Grave

Terror management theory suggests that following reminders of mortality, we must bolster worldview defenses in order to shield against existential terror. These worldview defenses manifest in order to boost self-esteem which effectively mitigates the terror associated with death. The current study examined alternative ways to manipulate mortality salience. We hypothesized that when participants were asked to write their own eulogy, they would display stronger worldview defenses than when given a traditional death prime. Participants in both the eulogy and death condition should display more worldview defenses than a control writing, however. The results of the analysis revealed that worldview defenses were significantly lower in the eulogy condition than the death aware condition, and did not significantly differ from the control condition. Although initially counterintuitive, this effect is most likely due to the nature of traditional eulogies. Eulogies are commonly filled with positive, optimistic tales of the deceased in which they are remembered fondly. The eulogy most likely served as a type of symbolic immortality, thus increasing self-esteem, negating the need for worldview defense.

Arrowood, Robert B.; Thomas Coleman III

Psychology

Ralph Hood, PhD

Self-esteem and Meaning Making While Under Death Awareness: A Perspective on Atheism

In accordance with research into Terror Management Theory, secular beliefs can serve an important role for mitigating existential concerns by providing atheists with a method to attain personal meaning and bolster self-esteem. Although much research has suggested that religious beliefs are powerful defense mechanisms and that implicit belief serves an important function even for atheists, these effects are limited or reveal more nuanced effects when attempting to explain atheists' (un)belief structures. The possibility of unbelief that provides meaning in the "here and now" is reinforced by the importance placed on scientific discovery, education, and social activism by most atheists. Thus, these values and ideologies can, and do, allow for empirically testable claims within a Terror Management framework. Although religious individuals can and largely do use religion as a defense strategy against existential concerns, purely secular ideologies are more effective for atheists providing evidence for a hierarchical approach and individual differences within worldview defenses. Evidence for and implications of these arguments are discussed.

Heaton, William; Robert Gormley; Naomi Whitson; Katie Pendergast; Suzanne Gagliano; Jessica York; Justin Brown

Psychology

Irene N. Ozbek, PhD

Exploring Relationships between Stress and Olfaction as Mediated by Neuropeptide Y

Olfaction plays an important role in many everyday situations. In particular, research is shifting towards the way that the sense of smell can be indicative of clinical psychological issues comorbid with physiological concerns. The literature is thorough in regard to a link between olfactory sensitivity and depression to the extent that smell is being suggested as a marker for depression (Croy et al., 2014). In the current study, the potential relationship between smell and stress is explored. Specifically, neuropeptide y (NPY) is suggested as the mediating factor in this relationship and explanatory physiological pathways are offered. NPY has been linked to stress, but this connection has not been explored in regard to olfactory sensitivity. Ultimately, the primary hypothesis of the current study is that olfactory sensitivity does indeed correlate negatively with stress and positively with NPY. Potential diagnostic measures and ideas for stress interventions will be explored given this outcome.

Nida, Allen

Psychology

Amanda Clark, PhD & Jill Shelton, PhD

Building the Chattanooga Alliance Research Engagement

The purpose of this project was to engage with community-dwelling individuals in the greater Chattanooga area, provide information to them regarding relevant research that is taking place at the University of Tennessee at Chattanooga (UTC) and facilitate their involvement in such research endeavors. Historically, most of the research conducted within the behavioral, social and health sciences utilizes convenience samples of undergraduate students. We sought to diversify UTC's sampling options, and in effect, the questions that UTC researchers can answer. We recruited through a variety of events, organizations, and advertising mediums. Most of these efforts were directed toward recruiting older adults, and individuals with neurodegenerative disorders. However, we also found interest in the community from middle-aged and younger adults. Importantly, we have just begun a movement toward building a culture within the Chattanooga area that prizes research involvement, through connections with other departments at UTC as well as community organizations.

Nida, Allen; Thomas Vorwerk; Joseph Trevor Slayton

Psychology

Jill Shelton, PhD

Context and Decision Making: The Effect of Context in Implementation Intentions for Prospective Memory

An implementation intention is a cognitive strategy that has been demonstrated to improve memory for tasks to be completed in the future, otherwise known as prospective memory tasks. The purpose of this research was to examine the role that context plays in implementation intentions' beneficial role in prospective memory. Participants were randomly assigned to one of three groups: a standard encoding group, an implementation intention group, and an implementation intention group that received extra contextual information about the prospective memory task. Each participant completed a novel eye-tracking prospective memory task. During this task, participants were asked to count images that contained a living object within a collage, while also remembering to complete a prospective memory task: to click the left mouse button when a particular image appeared just outside of the collage. Preliminary results suggest that extra context added onto an implementation intention might actually decrease prospective memory performance.

Pendergast, Katherine; Robert Gormley, MS; William Heaton, BS; Naomi Whitson, BA

Psychology

Irene N. Ozbek, PhD

Diabetes as a Factor for Determining Olfaction Sensitivity in ESRD Patients

The kidneys of patients with end-stage renal disease (ESRD) do not effectively filter toxins out of the body. This ineffective filtration leads to the buildup of various blood-borne molecules that may saturate olfactory receptor sites. Diabetes is the most common cause of ESRD, however, diabetes has also been tied to olfactory deficits independent of kidney disease. This prompted inquiry into the specific role of diabetes in olfactory deficits in ESRD patients. In the current study, ESRD patients were given the Wheeler-UTC olfactory threshold test (WUTC) and separated by whether they had a diabetes diagnosis or not. The WUTC consists of a range of step-wise concentrations for the odorants of vanilla, pinene, banana, and ethanol. The concentrations were administered to each participant twice in a randomized order by a trained research assistant in order to determine olfactory thresholds. Olfactory thresholds were compared through an independent samples Mann-Whitney U test. Evidence suggests that patients with diabetes were able to smell the odorants better than ESRD patients without diabetes. This suggests the need for future research to determine the factors responsible for the differences between diabetic and non-diabetic ESRD patients. Preliminary hypotheses for these findings will be discussed. Funding provided by Dialysis Clinic, Inc.

Slayton, Trevor

Psychology

Jill Shelton, PhD

Climactic Interruptions and their effects on Prospective Memory and Shopping Decisions

Prospective memory is defined as memory for executing future intentions (Dodhia & Dismukes, 2009; Einstein & McDaniel, 2005). A climactic interruption is operationalized here as a distraction from an ongoing task that does not reach its logical conclusion before an individual is made to return to the ongoing task (Kupor, Reich, & Shiv, 2015). Our hypotheses are as follows: (1) People who experience climactic interruptions during an online shopping task will subsequently spend more money in the online shopping task than people who only experience non-climactic interruptions; (2) People who experience climactic interruptions will more often use the same decision-making strategy (e.g. decisions based solely on cost or solely on quality) to purchase different items in an online shopping task compared to people who experience non-climactic interruptions. (3) People who experience a climactic interruption during a shopping task will experience more prospective memory failures when they return to their shopping task compared to individuals who experience a non-climactic interruption. Participants will be given instructions to remember to purchase specific items in a computerized shopping task while considering the cost and the quality of items.

COLLEGE OF ENGINEERING & COMPUTER SCIENCE

Brown, Matthew; Matthew Pruitt

Civil, Chemical, & General Engineering

Bryan Ennis, PhD

Finite Element Simulations of Granular Compaction Part 1: Roller Compaction

Roll pressing is a common dry granulation technique used throughout a variety of processing industries, ranging from production of battery cathode or catalysts powders to pharmaceutical granulate which is later tableted. Roll pressing has several advantages over alternative granulation techniques. In particular, it is a dry, continuous process, capable of recycle. Johanson developed an early rolling theory of compaction based on a solution of the stress equations of equilibrium by the method of characteristics. In this work, we revisit Johanson's theory and its underlying assumptions and boundary conditions. Finite element methods (FEM) are applied to the roller compaction for a granular continuous media using an Arbitrary Lagrangian-Eularian (ALE) framework. Experimental studies by Bindhumadhavan et al. have validated the effects of powder material properties on nip angle and peak pressure development as predicted by Johanson's theory. More extensive experimental and FEM studies were later undertaken by Cunningham et al. and Balicki. However, these previous FEM studies of roll compaction have relied on the ABAQUS Drucker Prager plastic material model alone. This work extends these studies to include additional material models (both plastic and geotechnical) utilizing LS-DYNA. Such models incorporate readily determinable material properties measurable by shear cell and compaction measurements.

Pruitt, Matthew; Matthew Brown

Civil, Chemical, & General Engineering

Bryan Ennis, PhD

Finite Element Simulations of Granular Compaction Part 2: Paste Extruder

Paste extrusion is widely used in processing (food, pharmaceuticals, and catalysts). As a matter of design, pressure is developed within the screw (screw characteristic), which then allows extrusion of the paste at the die (die characteristic). There have been few advances, either analytically or modelling since Benbow & Bridgwater [1]. In this and related work [2], analytical expressions for the rise in flight pressure with axial position, based on an unwound flight model have been developed, as a variant of the Janssen equation and originally based on the work of Darnell and Mol [3]. Here, feed pressure is amplified by sliding friction of barrel conveying pastes through a flight channel forward to the die face, leading the extrusion of strings of compacted paste, or extrudate. This work revisits unwound flight models for screw characteristic analysis using finite element methods. A full representative model of screw could also be attempted, but the results should be identical [3]. In particular, arbitrary Lagrangian/Eulerian methods are employed through LS-DYNA. The impact of various material models (both plastic and geotechnical: Mohr-Coulombic, Federal Highway Administration (FHWA) Soil Model, and Drucker-Prager) on the development of flight pressure is explored, as well as the impact of both flight and barrel friction.

Pruitt, Matthew; Matthew Brown

Civil, Chemical, & General Engineering

Bryan Ennis, PhD

Finite Element Modeling and Mechanics of Paste Extrsusion

Paste Extrusion is widely used, but poorly understood, in industry. This research attempts to produce a model to better predict a paste extrusion process for various types of materials. Finite Element Modeling will be used through the multi-physics simulation program, LS-DYNA. Popular as automobile crash software, LS-DYNA is able to simulate many types of processes ranging from explosions to space shuttle reentries. It is the hope of this research to validate these models with the analytical models.

Azarnoosh, Jamasp

Computational Engineering

Kidambi Sreenivas, PhD; Abi Arabshahi, PhD

CFD investigation of human tidal breathing through human airway geometry

This study compares the effect of the extra-thoracic airways on the flow field through the lower airways by carrying out computational fluid dynamics (CFD) simulations of the airflow through the human respiratory tract. In order to facilitate this comparison, two geometries were utilized. The first was a realistic nine-generation lower airway geometry derived from computed tomography (CT) images, while the second included an additional component, i.e., an idealized extra-thoracic airway (ETA) coupled with the same nine-generation CT model. Another aspect of this study focused on the impact of breathing transience on the flow field. Consequently, simulations were carried out for transient breathing in addition to peak inspiration and expiration. Physiologically-appropriate regional ventilation for two different flow rates was induced at the distal boundaries by imposing appropriate lobar specific flow rates. The scope of these simulations was limited to the modeling of tidal breathing at rest. The typical breathing rates for these cases range from 7.5 to 15 breaths per minute with a tidal volume of 0.5L. For comparison, the flow rates for constant inspiration/expiration were selected to be identical to the peak flow rates during the transient breathing.

Collao, M. David

Computational Engineering

Robert Webster, PhD

Computational Study of the Effects of Protruding Studs Casing Treatment on the Performance of an Axial Transonic Turbofan

Turbocompressors are key components in systems used in a variety of industries, having a particularly strong presence in aerospace and power generation. The fact that turbocompressors play crucial roles, regardless of the application, calls for undivided attention to their efficiency and reliability. Higher compressor efficiency may be achieved by means of improved design, but also by increasing the load on the compressor to levels closer to its limits of aerodynamic stability. Coming near stability limits, however, is dangerous because the compressor operates in conditions where self initiated aerodynamic instabilities are likely to turn into rotating stall and compressor surge. Running into these flow phenomena is detrimental to the performance of the entire system and may have catastrophic effects on components. Great efforts have been made in order to understand the physics behind such phenomena, and active and passive methods of flow control have been devised in order to extend the stable operating range of compressors, or to rescue a compression system from rotating stall and surge. The main goal of the present work is to find ways to extend the stability range of turbocompressors by using protruding studs as casing treatment, a passive stabilization method.

Ghasemi, Arash

Computational Engineering

Lafe K. Taylor, PhD; James C. Newman III, PhD

Massively Parallel Spectral/Finite Element Mesh Generation of Industrial CAD Geometries in Two and Three Dimensions

A scalable paradigm is developed to generate 2D/3D high quality finite/spectral element meshes containing arbitrarily curved elements. The current methodology begins with a linear mesh that is decomposed using a graph partitioning scheme. Higher-order elements are then created from the linear mesh, where a CAD model must be queried in order for the curved faces/edges to conform to the boundaries. Subsequently, the curved elements are directly generated using analytical maps which transform the point distribution of the master element to the element in physical space. These analytic maps are derived for triangular, quadrilateral, tetrahedral, prismatic, pyramidal, and hexahedral elements. It is shown that the stretching of Chebyshev/Fekete point distributions are also preserved by these maps and hence they can be used to generate well-conditioned spectral element grids. Since these maps require a computationally intensive min-distance projection to the CAD model, a fast min-distance search algorithm is proposed. The current method is embarrassingly parallel, uses MPI, and is implemented on a commodity cluster. Degradation in performance is observed with load balancing based on maximizing the volume to surface ratio and, therefore, a new load balancing is proposed to mitigate this loss in speed-up.

Hasbestan, Jaber

Computational Engineering

James Newman, PhD

Pleasingly Parallel Matrix Free Discontinuous Least-Squares Spectral Element Algorithm for Fluid Flow with Nonconformal Element Refinement

Least squares spectral element methods formulate the partial differential equation (PDE) as an optimization problem. One of the advantages of this method is that the boundary conditions can be implemented by adding a penalty equation to the cost function and hence be imposed in a weak sense with little effort. In this study a discontinuous methodology is utilized; that is, each element has its own set of degrees-of-freedom. This formulation possesses a greater sparsity pattern in the Jacobian matrix, and has a smaller bandwidth when compare to the continuous counterpart. However, these attributes come at the expense of an increased number of degrees-of-freedom on a given discretization. In the current work, the conventional discontinuous approach is modified to convert the equations to a matrix free system where there is no need for assembling the global system. The continuity in the formulation between two neighboring elements is imposed in a weak sense with a penalty equation added to the original PDE in each element. This penalty term minimizes the integral of the square root of the difference between the unknown state-vectors on each edge for neighboring elements. The conventional discontinuous approach evaluates this integral at the current time iterate.

Hereth, Ethan Allen

Computational Engineering

Lafe K. Taylor, PhD

A Dynamic Parallel Octree Grid Generation and Solver Framework

The development of a dynamic parallel octree grid generation and solver framework is presented. The computational octree mesh creation is completely parallel and dynamic in nature and is meant to provide a `zeroth' order representation of the target geometry as no cut-cell or immersed boundary conditions are implemented. A linear octree storage data structure is used resulting in optimal load balancing. This work focuses on, but is not limited to, applications related to urban simulations and could be applied to plume/contaminate propagation. Within the framework a cell-centered, incompressible, unsteady, Reynolds averaged Navier Stokes solver with an additional energy term to account for thermal buoyancy has been implemented and validated using various canonical test cases. The framework is meant to be extensible such that adding other types of numerical solvers should not be difficult. The parallel grid generation process is tested on various large scale cityscape geometries.

Joo, Jhiin

Computational Engineering

Kidambi Sreenivas, PhD; James C. Newman III, PhD

High-order Methods for Tandem Cylinders Simulation

The noise from aircrafts has been a serious problem in aircraft industries and the landing gear is known to be one of the main airframe noise contributions. The tandem cylinder arrangement represents the simplified landing gear of aircraft. In this way the flow around two cylinders in tandem arrangement is complicated yet significantly important to investigate the aircraft noise and there has been a substantial amount of research in this subject experimentally and numerically for several decades. In this work two-dimensional Large-eddy simulation (LES) is employed using a high-order streamline/upwind Petrov-Galerkin (SUPG) finite element method to study the flow around two-in-tandem cylinders. The cylinders are separated by 3.7 times the cylinder diameter in the streamwise direction. The mesh movement procedure is used to enforce deformations for the interior mesh points to avoid collapsed elements along the curved boundaries generated by a high-order polynomial interpolation. Simulated mean and RMS values of the pressure is compared to the experimental data. Velocity profiles between the cylinders and aft of the second cylinder are also compared to the experimental data. The two-dimensional results agree well with published experimental data by NASA.

Lin, Weiyang *Computational Engineering* James C. Newman III, PhD	**Shape Optimization for Two-Dimensional Acoustic Metamaterials and Phononic Crystals with a Time-Dependent Adjoint Formulation** A time-dependent adjoint approach for obtaining sensitivity derivatives for shape optimizations of two-dimensional acoustic metamaterials and phononic crystals is presented. The acoustic wave propagation problem is solved in the time-domain using a Streamline Upwind/Petrov Galerkin formulation. Surface parameterization is accomplished using control grids, which are based on a Laplacian-type equation. The gradient-based design procedure is suitable for large numbers of design variables, and results are shown on achieving effective material properties with a unit cell, and the broadband noise reduction with periodic arrays of stainless-steel cylinders.
Liu, Chao *Computational Engineering* James C. Newman III, PhD; W. Kyle Anderson, PhD.	**A Stabilized Finite Elements Dynamic Overset Method for the Navier-Stokes Equations** In terms of mesh resolution requirements, higher-order finite-element discretization methods offer a more economic means of obtaining accurate simulations and/or to resolve physics at scales not possible with lower-order schemes. For simulations that may have large relative motion between multiple bodies, overset grid methods have demonstrated distinct advantages over mesh movement strategies. Combining these approaches offer the ability to accurately resolve the flow phenomena and interaction that may occur during unsteady moving boundary simulations. Additionally, overset grid techniques when utilized within a finite-element setting mitigate many of the difficulties encountered in finite-volume implementations. This paper presents the development of an overset grid methodology for use within a streamline/upwind Petrov Galerkin formulation for unsteady, viscous, moving boundary simulations.
Raoufi, Arman *Computational Engineering* Sagar Kapadia, PhD	**Computational Design, Sensitivity Analysis and Optimization of Fuel Reforming Catalytic Reactor** In this study, the catalytic combustion of methane is numerically investigated using an unstructured, implicit, fully coupled finite volume approach. Nonlinear system of equations is solved by Newton's method. The catalytic partial oxidation of methane over both platinum and rhodium catalysts are studied three-dimensionally. Eight gas-phase species (CH4, CO2, H2O, N2, O2, CO, OH and H2) are considered for the simulation. Surface chemistry is modeled by detailed reaction mechanisms including 24 heterogeneous reactions with 11 surface-adsorbed species for Pt catalyst and 38 heterogeneous reactions with 20 surface-adsorbed species for Rh catalyst. The numerical results are compared with the experimental data and good agreement is observed. The performance of the fuel reformer is analyzed for two different catalysts. The effects of the design variables including inlet velocity, methane/oxygen ratio, catalytic wall temperature and catalyst loading on the cost functions representing methane conversion and hydrogen production are numerically investigated. The sensitivity analysis for the reactor is performed using three different approaches: finite difference, direct differentiation and adjoint method. The design cycle is performed using two gradient-based optimization algorithms to improve the value of the implemented cost function and optimize the reactor performance.
Zhang, Xueying *Computational Engineering* James C. Newman III, PhD	**Shape Optimization of Two-Dimensional Metamaterials with a Time- Dependent Adjoint Formulation** An unsteady discrete adjoint algorithm for Petrove-Galerkin discretizations in time-dependent electromagnetic problems is presented in this paper. The adjoint approach is used to obtain the sensitivity derivatives for shape optimization leading to a minimum of the objective function. We investigate a gradient-based optimization algorithm, in which the sensitivity derivatives of the objective function with respect to the design variables are formulated in the context of Petrov-Galerkin discretizations. An implicit, second-order backward temporal discretization (BDF2) is utilized in this work. An all-dielectric metamaterial at optical frequencies is proposed for verification of adjoint-based optimization algorithm. The full width at half maximum (FWHM) of reflection increases from 154THz to 303THz.
Ambalam, Sulochana *Computer Science & Engineering* Li Yang, PhD	**Predictive Policing** Predictive policing is anticipating likely crime events and informs actions to prevent crime. Predictions can focus on variables such as places, people, groups or incidents. Demographic trends, parolee populations and economic conditions may all affect crime rates in particular areas. In this research crime data utilized to visualize in geographic map to pin point the geographical location. This can help police to predict and reduce the number of crime incidents.

Cho, Jin Soo; Brandon Allen; Zhen Hu; Brian Williams; Austin Harris

Computer Science & Engineering

Mina Sartipi, PhD

Human Activity Recognition

The purpose of this research is to perform preliminary investigation of recognizing human activities using wearable technology and machine learning algorithms to analyze the data acquired from wearables. Human activity recognition is widely used in the areas of eldercare, healthcare, athlete training, and assisted living since human activity recognition tries to identify different human body movements/activities and estimate the dwell time for each activity which can be used for behavior analysis and rehabilitation assessment. Due to the advancement of wearable technologies, the real-time remote human activity recognition has gained more attention than before. This research predominately focuses on verifying the concept of recognizing human activities using wearables, algorithm development in order to maximize the efficiency, and to improve performance. The existing data was gathered and analyzed through the following procedures. An inertial measurement unit (IMU) sensor, mounted on the chest, was used to acquire accelerometer, gyroscope, and magnetometer data from each human subject when they make five different activities: walking, sleeping, sit/stand, going upstairs and downstairs. Each activity was performed fifty times for each human subject. Then, the acquired data was analyzed through data preprocessing, feature extraction, feature selection, and multi-class activity classification.

Harris, Austin

Computer Science & Engineering

Mina Sartipi, PhD

Real Time FRT System Development and Performance Demonstration

The purpose of this research is to design and develop a mobile real-time Functional Reach Test (FRT) system with wireless connectivity in mStroke project funded by NIH. FRT is an assessment of a patient's stability by measuring the maximum distance a human subject can reach forward while standing in a fixed position. Currently, the FRT is being conducted by a physician measuring the distance that the human subject reaches in the clinical facilities. However, with the advancement of wearable technology, a mobile real-time FRT system can be built to achieve the desired performance and at the same time FRT can be executed remotely which can bring a significant benefit for behavior monitoring and rehabilitation assessment. During the FRT, two inertial measurement unit (IMU) sensors, put on the chest and the left thigh of human subject, were used to gather the data related to torso bend angle, torso twist angle, and thigh angle of this human subject. Then, the data was analyzed using the constrained linear regression to obtain three coefficients corresponding to the distances contributed by torso bend angle, torso twist angle, and thigh angle, respectively. Eventually, function reach distance was calculated by the adding three weighted distances.

Kodiboyana, Naaga Sathya Abhinav

Computer Science & Engineering

Li Yang, PhD

A Prediction, Reporting, and Response System for Public Safety and Security in Chattanooga

Timing is critical for anyone who is on crime spot or feels coming threat in dark and quiet areas. We will design an alarming device that can be reached immediately. Once the device is triggered the police or law enforcement will receive the reporting. Meanwhile, surrounding smart devices close to the crime spot such as lights and alarm will be turned on deter crime. Real-time constraints and system reliability need be analyzed and verified.

Maroju, Phanindra, MS

Computer Science & Engineering

Li Yang, PhD

A Prediction, Reporting, and Response System for Public Safety and Security in Chattanooga

Timing is critical for anyone who is on crime spot or feels coming threat in dark and quiet areas. We will design an alarming device that can be reached immediately. Once the device is triggered the police or law enforcement will receive the reporting. Meanwhile, surrounding smart devices close to the crime spot such as lights and alarm will be turned on deter crime. Real-time constraints and system reliability need be analyzed and verified.

Wu, Chao

Computer Science & Engineering

Yu Liang, PhD

Hadoop-enabled Predictive Analytics about Carp Aggregation

This paper presents a Hadoop-enabled analytics framework for carp aggregation, with focus on the mathematical modeling about the collective behavior of carp (a harmful fish in North America). The referred mathematical model is derived from the following assumptions: (1) instead of the consensus among every carps involved in the aggregation, the aggregation of carp is completely a random and spontaneous physical behavior of numerous of independent carp; (2) carp aggregation is a collective effect of inter-carp and carp-environment interaction; (3) the inter-carp interaction can be derived from the statistical analytics about large-scale observed data. The proposed mathematical model is mainly based on empirical inter-carp force field, whose effect is featured with repulsion, parallel orientation, attraction, out-of-perception zone, and blind. Based on above mathematical model, the aggregation behavior of carp is formulated and preliminary simulation results about the aggregation of small number of carps within simple environment are provided. Further experiment-based validation about the mathematical model will be made in our future work.

Thipparapu, Deepak, MS *Computer Science & Engineering* Li Yang, PhD	**A Prediction, Reporting, and Response System for Public Safety and Security in Chattanooga.** Timing is critical for anyone who is on crime spot or feels coming threat in dark and quiet areas. We will design an alarming device that can be reached immediately. Once the device is triggered the police or law enforcement will receive the reporting. Meanwhile, surrounding smart devices close to the crime spot such as lights and alarm will be turned on deter crime. Real-time constraints and system reliability need be analyzed and verified.
Patel, Shikha *Mechanical Engineering & Chemical Engineering* Will Sutton, PhD	**Optimization of Transient Heat Transfer for Layered Ceramic Insulation and Stainless foil fire barriers** Time varying flame boundaries to heat transfer applications is a common application in energy and safety related systems. Many such systems could be tested and analyzed; however, the number of thermophysical parameters involved and the possibilities of boundary conditions are endless. Many papers have justified numerical and analytical models based on computational efficiency, with the objective of eventually applying those efficient techniques to real problems. There are, however, a number of standard test situations related to such systems that may be readily studied. The purpose of this study is to be able to optimize a coarse numerical model and range of thermophysical parameters that represent the physics of the real problem in a standard test situation.

COLLEGE OF HEALTH, EDUCATION, & PROFESSIONAL STUDIES

Monroig, Darolyn *Center for Community Career Education* Sandy Cole	**Each One Reach One: Meeting the demands of the Modern Classroom.** In 1999, the grant was brought to the University of Tennessee at Chattanooga's department of education. The University named it "Each One Reach One." •This was done in order to shift grant's focus of finding up and coming educators with a commitment to diversity in teaching, and providing these students with various forms of support for their futures.
Curtis, Laura; Thomas Patrey *Health & Human Performance* Shellie Acocello, PhD, ATC	**Complex Visuomotor Assessment and Training for Reduction of Injury Risk** Concussions make up 7.4 percent of all injuries in college football. Concussions have recently become a forefront topic in the sports world due to the presence of prolonged neurocognitive and neuromuscular deficits, such as impaired reaction time and reduced postural control, which may lead to further musculoskeletal injury or repeated concussion. A concussion, as defined by the Third International Conference on Concussion in Sport, "is a complex pathophysiologic process affecting the brain induced by traumatic biomechanical forces.1" •The purpose of our research was to identify any associations between concussion history, neurocognitive function, neuromuscular control, and core and lower extremity (core/LE) sprain or strain among college football players.
Dreyfus, Hillary *Health & Human Performance* Gary B. Wilkerson, EdD, ATC	**Prediction of Lower Extremity Injuries among High School Football Players** NCAA statistics have shown that from 1988 to 2004, over 50% of all injuries involved the lower extremities (LE). The Y-Balance Test has been used to identify individuals that display an elevated risk for LE injury. Research has shown decreased core muscular endurance is potentially a risk factor for LE injury. Previous LE injury as determined through self-assessment injury questionnaires can predict LE injury. Limited research exists tying multiple lower extremity injury prediction factors together. The purpose of this study was to identify pre-participation screening measures that demonstrate a substantial association with subsequent lower extremity injury among high school football players. A pre-participation screening was performed using the McCallie School Football team. Data was collected for various screening tests including horizontal trunk hold time, anterior reach distance, footprint width index, inversion ankle strength, unilateral vertical jump height, and the Sports Fitness Index questionnaire. Using the obtained results, a multivariable injury prediction model was produced.

Gross, Marlee; Sean Shelton, CSCS

Health & Human Performance

Gary B. Wilkerson, EdD, ATC; Carrie Baker, PhD, ATC

Validation of the Sport Fitness Index for quantification of injury effects on functional status

The Sports Fitness Index (SFI) is a 10-question survey created to numerically represent global function in order to assess an athlete's risk of injury. While this survey has been shown to be an accurate identifier of elevated injury risk in collegiate football athletes, no previous research has been done to assess its utility in high school athletes or other collegiate sports. Previous use of the SFI has demonstrated specific cut-points that have strong associations with the occurrence of a sprain or strain in collegiate football players. The ability to quantifiably predict injury for different athletic populations would be valuable so that health care professionals can target athletes in need of risk management. Objective: To investigate the utility of the SFI in high school and collegiate athletes. At pre-participation examinations (PPE), paper copies of the SFI were self-administered along with a checklist for documentation of sprains and strains sustained during the preceding 12-months. A post-season version of the SFI was collected in order to analyze the prospective validity of the index. SPSS software was used to analyze the data.

Johann, Josh; Kelsey Cline; Shaquille Robinson; Brandon Harvey

Health & Human Performance

Shewanee Howard-Baptiste, PhD

Implementation and evaluation of educational classes on physical activity and nutrition to underserved Chattanooga families with the intention of improving modifiable CVD risk factors

Cardiovascular disease (CVD) is the leading cause of death in the United States. There are many risk factors leading up to CVD, but most CVD risk factors are modifiable, which include hypertension, tobacco use, diabetes, sedentary behavior, poor nutrition, hypercholesterolemia, and obesity. CVD was estimated in 2010 to cost nearly $300 billion dollars in direct medical costs in the United States "“nearly half of the United States defense and security annual budget"“ and is expected to triple by 2030. Unfortunately, Hamilton County rates are consistent with nationwide trends. Nearly two out of three residents are considered overweight or obese. Local education systems are seeing catastrophic rates of disease. Within a 10-year span, school nurses saw a 1,250% increase in diabetes prevalence among schoolchildren. Since CVD has become a pressing issue, it has become a cornerstone topic for researchers. Though many treatments exist for CVD, prevention is becoming increasingly relevant. Particularly, community based participatory research is an approach that intentionally appeals to engaging communities in healthy behaviors. The purpose of this intervention is to successfully implement educational classes on physical activity and nutrition to local, underserved families in the Chattanooga area with the intention of improving modifiable CVD risk factors.

McGrail, Rachael; Kyle Morey; Elisa Tanksley

Health & Human Performance

Gary B. Wilkerson, EdD, ATC; Marisa Colston, PhD, ATC; Joe LaCoste, DC

Assessment and Training of Dynamic Stabilization of the Lumbopelvic-Hip Complex

Antagonistic imbalances in strength and flexibility alter joint alignment and can increase susceptibility to injury. Isometric contractions have been shown to alter muscle activation patterns without concomitant strength training. Objective: To evaluate the effectiveness of the Rotex device for identification of suboptimal Lumbopelvic-hip complex (LPHC) antagonist balance and its potential value for improvement of LPHC function. Design: A single-group pre-post test study. Setting: This study was performed at the University's strength training facility. Patients or Other Participants: 37 NCAA Division I athletes (age=19.6 ±1.2 years, mass=69.5 ±11.1 kg, ht=173.1 ±8.2cm, 22 male, 15 female). Interventions: Athletes performed a two second single-leg stance on their non-dominant foot and then walked 10 m. Athletes performed a Rotex device protocol which involved sustained internal rotation at the hip. Walk was repeated. Main Outcome Measures: Pre and post-test Internal (IR) and external rotation (ER) ROM at the hip were measured for each athlete using Baseline ® Digital Inclinometer. IPod attached to level belt recorded Anterior/Posterior and Medial/Lateral pelvic tilt. All measurements to be analyzed with SPPS Statistical software.

Ross, Ryan; Hillary Dreyfus

Health & Human Performance

Gary B. Wilkerson, EdD, ATC

Prediction of Lower Extremity Injuries among High School Football Players

NCAA statistics have shown that from 1988 to 2004, over 50% of all injuries involved the lower extremities (LE). The Y-Balance Test has been used to identify individuals that display an elevated risk for LE injury. Research has shown decreased core muscular endurance is potentially a risk factor for LE injury. Previous LE injury as determined through self-assessment injury questionnaires can predict LE injury. Limited research exists tying multiple lower extremity injury prediction factors together. The purpose of this study was to identify pre-participation screening measures that demonstrate a substantial association with subsequent lower extremity injury among high school football players. A pre-participation screening was performed using the McCallie School Football team. Data was collected for various screening tests including horizontal trunk hold time, anterior reach distance, footprint width index, inversion ankle strength, unilateral vertical jump height, and the Sports Fitness Index questionnaire. Using the obtained results, a multivariable injury prediction model was produced.

Simonis, Marley; Ann Sbardellati

Health & Human Performance

Gary B. Wilkerson, EdD, ATC

Foot Width Index and Inversion Strength as Injury Predictors

Injuries to the core and lower extremity are common for athletes at all levels of competition. If risk factors can be identified prior to participation, the risk of injury may be reduced. Early identification of posterior tibialis weakness and foot structural abnormalities in athletes can lead to remedial exercise programs designed to decrease the risk of lower extremity injury. The purpose of this study is to identify measures collected during a pre-participation examination that may be associated with elevated lower extremity injury risk among athletes. We used a foot width index, an ankle inversion strength measurement, the Sport Fitness Index survey, and anthropometric measures to determine the relative predictive value of this data for injury risk for NCAA Division I athletes (soccer, volleyball, and cross-country) and high school football players. Results will be disclosed at time of presentation. The conclusion is unknown at this time.

Williams, Whitley; Michael Loving

Health & Human Performance

Gary B. Wilkerson, EdD, ATC

Effect of Visuomotor Training for Injury Risk Reduction among College Football Players

Objective: To assess effects of pre-season training that presented simultaneous visuomotor and postural balance challenges. Design: Cohort pre-test/post-test. Setting: The University of Tennessee at Chattanooga Strength and Conditioning Facility. Patients or Other Participants: Fifty male collegiate football players who participated as part of the pre-season examination. Interventions: Fifty players participated in the pre-test baseline measurements, which included the Sport Fitness Index for a history of previous injury, unilateral postural stability quantified by Sway Balance, and tests for visuomotor reaction time quantified by Dynavision. Thirteen players completed nine training sessions on the Dynavision over a three-week period. Main Outcome Measures: Data will be extracted from records by the UTC Athletic Department pertaining to pre-season training activities, the pre-participation examination, and injuries sustained over the season. Receiver operating characteristic analyses of injured versus uninjured status will be used to identify the cut points for dichotomized classifications of high risk versus low risk status, thereby permitting 2x2 cross-tabulation analysis and calculation of sensitivity, specificity, and odds ratio (OR) for each potential injury predictor. Logistic regression will be used to assess the relative contributions of the binary predictor variables to the discriminatory power of a multivariable model.

Winnan, Brynja; Alli Abell

Health & Human Performance

Gary B. Wilkerson, EdD, ATC; Carrie Baker, PhD, ATC

Association of Pre-Participation Status with Injury Hazard over the Course of a Football Season

Studies have shown injury history to be one of the strongest predictors of subsequent injury. Other factors such as deficits in neurocognitive function and lumbopelvic musculature, concussion history, and athlete exposure have also been shown to play a role in functional instability and injury risk. The objective of this study was to determine the extent to which these factors predict injury hazard among college football players. All participants were UTC football players with a variation of different positions. The total of number of football athletes measured was 48 individuals. The participants ranged from 17-22 years old (average:19 years old). This set of participants ranged from 1.68 "‟ 2.01 meters in height, with an average of 1.86 meters. The weight of the participants ranged from 71.9 "‟ 144.2 kilograms, averaging at 103.9 kilograms. Measurements of performance capabilities, such as reaction time and postural balance, and survey information that includes self-reported past injuries/illness, functional limitations and personal characteristics were added in the annual physical examination procedure prior to the beginning of pre-season participation. We are currently in the process of analyzing our data. All current findings are preliminary.

Grant, Kelsey, OTS; Ryan Johnson, OTS

Occupational Therapy

Elicia Cruz, PhD, OTR/L

The Use of Occupation to Increase Occupational Performance of Adolescents with Substance Use Disorder

Our study looks to examine the outcomes of the addition of twice weekly occupational therapy (OT) services to the current multi-disciplinary approach for treating individuals suffering from substance use disorder at Council for Alcohol and Drug Abuse Services (CADAS), a local residential treatment program. Using the Canadian Occupational Performance Measure (COPM), we will be measuring participants self-perception of their performance and satisfaction with identified occupational problems.

Grant, Paige; Alli Harville

Occupational Therapy

Jessica Crowe, OTD, OTR/L

Effectiveness of Spaced Retrieval Training on Activities of Daily Living in Patients with Cognitive Impairment

Spaced retrieval training (SRT) has been used as a teaching method to help clients with cognitive impairment to improve upon functional goals. However, there is limited research on the use of SRT to re-teach specific activities of daily living (ADLs). A person's ability to perform ADLs can impact quality of life and caregiver burden. This case study design examined how the implementation of SRT affected the retraining of ADLs in a person with a mild to moderate cognitive impairment. The participant in this study was chosen based on meeting the following scores: Mini-Mental State Examination (MMSE) score of 11-23, a 3.6-4.2 on the Allen Cognitive Leather Level (ACL) leather lacing screen, Geriatric Depression Scale- Short Form score of 0-9, and a 0-90 score on the Modified Barthel Index (MBI). Five MBI pre-test scores were collected prior to implementation of SRT intervention in order to establish a trend line. The participant completed 7 treatment sessions using SRT approaches. MBI scores were collected post-intervention. Data was analyzed using trend line analysis with linear regression. The results of this study revealed that there was relationship between the participant's improved MBI scores and implementation of the SRT technique.

Holland, Brooke; Joshua Pratt; Julia Schlicher

Occupational Therapy

Elicia Cruz, PhD, OTR/L

Exploring the Needs of Assembly Line Workers to Manage Psychosocial and Physical Demands of the Job

This mixed-method exploratory study investigated the needs of assembly line workers in managing the psychosocial and physical demands of the job at a large appliance factory in northwest Georgia. A semi-structured interview was conducted, which produced qualitative and quantitative data. This interview gathered information on sixteen workers' perceptions of the work demands and their methods of managing them at work and at home. Qualitative analysis drew out themes in the workers' perceptions. Results indicated areas in which the appliance factory and future researchers may wish to target in order to improve the workers' job demands or the way in which they manage them.

Wishing, Brianna; Tiffani Sherlin; Taylor Mangrum

Occupational Therapy

Jessica Crowe

Effects of Errorless Learning on Teaching Activities of Daily Living to Individuals with Cognitive Impairment

The elderly population has increased as a result of improvements in healthcare including free wellness visits, increased discounts on prescription drugs, and eliminating lifetime limits on insurance plans (Centers for Medicare & Medicaid Services, n.d.). Accompanied with these advancements is an increase in the incidence of cognitive impairments (Deak, Freeman, Ungvari, Csiszar, & Sonntag, 2015). Therefore, it is important to build evidence on effective interventions to meet the needs of this population. This poster presentation will present the results of a case study examining the effectiveness of errorless learning (EL) to teach activities of daily living (ADLs) to individuals with cognitive impairment through the approach of backward chaining. A pretest-posttest data collection approach was used. The participant met the inclusion for the study: Mini Mental State Examination (MMSE) 11-20; Modified Barthel Index (MBI) 0-90; Allen Cognitive Level Leather Lacing Screen (ACL) 3.6-4.2, and the Geriatric Depression Screen-Short Form (GDS-SF) 0-9. The participant received the intervention over ten, thirty-minute visits with a trained occupational therapist. Data analysis was completed using a trend line.

Bennett, Alexis; Emily Hartsuiker; Riana Lawrence; Jennifer Stocks; Hanna True; Brandon Allen; Jin Cho; Austin Harris; Zhen Hu; Brian Williams

Physical Therapy

Nancy Fell, PT, PhD; Mina Sartipi, PhD

Inaugural Trial of mStroke with Patients

Stroke represents the leading cause of disability in the adult population with an increase in prevalence expected in the coming years. In order to combat the rising cost of healthcare, patients are being discharged from rehabilitation earlier than ever before, which can be detrimental to functional outcomes, neuroplastic recovery, and quality of life. Telemedicine has the potential to fill a gap in stroke rehabilitation by continual patient monitoring and remote recovery support following discharge. The ultimate research goal of several collaborating University of Tennessee at Chattanooga faculty in physical therapy and computer science is to implement a telehealth stroke management system (mStroke) to improve patients' movement, overall function, and quality of life. This pilot study examined the correlation between mStroke tri-axial accelerometer, magnetometer, and gyroscope sensor-collected and algorithm derived data with clinician-collected data on 5 common functional ability measures in patients post-stroke. Five subjects post-acute stroke completed the study, which was held at Siskin Hospital for Physical Rehabilitation. Spearman rho correlation for gait-speed was significant at $p<0.01$; all other measures had low-moderate correlation values. No statistical analyses were run on the fall risk measure due to computer application failure.

Compton, Katherine

School of Nursing

Joanie Jackson, DNP, APRN, FNP-BC

Standardizing orientation for Non-Physician Providers Working in the Hospital Setting

The purpose of this project is to review the current orientation process of nurse practitioners and physician assistants (referred to as Non-Physician Providers - NPPs) working in the hospital setting, in order to develop and implement a standardized, evidence-based orientation program. The majority of previous research has been primarily focused on the role perception of the Non-Physician Providers, while there has been limited research examining the actual orientation process. Questionnaires and assessment tools will be distributed and the effect on role transition, self-efficacy, and job satisfaction will be reviewed and analyzed. The results of this project will aid in identifying factors that could enhance the role transition from novice NPP to competent expert. By improving the current orientation process, there is potential for improved job satisfaction and decreased turnover rate for NPPs working in the hospital setting.

Dane, Matthew

School of Nursing

Carolyn Schreeder, DM, MSN

PICOT: In Circulating Nurses and Surgical Technologist in the General Surgery Department at Baptist Memorial Hospital Memphis, how does applying the Toyota Kata and Training Within Industry methodologies, compared to current state, affect patient throughout and operational efficiency over a six-month period.

The current Perioperative Training Program for Registered Nurses and Surgical Technologists does not provide detailed job breakdown and instruction regarding surgery room turn over. Turnover defined as the time a patient leaves the operating room suite until the time the next patient enters the operating room suite for subsequent cases. Inadequate "Turn over Training" •creates inefficiencies in the operating room causes decreased room utilization, loss of additional revenue, and decreased patient and physician satisfaction. Detailed training could provide increased efficiency and decrease turnover time by: providing role clarity, utilizing parallel processes, and eliminated "dead" •time. In this translational project the Toyota Kata method and Training Within Industry program for staff training regarding surgical turn over process will be implemented within the General Surgery Department at Baptist Hospital Memphis. The program's outcomes will be measured based on operational efficiency and patient throughout. The metrics utilized to determine outcome effectiveness include turn over time (patient out of room to next patient in room time), operating room utilization (percentage of time peak operating hours are utilized), and on time starts (percentage of time patient wheels in room at scheduled time).

Duggan, Meg; Farron Killburn, MA

School of Nursing

Ray Alonge, MSN, CRNA; Linda Hill, DNSc, CRNA, APN

Anesthesia in Africa: A Student Perspective from Serving in Madagascar

In healthcare, cultural congruence is equally as important as every other facet related to taking care of a patient. Without cultural awareness that considers factors such as language, religious practices, and/or prior access to healthcare services, a healthcare provider may miss vital information crucial to successful surgical outcome or post-operative healing. Meghan Duggan, a graduate student nurse anesthetist from the University of Tennessee at Chattanooga, served as an anesthesia assistant for two weeks aboard the m/v Africa Mercy hospital ship in Toamasina, Madagascar. The anesthesia providers, including Duggan, met with each patient the night before surgery to evaluate the patient's health history; assess chief medical complaint; perform an anesthesia preoperative assessment of airway anatomy; and discuss what to expect about the anesthesia process prior to surgery. After providing anesthesia for 32 cases aboard the ship, Duggan gained insight to the different perioperative experiences. This research aims to answer the questions: How would the perioperative experience of a surgical patient in Madagascar differ from that of one in Tennessee? How would the preoperative assessment and anesthesia provider to patient dialogue be modified to best serve the Madagascar population?

Floyd, Janice

Nursing

Carolyn Schreeder, DM, MSN

Dedicated Education Unit

A dedicated education unit (DEU) is a teaching model that facilitates clinical learning where a registered nurse volunteers to serve as a clinical coach and is paired with a student rather than being assigned. The clinical coach to student ratio is 1:1, however, the entire unit is dedicated to student learning. The nurse manager oversees the operations of the Cardiac Unit while the DEU provides a supportive, confidence building environment for student learning. A clinical coach is a registered nurse with at least one-year experience and is preferably bachelors prepared. The clinical coach works with a student related to providing patient care while assuming the primary role of teaching. The nurses who have volunteered to serve as a clinical coach will participate in a DEU orientation related to academic objectives and desired outcomes. The faculty member of Lincoln Memorial University Caylor School of Nursing will visit the DEU on a weekly basis to collaborate with the clinical coaches and nursing students, grade student clinical paperwork, and perform final student evaluation. The DEU model improves the undergraduate student learning experience by enhancing the clinical learning environment while establishing partnerships between clinicians, academics, and students.

Giglio, Wes

School of Education

James A. Tucker, PhD

Incremental Rehearsal, CCC, and Interleaving: Using Cognitive Science to Build Academic Retention and Understanding

Cognitive science has helped us to understand the brain functions which govern short and long term memorization, retention, and recall. Educational researchers have developed sophisticated retention techniques designed to take advantage of these processes. This poster examines three of the most prominent techniques: Interleaving, Incremental Rehearsal, and Cover Copy Compare. Each has different applications across academic disciplines.

Havens, Heather

School of Nursing

Joanie Jackson, DNP, APRN, FNP-BC; Susan Thul, DNP, APN, CNM; Dr. Elizabeth Chismark

A Comprehensive QI Program to Reduce Pressure Ulcers in Children

Pediatric oncology patients have unique risk factors for developing pressure ulcers that result from their cancer directed therapy. Data from the St Jude quarterly pressure ulcer surveys show that staff nurses commonly over-score or underestimate their patient's risk for developing pressure ulcers. A PICOT question was created as follows: In staff nurses working on the leukemia inpatient unit at St Jude Children's Research Hospital (P), how does implementation of an evidence based wound care prevention program (I) compared to current practice (C) affect the nurse's knowledge of pressure ulcer prevention and identification of patients at higher risk of developing pressure ulcers (O) over a 4 month period (T)? Four educational Computer Based Learning segments will be completed at the beginning of the project. Unit nurses will assess pressure ulcer risk using the appropriate Braden/ Braden Q scales and pediatric oncology specific risk factors as described in CBL segments. These high risk patients will then be the focus of weekly rounds where their pressure ulcer risks and interventions will be evaluated through an interdisciplinary team. The team's findings will be communicated back to the unit council for further action appraisal.

Holland, Kimberly S., MSN, RN

School of Nursing

Carolyn Schreeder, DM, MSN

Implementing a standardized, blended bedside shift report

Bedside shift report has been found to contribute to the accuracy of report, patient safety, and satisfaction for both the patient and the nurse; however, nurses reported that some information should not be communicated at the bedside. Additionally, the use of a standardized report process which incorporates SBAR and patient involvement can improve the handover process. Following an educational program, a small orthopedic unit in a large hospital has implemented a standardized, blended approach to shift change. A pre-implementation survey gauged nursing satisfaction with the current shift change process; post-implementation satisfaction surveys will be administered at three and six months. Fall rates, SBARS, and daily patient census will be collected weekly, and periodic observation of the shift change process will be documented. HCAHPS will be collected monthly.

Humfleet, Melissa

School of Nursing

Sarah Wright, BA; Carolyn Schreeder, DM, MSN

Putting Your Best Foot Forward

To evaluate the outcome of patient assessment and referral in a free rural health clinic following implementation of diabetic foot care model. Current practice is void of a standardized diabetic foot care model for patient assessment. Inlow's 60-second Diabetic Foot Screen Tool will be implemented. Permission from the Canadian Wound Care Association has been granted. All diabetic patients will have foot assessments at scheduled visits. A surveillance and referral tool have been created for use as needed. Short term goal is 25% compliance with the documentation of assessments. Long term goal is 50% compliance with the documentation of assessments and use of referral tool. Recommendations for Nursing is the opportunity to improve the quality of life by promoting health and decreasing complications for the diabetic patient.

Johnson, Judy, MSN, RN

School of Nursing

Carolyn Schreeder, DM, MSN; Joanie Jackson, DNP, APRN, FNP-BC

Let's Pause for Womens' Health: Implementing Menopause Standard of Care Standard of Care Guidelines

This study was conducted with healthcare providers in a primary care clinic located in rural Tennessee to determine if implementing an educational session on North American Menopause Society (NAMS) guidelines compared to current practice, affected provider knowledge, patient assessment and referral over 6 months. A pre-test/post-test design and education session was developed using NAMS Health Questionnaire (Section 13) and NAMS clinical guidelines. Providers completed NAMS Health Questionnaire with each participant. A Patient Education Brochure was developed to aide providers in educating women. Following implementation, patient records were reviewed monthly using a Surveillance and Monitoring Tool to measure compliance with the NAMS Health Questionnaire, patient education brochure, hormonal therapy, antidepressant therapy, and referral screening tool for bone density scans, mammogram, and Pap Smear. Seventy menopausal women received a patient education brochure, 17 received hormonal replacement therapy (HRT), 2 were taking non-hormonal therapy, 4 were taking complementary and alternative medicine (CAM), 1 was taking herbs; and 24 taking antidepressants; 9 had bone density scans, 24 mammogram, and 13 pap smear. Sixty-four patients were referred for either a bone density scan, mammogram or pap smear. Based on the findings, healthcare providers had limited knowledge of NAMS Guidelines and incorporating NAMS guidelines into clinical practice.

Leland, Adam

School of Nursing

Gwen Carlton, DNP, APN, FNP-BC

Dust Mite Reduction Measures and Asthma Control

Care providers and asthma patients alike have reason to implement dust mite allergen control measures. Though a number of dust mite control measures have been formulated, few demonstrate an ability to reduce dust mite allergen concentrations, and improve asthma symptom control, safely and effectively. The rest of this paper will provide a literature review pertaining to three of the most commonly used interventions currently implemented to reduce the concentration of dust mite allergen indoors. The three dust mite control interventions to be examined include; allergen impermeable mattress covers, acaricidal wash products, and control of indoor humidity.

Nunn, Kelly, MSN, FNP-BC

School of Nursing

Joanie Jackson, DNP, APRN, FNP-BC

Palliative Care Nursing Education

Palliative care is defined as a collaborative effort among health care providers to treat mental and physical symptoms of patients that are experiencing a life-threatening or chronic illness. Lack of education regarding symptom management, physician omission of nurses as part of the interdisciplinary team, and inability of nurses to adequately implement appropriate communication with patients and families in regards to issues such as disease path, care goals, end-of-life questions and treatment were identified during review of literature as barriers to nursing care of palliative care patients. Nurses play a pivotal role in communicating patient and family needs and goals to physicians allowing for earlier referral to palliative care. A palliative care educational module will be: developed and implemented based on best practice evidence from an extensive literature review; developed so that effective communication techniques can be utilized to aid nursing staff in caring for palliative care patients, their families; to guide appropriate communication and collaboration between nursing staff and health care providers in regards to consultation of palliative care patients. A "Train-the-Trainer" approach will be utilized to achieve long term sustainability for the initiative. Monthly focus groups will be employed to elicit qualitative responses from the population of nurses participating in the project.

Owens, Gianna, MSN, APN, BC

School of Nursing

Susan Thul, DNP, ARNP, CNM

Peers educating Peers: A Hepatitis C Prevention Intervention for Women in Rural Appalachia

Hepatitis C (HCV) transmissions have tripled in Tennessee over the past seven years and the majority of new infections have been among young, white, rural injection drug users (IVDU). We target women in a rural Appalachian community to prevent transmission of HCV. We evaluate the effect of DUIT an evidence based HCV peer education program on HCV knowledge, self-efficacy and self-care behavior among former substance abusers and their supervising staff residing in halfway houses in DeKalb County. Peer education programs have the potential to prevent transmission of HCV in rural communities.

Simms, Priscilla

School of Nursing

Susan Thul, DNP, APN, CNM

An Evidence-Based Practice Protocol for Victims of Sexual Assault

Sexual assault is a widespread problem in the United States with over 270,000 women reporting a sexual assault in 2010. Care for victims has improved with the implementation of sexual assault nurse examiner (SANE) programs across the U.S., but continued improvements are needed. While the components of the forensic examination and evidence collection are standardized, the evaluation and care of victims related to health promotion, disease prevention, and psychological wellness remains less comprehensive and uniform. The purpose of this study is to: 1) examine SANE knowledge and self-efficacy before and after implementation of a SANE education program, and 2) examine SANE compliance with the evidence-based practice protocol. The study site is an outpatient, community-based rape crisis center in Chattanooga, TN. Participants consist of 13 SANEs who self-selected to participate in the study between February and August 2016. Before protocol implementation, a SANE education program will be conducted and pre/post tools will be administered. After protocol implementation, chart reviews will be conducted. Data will be analyzed using repeated measures ANOVA and descriptive statistics.

Snyder, Angela

School of Nursing

Joanie Jackson, DNP, APRN, FNP-BC; Emily Browne, DNP, RN, CPNP; Susan Thul, DNP, APN, CNM

Compassion Fatigue Program in a Pediatric Oncology ICU

Compassion fatigue (CF), a combination of burnout and secondary traumatic stress, has been found to affect pediatric intensive care unit (ICU) nurses due to the intense caring relationships between patients/families/nurses, increased patient care acuity, and repeated contact with patients requiring long term critical care (Figley, 1995; Potter, 2013). In an effort to decrease the effects of CF, an evidence-based program will be implemented in the ICU of a pediatric oncology hospital to determine what effect a CF prevention program, compared to current support services, will have on staff resilience, burnout, and staff knowledge over a six month period. This six-month program will include nursing staff working in the ICU at St. Jude Children's Research Hospital. The CF educational program will focus on intentionality, self-regulation, self-validation, connection, caregiving, and self-care which are all components of the Accelerated Recovery Program (ARP) developed by Dr. Eric Gentry (Gentry, 2013). Nurses who are trained in the ARP will become Certified CF Mentors and will be embedded on each shift to provide peer-to-peer support and activate the ARP during times of distress. Monthly self-care rounds will be implemented which will include debriefings and self-care strategies for nursing staff.

Stitcher, Megan A., MSN, FNP-C

School of Nursing

Susan Thul, DNP, APN, CNM; Gwen Carlton, DNP, APN, FNP-BC

Motivational Interviewing in Allergy Immunotherapy

Asthma affects 25 million individuals in America and nasal allergies affect 50 million. The effect of asthma and allergies causes increased medical costs, missed work days, reduced quality of life, and early deaths. The control of asthma and allergy symptoms is the goal of treatment. Treatment regimes are comprised of allergy immunotherapy (AI). AI contributes to an improved quality of life by controlling asthma attacks and improving allergy symptoms. For AI treatment to be successful, treatment adherence is a necessity. AI therapy requires subcutaneous and sublingual medication administration which can be costly and time consuming to patients. Treatment plans involve weekly injections during an initial build up phase and monthly injections in the maintenance phase, with treatment lasting up to several years. Due to many factors, such as inconvenience, patient compliance is often low. Methods to increase compliance are of interest to providers in efforts to improve patient outcomes. The use of Motivational Interviewing (MI) is one method utilized to improve patient compliance. The use of proper MI techniques for improved AI adherence is the desired result among American adults suffering from allergic disease and asthma.

Vollrath, Kristin, MSN, RN, FNP-BC

School of Nursing

Susan Thul, DNP, ARNP, CNM; Jenny Holcombe, PhD; Phyllis Townsend, MD

Increasing Adolescent HPV Vaccination Rates in Pediatric Private Practice

Human papillomavirus (HPV) is one of the most common sexually transmitted infections in the United States, and a well-known cause of cancer. Despite the proven efficacy of the HPV vaccine, vaccination rates remain persistently low. To reduce this vaccination gap, researchers have addressed HPV vaccination barriers, facilitators, and shot promotion strategies. A Doctorate of Nursing Practice (DNP) translational project is being implemented to reduce HPV vaccination disparities in 11-26 year olds. The project examines the following PICOT question: In Pediatric Healthcare providers at a community based private practice (population), how does an evidence based HPV office protocol and provider education program (intervention), compared to current practice (comparison) affect provider HPV knowledge/self-efficacy and patient HPV vaccination utilization rates (outcome) within 7 months (time)? Project goals are to improve staff HPV knowledge, staff self-efficacy in vaccine promotion, HPV vaccination rates, and community attitude towards the HPV vaccine.

Washington, Shante, MSN, APRN, FNP-BC

School of Nursing

Susan Thul, DNP, ARNP, CNM; Joanie Jackson, DNP, APRN, FNP-BC

Soldiers Returning from Iraq or Afghanistan with New Onset Respiratory Disorders

United States military personnel deployed to Iraq and Afghanistan are exposed to hazardous chemicals to include burn pits, particulate matter, and extreme temperatures, often as high as 120^0F. These hazardous exposures place the military personnel at risk for developing post-deployment respiratory symptoms and disabling chronic lung diseases including asthma and constrictive bronchiolitis. Rose, Miller, Morris, & Baird (2012). The purpose of this project is to implement evidence based post-deployment respiratory screening, assessment and referral protocol (RASP) for soldiers returning to Fort Campbell, Kentucky, from deployment to Iraq and Afghanistan. The evidence based protocol will guide military providers in the process of respiratory screening and provide for uniform screening techniques and consistent referrals for those soldiers meeting the criteria for further respiratory evaluation. Components of the protocol include: a Post-Deployment Health Assessment (PDHA), evidence-based Clinical Decision tree/algorithm for provider reference and a clinical referral process. Provider education programs and retrospective chart reviews will be use to ensure and evaluate the success of the project A standardized approach to the screening of post-deployment soldiers will increase the knowledge of military health care providers and enhance care of the patients.

Woodward, Judy

School of Nursing

Carolyn Schreeder, DM, MSN

Motivational Interviewing: Improving Outcomes for Diabetes

Diabetes is a serious chronic disease that requires patient investment in self-management for success in avoiding complications of the disease. One of the complications of diabetes is vision loss due to the damage to blood vessels in the eyes. Diabetic eye disease impacts at least half of type II diabetics, and virtually all of type I diabetics. Vision loss can be prevented with early detection and treatment, therefore it is crucial for patients with diabetes to have yearly eye exams. The number of patients with diabetes who have annual eye exams at the Cheatham County Health Department is extremely low, at 4.7%. Our current health care system is based on the treating acute illnesses, but has failed in helping patients with chronic disease in self-management. The traditional methods of education and giving advice have very marginal success in engaging patients and eliciting their own motivation to self-manage. Motivational interviewing is an evidenced-based approach for working with patients to help develop the patient's own motivation for behavior change and self-management. Motivational Interviewing is successful with engaging patients with diabetes for confidence with self-management behavior.

Yeargan, Caleb

School of Nursing

Gwen Carlton, DNP, APN, FNP-BC

Factor Xa inhibitors for Non-Valvular Atrial Fibrillation

This presentation will compare the safety and efficacy of Factor Xa inhibitors to coumadin for thromboembolic prophylaxis in patients with non-valvular atrial fibrillation.

Bellino, Christina

School Psychology

Jim Tucker, PhD

The Disadvantages of Families with Special Needs Children in Chattanooga

Limitations to families in poverty not only have severe implications on children, but also can have negative consequences for the parents undergoing a great deal of stress in this situation. Poverty impacts a family's financial stability and therefore, parents cannot provide adequate home environments, adequate nutrition for a healthy life, and adequate insurance/efficient medical care for themselves and their children. Poverty also relates to the lack of opportunities and economic advancements that an adult in poverty may experience. Living in poverty also affects a child's educational achievement. While living in poverty can have a dramatic effect on a child's future, a child who is diagnosed with special needs and lives in poverty, can be significantly disadvantaged, and 14% of low-income families have a child with special needs. Children with special health care needs may need medical and support services in order to maintain strong physical health, mental health, emotional health, and developmental health. The financial burden for families who are living in poverty already include complications with paying bills, having enough food, transportation problems, medical expenditures, and social agency expense; the additional expenses for having a child with special needs only exacerbates this burden and stress.

Jackson, Ashley

School Psychology

Jim Tucker, PhD

McKee Learning Lunch: Community Engagement Learning

I will describe the McKee Learning Lunch process, its contributions to the city of Chattanooga, and the results from the 10 McKee Learning Lunchs that the Chair of Excellence has hosted.

Mathai, Diviya

School Psychology

Jim Tucker, PhD

Why is there such a dearth of information about students who have parents with a diagnosed mental illness?

Existing research has provided insight into providing resources to parents whose children have a mental disability, but there appears to be little research on the expectations for children to be a parent's caregiver. Children whose parents have a mental disability need help navigating the school, as do their parents. The truth is that whether by choice or not, more disabled adults are becoming parents and leaving children to cope with the stressors that accompany having a disability in the family. Educators and ancillary school staff do a disservice to students by ignoring the factors that exist for these students, including psychological adjustment and psychosocial well-being. This poster presentation will explore the effects of having a parent with a mental disability on a student's academic outcomes and learning potential. The truth is that there is a plethora of resources for parents learning to cope with a child's disability. This presentation will include suggestions for helping children respond to having a parent with a mental disability and for assisting students whose parents have a diagnosed mental illness.

Reeder, Ashley

School Psychology

Jim Tucker, PhD

Effects of Caffeine on Performance in Students with Generalized Anxiety Disorder (GAD)

You wake up to the sound of your daily alarm. You may hit snooze once or twice. You get up, get dressed, and do you daily morning routine to prepare for the rest of the day. Is making a pot of coffee one of those items on your morning checklist? Chances are, consuming coffee, or caffeine in general, is on your agenda. Caffeine is the most popular choice of stimulant to kick us into gear. We love it because it wakes us up and gets us through our daunting, daily rituals. But what other effects does it have on our bodies? Caffeine is a stimulant to the central nervous system. While the effects may perk us up, there are other effects; anxiety-inducing side effects. In our society, students of all ages are ingesting this stimulant that we value to be like gold. Some of those students are also diagnosed with General Anxiety Disorder (GAD). If they are indulging in caffeine, which can induce the same effects of anxiety as are produced by their own experiences with anxiety, how well can they function in class? This presentation will explore the effects that coffee has on us.

Terrell, Grace

School Psychology

Jim Tucker, PhD

Arts Integration in Education: What is Art?

Arts integration, not to be confused with the traditional arts education, is a form of instruction that incorporates various forms of the arts theatre expression, dance, music, and visual expressions with core content from other subjects, including but not limited to math, science, and history. The application of arts integration uses the teaching and learning approach throughout the curriculum, instead of a list of elective subject classes. Arts integration is said to improve long-term retention of content knowledge by serving as a trail way to learning; for example, taking a general subject matter such as the Civil War and using theatrical expression to cultivate learning. Arts integration, in its many forms can help to shrink the achievement gap. When students are given the opportunity to explore and find a connection(s) or are shown ways to connect to what they are trying to learn, deeper interest is established and opportunities for higher academic achievement are increased. This topic was chosen because too often pupils in the education system are written off as unable to learn or uninterested in the core curriculum and are quickly recommended for specialized services.

UTC Research Dialogues
Graduate Research Symposium
Podium Presentations
Ocoee and Heritage Rooms, April 14, 9:30 – 12:00

Ocoee Room Presentations

9:30 - Alyssa Allen • Health and Human Performance
9:50 - Jonathan Goldberg • Health and Human Performance
10:10 - Kala Nunley • Health and Human Performance
10:30 - Robert Arrowood (1) • Psychology
10:50 - Robert Arrowood (2) • Psychology
11:10 - Justin Walley • Biology, Geology and Environmental Science
11:30 - Thaddeus Johnson • Criminal Justice

Heritage Room Presentations

9:30 - Oliver Nichols • Computer Science
9:50 - Surbhi Jain • Computer Science
10:10 - Chao Wu • Computer Science
10:30 - Don C. Warrington • Computer Engineering
10:50 - Matt Joplin • Electrical Engineering

The Presentations

Walley, Justin

Biology, Geology, & Environmental Science

David Aborn, PhD

Diet Analysis of Wintering Waterforl in the Southeastern United States

The purpose of this study was to gain a better understanding whether there is a habitat preference among wintering waterfowl between agricultural or natural wetlands, and to see if there were differences in the diet of waterfowl foraging in the different areas, as well as among guilds. Specimens were obtained from waterfowl hunters at various sites across the Southeast region. I removed the digestive tract from each specimen and then dried the contents in an oven at 50 degrees Celsius for a period of a week. Once dried, I recorded the total mass and diet mass of each digestive sample's, along with the species' guild, ecoregion, and habitat into an Excel spreadsheet. A total of 250 specimens were analyzed over the winter waterfowl season in 2013-2014, and an additional 179 specimens in the 2014-2015 winter waterfowl season. With this information I am analyzing the diet of over 25 species of waterfowl across a geographic broad range, from Arkansas to North Carolina. This information will give waterfowl managers a greater understanding of waterfowl foraging during the winter months and also show if there is a habitat preference in different geographic regions.

Johnson, Thaddeus

Criminal Justice

Vic Bumphus, PhD

Mitigating Delinquency Through Academic Intervention: An Empirical Test of Social Control Theory

Using school and program records for 236 ninth grade students involved in the GEAR UP program, a partial test of Hirschi's social control theory (1969) was conducted to investigate the effect of academic performance and social bonds on problem behavior. Rarely tested in at-risk, minority student groups, the adolescents sampled in this research attended schools zoned for predominantly disadvantaged minority communities. Findings demonstrate that grade point average, attendance, gender, and participation in GEAR UP summer activities significantly impact student behavior. The results have implications for broadening the context of social control theory and reducing school delinquency.

Arrowood, Robert *Psychology* Ralph Hood, PhD	**A Real-World Analysis of Worldview Defense Following Death Awareness** Terror Management Theory suggests that when people are faced with reminders of death, worldview defenses manifest in order to contend with the anxiety caused by these reminders. The current study is the first to examine a real-world death reminder (The Chattanooga Shooting) and laboratory death awareness measures among participants who live in the area of the terrorist attack. All participants were put through a traditional terror management paradigm (prime, delay, defense) within 60 hours of the terrorist attack in Chattanooga. The results suggest that trait negative affect moderates the effects of mortality salience on worldview defense manifestation during naturally occurring reminders of death. Specifically, worldview defenses do not manifest when death is in conscious thought; however, unconscious death awareness produces powerful distal defenses via worldview defense. This effect was only found among those participants who are high in negative affect, however, suggesting that those who are dispositionally prone to negativity are more susceptible to mortality salience when the threat is highly salient. Finally, the novelty of this naturalistic study suggests a more nuanced understanding of conflicting theories that both support the attained results.
Arrowood, Robert *Psychology* Ralph Hood, PhD	**Death, Quest, and Religion: Reexamining the role of self-esteem and religion following mortality salience** Although death is often considered a terrifying experience, Terror Management Theory posits that religious belief is a powerful defense mechanism against terror. Religion is unique in that it can offer believers both a symbolic immortality (group belonging) as well as a literal immortality (afterlife) assuming they feel they have followed the tenets of their religious tradition. Previous research suggests that when mortality is made salient, implicit religious belief may be bolstered to contend with this awareness. The current studies examined further examined religion's role in coping with mortality salience. Study 1 found that inducing death awareness caused elaborate narratives of an immortal afterlife. Study 2 found that death awareness moderated the relationship between quest religiosity and state self-esteem in that those high in quest orientation reported lower self-esteem following death awareness. Finally, study 3 revealed that death awareness caused decreased willingness to participate in a small monetary risk without any influence of religious orientation. Together, these results suggest that inducing death awareness may cause additional optimistic religious ideation that can be used to maintain self-esteem.
Warrington, Don C. *Computational Engineering* James C. Newman III, PhD	**Forward and Inverse Solution of the Wave Equation for Piling Using Axisymmetric Finite Elements** This dissertation discusses the development of an improved method for the static and dynamic analysis of driven piles for both forward and inverse solutions. Wave propagation in piles, which is the result of pile head (or toe) impact and the distributed mass and elasticity of the pile, was analyzed in one of two ways: forward (the hammer is modeled and the pile response and capacity for a certain blow count is estimated) or inverse (the force-time and velocity- or displacement-time history from driving data is used to estimate the pile capacity.) The finite element routine developed was a three dimensional model of the hammer, pile and soil system using the Mohr-Coulomb failure criterion, Newmark's method for the dynamic solution and a modified Newton method for the static solution. The forward method could either model the hammer explicitly or use a given force-time history, analyzing the pile response. The inverse method used an optimization technique to determine the aggregated soil properties of a given layering scheme. In both cases the static axial capacity of the pile was estimated using the same finite element model as the dynamic method and incrementally loaded.
Jain, Surbhi *Computer Science* Li Yang, PhD	**Attribute Based Access Control** According to NIST Attribute based access control (ABAC) is a methodology where authorization, to perform any set of operations is determined by evaluating different attributes like Subject, Object, rules, relationships or any environmental conditions. Basically these attributes are the sets of label or properties that can be used to describe all the entities that must be considered for authorization purposes. ABAC provides ability to make any decision to permit or deny access to the requested resource by any person or object based on the evaluation of different policies against the available attributes.
Nichols, Oliver *Computer Science* Li Yang, PhD	**Getting Rid of the Password** Passwords are the most popular way to log in to websites and online services. While this is a popular solution, it is not the best solution. Users are not able to remember strong passwords for many websites. The average user logs into 25 online services within three months. When the user is unable to remember different passwords for different services, the user resorts to writing down the password, reusing passwords, or similar methods that are bad practices for security. As computers get faster over time, so do attacker computers. The length of time to crack a password will shorten, thus requiring users to use longer passwords. This will make it harder for users to remember different passwords for many services. An alternative solution to passwords is a PassDoodle. With a PassDoodle, the user logs into a website by drawing a doodle. This is very similar to the Windows Picture Password, but this scheme uses free-form drawing to increase security and background pictures that have many points of interest. Numerous studies have shown that users can remember pictures better than words. The goal of PassDoodle is to increase security and memorability.

Wu, Chao

Computer Science

Yu Liang, PhD

An Agent-based Mathematical Model about Carp Aggregation

This work presents an agent-based mathematical model to simulate the aggregation of carp, a harmful fish in North America. The referred mathematical model is derived from the following assumptions: (1) instead of the consensus among every carps involved in the aggregation, the aggregation of carp is completely a random and spontaneous
physical behavior of numerous of independent carp; (2) carp aggregation is a collective effect of inter-carp and carpenvironment interaction; (3) the inter-carp interaction can be derived from the statistical analytics about large-scale observed data. The proposed mathematical model is mainly based on empirical inter-carp force field, whose effect is
featured with repulsion, parallel orientation, attraction, out-of-perception zone, and blind. Based on above mathematical model, the aggregation behavior of carp is formulated and preliminary simulation results about the aggregation of small number of carps within simple environment are provided. Further experiment-based validation about the mathematical model will be made in our future work.

Joplin, Matt

Electrical Engineering

Daniel Loveless, PhD

Measurement of Radiation-induced Transients in a Nanosatellite

A method for capturing transient effects of single events due to radiation in orbit will be presented. The method utilizes an autonomous management and logging system interfacing with an application-specific integrated circuit that interacts with ionizing radiation and quantizes the temporal aspect of the single event effect digitally. This information is logged, organized, time-stamped, and prepared for transmission to ground for analysis. The system is self-managing and designed for ease of integration into the stringent power, size, and mass requirements of nanosatellite systems.

Allen, Alyssa

Health & Human Performance

Shewanee Howard-Baptiste, PhD

Physical Activity and Lifestyle Intervention at the Childhood Healthy Eating and Active Living Center at Children's Hospital at Erlanger

Childhood obesity is becoming an epidemic in the United States, affecting the Chattanooga community in various ways. In order to identify the early signs of obesity and create healthy lifestyle patterns, the Childhood Healthy Eating and Active Living (C-HEAL) Center at Erlanger has opened its doors to provide intervention strategies for children and their families. My graduate research at the C-HEAL Center includes evaluation of the intervention program, creation of different activities or methods of involvement, and implementation of these ideas in the clinic-based setting. The program was designed to connect children and their families with resources in their environment. Activities were developed to address the need to incorporate greater nutrition information and physical activity into a child's daily life. The children at the C-HEAL Center responded to the interventions in a myriad of ways and reflect the need for more detailed interventions for families.

Goldberg, Jonathon

Health & Human Performance

Shewanee Howard-Baptiste, PhD

C-HEAL Mini Health Fair

According to the Center of Disease Control and Prevention, the prevalence of obesity in children has been on the rise. Approximately 12.7 million, 17%, children and adolescents aged 2 to 19 years are obese. The Childhood Healthy Easting and Active Living Center (C-HEAL) combats childhood obesity in the city of Chattanooga by implementing a healthy lifestyle. In order to increase physical activity and nutritional awareness for C-HEAL, graduate students at UTC are conducting mini-health fairs for clinic participants.. UTC hosted three mini-health fairs centered on physical activity, games, and nutritional information for families to live healthier lives. The health fairs are comprised of multiple stations focusing on family based active learning. Each health fair is building upon previous health and physical activity sessions. Nearly 40 participants, including parents and children, attend each month. Obesity is an epidemic that needs an aggressive and intentional approach that involves community partners working collaboratively to address chronic and co-morbidity conditions.

Nunley, Kala

Health & Human Performance

Shewanee Howard-Baptiste, PhD

Benefits of an After-School Physical Activity and Health Program for Minority Adolescent Females

The Chattanooga Girls Leadership Academy (CGLA) is a small all girls school, grades 6-12. The population consists predominately of minority girls age range between 12-17 years old. CGLA is known for catering to high risk female youths that face socio-economic barriers such as poverty and achieving academic success. According to the CGLA Executive Summary, 97% of the students qualify for reduced lunch. By implementing an after-school physical activity and health program, we hope to improve basic health knowledge by emphasizing the importance of a healthy lifestyle with open-ended discussions and introducing innovative physical activities. Implement an after-school physical activity and health program for minority adolescent females by introducing basic health concepts such as interpreting a food label, understanding portion size, engage in vigorous physical activity, and discuss body image and how it relates to health. The program will educate an underserved population that is affected by social determinants such as family income, location, gender, and age. We hope to build a bridge between those social determinants and CGLA.

UTC RESEARCH DIALOGUES
GRADUATE RESEARCH SYMPOSIUM
3-MINUTE THESIS COMPETITION
UC AUDITORIUM, APRIL 14, 10:00 – 11:00 AM

COMPETITORS

ROBERT B. ARROWOOD

Scared to Death: An Examination of Underlying Terror in Death Awareness

PAUL-ERIK BAKLAND

Prevalence and Severity of Batrachochytrium dendrobatidis in Natural Wetlands and Urban Retention Ponds in Southeast Tennessee

DAVID COLLAO

Computational Study of the Effects of Protruding Studs Casing Treatment on the Performance of an Axial Transonic Turbofan

THADDEUS JOHNSON

Mitigating Delinquency Through Academic Intervention: An Empirical Test of Social Control Theory

JHIIN JOO

"Hey, airplane. Hold down the noise, please!"

MATT JOPLIN

Method for Evaluating Impact of Microcomputer Application State on Hardware Lifespan in Space

AMY KATCHER-DUNNE

Does LEED certification matter to product purchasing decisions? A case study of the Chattanooga Volkswagen Passat owners

SHIKHA PATEL

Optimization of Transient Heat Transfer for Layered Ceramic Insulation and Stainless foil fire barriers

MADELINE STROM

Habitat specific fitness consequences of sociality in Octodon degus

CHAO WU

An Agent-based Mathematical Model about Carp Aggregation

RESEARCH DAY SENIOR FORUM

GRADUATING SENIORS IN THE SPEECH MINOR PROGRAM

UC AUDITORIUM, APRIL 14, 3:00 – 5:30 PM

MASTERS OF CEREMONIES:

DRAE BOWLES & AARON BUTLER

PARTICIPANTS:

JORDAN SMITH
Healthy Fast Food Place

STEVEN JENKINS
Let's Watch Bullying Kill Itself

JANIE HENNEN
Breeding Database for Dogs

DAVID CHLARSON
Personality/Career App

KRISTIN BOWMAN
Useful Gen Eds

ANDREUS ANDERSON
Summer Jobs for Youth

Notes