

UNDERGRADUATE RESEARCH Highlights

Kulhavy DL, Unger DR, Hung I, Douglass D. Integrating Hands-on Undergraduate Research in an Applied Spatial Science Senior Level Capstone Course. *International Journal of Higher Education* 2015; 4:1: 52-60. (Stephen F. Austin State University)

A senior in an Ecological Planning capstone course designed an undergraduate research project to increase his spatial-science expertise and to assess the hands-on instructional methodology employed within the Bachelor of Science in Spatial Science program at Stephen F. Austin State University. The height of 30 building features estimated remotely with LiDAR data, within the Pictometry remotely sensed web-based interface, and in situ with a laser rangefinder were compared to actual height measurements of building features. A comparison of estimated height with actual height indicated that all three of the estimation techniques tested were unbiased estimators of height. David Kulhavy is a professor of landscape ecology; Daniel Unger is a professor of spatial science; and I-Kuai Hung is an associate professor of GIS. David Douglass is a spatial-science senior and participated in the research as an independent study course. He has graduated and is currently pursuing employment in the spatial-science field. The research was supported in part by the McIntire-Stennis Cooperative Forestry Research Program.

Elliot KM, Flimlin HE, Sethares KA. Perceived Benefits and Barriers of Heart Failure Self-Care During and After Hospitalization. *Home Healthcare Nurse*. 2014; 32:8: 482-488. (University of Massachusetts Dartmouth)

The current longitudinal study examined patients with a diagnosis of heart failure and the perceived benefits of, and barriers to, self-care throughout hospitalization. The main instrument in the study was the Health Belief Scale. Quantitative data collection was used to interview patients and examine factors affecting the decision to engage in and adhere to self-care habits. Results suggest that patients performing self-care reduced symptom exacerbation and improved their overall quality of life. Heather E. Flimlin graduated with a bachelor of science in nursing in 2013 from the University of Massachusetts Dartmouth where she spent three years working as a research assistant reviewing topics including cultural competence in nursing; nurse indicators in nursing care for positive perinatal outcomes; and heart failure self-care. She attended the Heart Failure Society of America's Scientific Assembly in Boston, Massachusetts, and placed third in the competition for undergraduate research presentations at the 2012 Sister Madeleine Clemence Vaillot

Scholarship Day. Flimlin currently works as a registered nurse at St. Peter's University Hospital in New Brunswick, New Jersey. The research was funded by a grant from The University of Massachusetts Dartmouth Foundation and the Theta Kappa Chapter of Sigma Theta Tau International.

Schap D, Baumann R, Guest L. Wage Net Discount Rates: 1981-2012. *Journal of Forensic Economics*. 2014; 25:2: 153-174. (College of the Holy Cross)

Time series properties of wage net discount rates are derived using three short-term interest rates. The three 1981-2012 series are found to be suitable for short-term forecasting. Two endogenously determined sub-series starting in 1990:12 and 1994:05 exhibit stationary attributes about positive constants (not statistically different from zero), suitable for long-term forecasting. David Schap is professor of economics and Robert Baumann is associate professor of economics. Lauren Guest graduated in 2013 and worked on the project as a research assistant during the summer of 2013 and in directed research courses in the fall semester of 2012 and the spring semester of 2013. Guest now works for software startup company Trio Health, whose software tracks patient data for various chronic diseases. The Office of the Dean at Holy Cross provided funding for summer 2013 research.

Kiffner C, Albertini M, Ede A, Donnellan B, Hahn N, McGinnis MA, Nietlisbach N, Tate J, Kioko J. Performance of Individual Species as Indicators for Large Mammal Species Richness in Northern Tanzania. *Ecological Indicators*. 2015; 53: 70-77. (The School for Field Studies, Center for Wildlife Management Studies, Tanzania)

In order to prioritize areas for biodiversity conservation, conservation practitioners frequently use a single species whose distribution is statistically related to overall species richness. This study found that elephants performed poorly as an indicator of large mammal species richness. Zebra and wildebeest performed best as indicators of species richness and therefore should be used for delineating corridors for large mammals between protected areas in Northern Tanzania. Christian Kiffner is deputy director/lecturer in Techniques of Wildlife Management and John Kioko is associate professor in Wildlife Ecology at The School for Field Studies (SFS), Center for Wildlife Management Studies in Tanzania. Michael Albertini is a student-affairs manager for The School for Field Studies, Center for Wildlife Management Studies. Alena Ede, Brenna Donnellan, Nathan Hahn, Mollie

McGinnis, Nicole Nietlisbach, and Jennifer Tate participated in this research as part of their study-abroad experience at The School for Field Studies. Ede and Hahn attended SFS during the fall semester of their junior year at Colorado College; Donnellan attended during the fall semester of her junior year at Santa Clara University; McGinnis attended during the spring semester of her junior year at Pennsylvania State University; Nietlisbach attended during the fall semester of her junior year at Hamilton College; and Tate attended during the spring semester of her junior year at Clemson University. This research was supported by The School for Field Studies, Center for Wildlife Management Studies.

Meyers K, Rodriguez K, Moeller RW, Gratch I, Markowitz M, Halkitis PN. High Interest in a Long-Acting Injectable Formulation of Pre-Exposure Prophylaxis for HIV in Young Men Who Have Sex with Men in NYC: A P18 Cohort Substudy. *PLOS ONE*. 2014; 9:12. (New York University)

The present study explored interest in a long-acting injectable pre-exposure prophylaxis (LAI-PrEP) agent for HIV-1 infection among a racially and ethnically diverse cohort of young men who have sex with men. Participants were asked about their willingness to use LAI-PrEP and about their preference for PrEP administration. More than 80 percent of participants expressed willingness to use LAI-PrEP, and 79.2 percent preferred the long-acting injectable administration compared to a daily pill or neither. Robert Moeller is an assistant professor of psychology. Ilana Gratch conducted this research in the summer of 2013 during an internship at New York University. Ilana Gratch is currently a junior psychology major at Middlebury College. The research was supported by the Aaron Diamond AIDS Research Center.

Karimpour M, Heinzl K, Stendback E, Galle K, Zamiran S, Osouli A. Scour Characteristics of Saturated Levees Due to Floodwall Overtopping . Presentation March 19, 2015; San Antonio, TX. (Southern Illinois University Edwardsville)

In this study, the effects of overtopped water from floodwall impinging the soil surface on scour development are studied. A laboratory-scaled simulator of a typical levee on the banks of Mississippi river with a scale of 1:20 was constructed. Silty soil materials were used to observe scour potential of the soil. In all the tests, the scour development and the stability of the wall were monitored and analyzed. In addition, the erodibility of the levee materials was determined using Erosion Function Apparatus (EFA). The results of EFA tests were compared to test results from physical models. Abdolreza Osouli is assistant professor in the Civil Engineering Department at Southern Illinois University Edwardsville. Kyle Heinzl graduated in 2014 and currently works at PSI Engineering.

Emaline Stendback and Kevin Galle are senior undergraduates in civil engineering. The research was supported by a STEP grant funded by Southern Illinois University and the Undergraduate Research Creativity Award Program.

Lawnicki, AM. "Papa, should I tell you what I think of this exhibition, I would cry." An analysis of visitor-impression books at the Bosnian Historical Museum in Sarajevo. *Journal of Politics and Society*. 2014; 10:10. (SIT Study Abroad Program—Serbia, Bosnia, and Kosovo: Peace and Conflict Studies)

The research finds that visitor-impression books can be a useful analytical tool in museum studies and that those at the Bosnian Historical Museum allowed for three main conclusions: 1) the exhibit serves the dual role of providing both a memorial and a museum, 2) this dual role is representative of contemporary Sarajevo politics of memory, and 3) museum visitors, for the most part, were able to benefit from the dual role of the museum. Although not a co-author, this student's research was overseen by Orli Fridman of SIT Study Abroad, a program of the nonprofit World Learning organization. Amanda Lawnicki graduated in 2014 from Beloit College with a bachelor's degree in international relations and Russian. She studied abroad with SIT in the spring of 2013. She is currently in Bosnia volunteering for the Center for Peacebuilding and will be attending graduate school in Russian Area studies beginning in the fall of 2015. Her research as part of her semester abroad was supported by tuition grants from Beloit College and SIT, along with government loans.

Larsen ML, Hayward TB, Teves JB. Scaling Properties of Raindrop Size Distributions as Measured by a Dense Array of Optical Disdrometers. *Journal of Hydrology*. 2015; 521: 424-432. (College of Charleston)

The study used an array of detectors able to measure individual raindrop sizes and arrival times (called disdrometers) to explore scale-invariant behavior in raindrop arrival times. It was confirmed that large raindrops appear more clustered in time than small drops, and that scaling exponents are constant from detector to detector within each rainstorm. Michael L. Larsen is an assistant professor of physics and astronomy. Timothy Hayward was a senior and Joshua Teves was a sophomore when this work was begun. The research was completed during the summer of 2014. Hayward is now enrolled in a physics doctoral program at the College of William and Mary, and Joshua Teves is now a junior at the College of Charleston. The research was funded through National Science Foundation grant AGS-1230240 secured by Larsen.

Ross C, Rychtar J, Rueppell O. A Structured Population Model Suggests that Long Life and Post-Reproductive Life Span Promote the Evolution of Cooperation. *Journal of Theoretical Biology*. 2015; 369: 85-94. (The University of North Carolina at Greensboro)

The study showed that the traditional view of the relation of sociality and longevity may be too simple. We have shown that complex interactions of duration of life-history stages affect altruism potential. In particular, timing of life history may significantly affect the evolution of cooperative behavior and the long post-reproductive stage and longevity promote the evolution of cooperation. Jan Rychtar is a professor of mathematics at the University of North Carolina at Greensboro, and Olav Rueppell is a professor of biology. Caitlin Ross worked on the project from spring 2012 to fall 2013. Ross is currently a PhD student at Rensselaer Polytechnic Institute. The work was funded by the NSF (DMS0850465 and DBI 0926288), the National Institute on Aging, and the National Institute of General Medical Sciences of NIH (R15GM102753 and R21AG046837).

Fryling M, Cotler J, Rivituso J, Mathews L, Pratico S. Cyberbullying or Normal Game Play? Impact of Age, Gender, and Experience on Perceptions Regarding Cyberbullying in Multi-player Online Gaming Environments. *Journal of Information Systems Applied Research (JISAR)*. 2015; 8. (Siena College)

This paper includes preliminary findings from a research study to investigate perceptions among adolescents and adults regarding the prevalence, seriousness, and psychological impact of cyberbullying in multi-player online gaming environments. Analyzing data from adolescent and adult survey respondents (ages 12 to 70) indicate that cyberbullying does occur in the online game space and can have negative psychological effects. In addition, an emerging theme from this research is that age, gender, and experience play an important role in perceptions regarding the frequency, seriousness, and impact of cyberbullying in online gaming environments. Meg Fryling is an assistant professor of computer science at Siena College, Jami Cotler is senior visiting lecturer of computer science at Siena College, and Jack Rivituso is an assistant professor of business and information technology at SUNY Cobleskill. Two undergraduates participated in the research over the summer of 2013: Lauren Mathews, a computer science major, and Shauna Pratico, an English major. Pratico graduated in 2014 and currently works as an account specialist at DSM. Mathews will graduate in May and is considering graduate studies. The research was partially funded by the Siena College Center for Undergraduate Research and Creative Activity.

Smith LC, Leach DG, Blaylock BE, Ali OA, Urbach AR. Sequence-Specific, Nanomolar Peptide Binding via Cucurbit[8]uril-Induced Folding and Inclusion of Neighboring Side Chains. *Journal of the American Chemical Society*. 2015; 137. (Trinity University)

This paper describes the discovery of a peptide sequence, Tyr-Leu-Ala, that is recognized by the synthetic receptor, cucurbit[8]uril (Q8), with nanomolar affinity and exceptional specificity in aqueous solution. NMR spectroscopy, mass spectrometry, and isothermal titration calorimetry were used to deduce the novel binding motif, which involves the inclusion of side chains from both the Tyr and Leu residues inside the Q8 cavity. This study is important because it demonstrates the strongest binding to date of a synthetic receptor for a peptide and shows for the first time that a synthetic receptor can have the desirable recognition properties of an antibody. Adam Urbach is a professor of chemistry. Lauren Smith is a 2014 graduate of Trinity University (majoring in biochemistry and molecular biology and in art) and is deciding on a PhD program for the fall. David Leach is a third-year undergraduate majoring in chemistry. Brittney Blaylock is a sophomore. Omar Ali is a 2014 graduate of Trinity University (chemistry) and is deciding on a medical program. The research was supported by Trinity University and grants from the National Science Foundation, the Welch Foundation, and the Henry Dreyfus Teacher-Scholar program. Omar Ali was a Beckman Scholar.

Al Rumaithi F, and Al Anouti F. The Quality of Ornamental Water within Shopping Malls in the United Arab Emirates. *Journal of Virology and Mycology*. 2014; 3:132. (Zayed University)

The objective of this study was to examine water quality in indoor ornamental fountains within shopping malls in Abu Dhabi (UAE), and compare the different guidelines implemented with regard to assuring microbial quality and public safety. The study emphasized the importance of establishing proper guidelines for ornamental water within indoor malls in Abu Dhabi to ensure public safety at all times. F. Al Anouti is assistant professor in the Department of Natural Science and Public Health, College of Sustainability Sciences and Humanities. Fatema Al Rumaithi is currently employed as environmental-safety officer and was a student at the time of the research specializing in health sciences. The research was completed in 2014 as a senior research project.