University of Houston-Downtown

PROGRAM

8th ANNUAL
GRADUATE SCHOOL AND INTERNSHIP FAIR

Sponsored by the UHD Scholars Academy

Funded by the
National Science Foundation, U.S. Army Research Office,
U.S. Department of Education, University of Houston-Downtown

Friday, October 26, 2007
UHD Special Events Center

Welcome Address

On behalf of the UHD Scholars Academy and the College of Science & Technology, we would like to welcome you to the 2007 Scholars Academy Graduate School & Internship Fair. The UHD Scholars Academy (SA) is a competitive academic program for undergraduates majoring in science, technology, engineering and mathematics (STEM) fields. The SA works to increase the number of academically capable students graduating with degrees in STEM fields and to increase the number of those choosing to pursue graduate study in these fields. This year, the Scholars Academy has grown to 191 students. Most of these students are in attendance today along with numerous other students majoring in the STEM fields.

We are proud to announce the inclusion of a Student Poster Presentation Session as part of the Graduate School and Internship Fair. The research work presented in these select scientific posters are the result of independent student research conducted on the UHD campus or at collaborating institutions. Our student driven research has served as a springboard for presentations at regional and national scientific conferences. All students in the SA are encouraged to participate in independent research projects during their undergraduate career and approximately 66% of the SA students do. This past summer, 60 students participated in independent research activities, with another 25 students in off-campus interns at the Texas Medical Center, Case Western School of Medicine, Rice University, Sam Houston State University, and UT Medical Branch.

Last academic year, Academy students presented approximately 100 posters at local and national meetings. Within this time period, Academy students presented research posters to the regional/national conferences including ABRCMS, ASM, MAA, NCUR, RADTech, SACNAS, Sigma XI, TAS, and WAESO, and additional local meetings within their disciplines, and won several awards for their work.

We hope you enjoy your time at UHD with our students and Scholars, and we all look forward to collaborating with you and your institutions in the future.

Sincerely,

Vicky Estrera, Ph.D.
Director, UHD Scholars Academy

Akif Uzman, Ph.D.
Chair, Dept. of Natural Science

Table of Contents

Program Schedule
Friday, October 26, 2007

9:30 - 9:00 am	Registration and Check-in
9:00 - 10:30 am	Student Poster Session and Breakfast Mixer
10:30- 12:15 pm	Graduate School and Internship Exhibits
12:15- 1:15 pm	Lunch for invited guest, faculty and student poster presenters

Conference Organizers:

Dr. Vicky Estrera, Director, Scholars Academy, UHD
Mr. Rene Garcia, Program Manager, Scholars Academy, UHD
Dr. Akif Uzman, Chairman, Department of Natural Sciences, UHD

UHD Scholars Academy Co-Directors:

Dr. Alberto Gomez-Rivas, Chairman, Department of Engineering Technology
Dr. Dennis Rodriguez, Chairman, Department of Computer and Mathematical Sciences
Dr. Akif Uzman, Chairman, Department of Natural Sciences
Dr. Richard Alo, Executive Director, Center for Computational Science
Dr. Larry Spears, Director, Urban Center for Student Success in STEM
Dr. George Pincus, Dean, College of Sciences and Technology

SJCN Scholars Academy:

Mr. Lamar McWaine, Director, San Jacinto College North Campus

UHD
UH-Downtown

8th Annual
Graduate School and Internship Fair

SCHOLARS
ACADEMY

Graduate School and Internship Programs

Baylor College of Medicine
  Graduate School of Biomedical Sciences
  Molecular and Human Genetics
  Molecular Physiology and Biophysics
  SMART Program: Summer Undergraduate Research Training

City of Houston – Houston Crime Lab

Continental Airlines – Technology Division

Glori Oil Limited

Hispanic Association of Colleges and Universities
  National Internship Program

Kaplan Test Prep and Admissions – Graduate Programs

Rice University
  Department of Biochemistry & Cell Biology
  Gulf Coast Consortia, Keck Center

Texas A & M University Health Science Center
  College of Medicine

Texas Tech University
  Graduate School Recruiting Office

University of California at Berkeley
  Biological Sciences Student Diversity Programs

University of Houston-Central
  Admissions and Recruitment, College of Pharmacy
  College of Technology
  Department of Mathematics

University of Texas at Austin
  Graduate Recruitment and Outreach

University of Michigan at Ann Arbor
  Wireless Integrated MicroSystems Engineering Research Center

University of Texas - MD Anderson Cancer Center
    Behavioral Sciences
    Center for Research on Environmental Disease
    Department of Gynecologic Oncology

University of Texas Health Science Center Houston
    Graduate School of Biomedical Sciences
    School of Health Information Sciences
    School of Nursing
    School of Public Health
    Summer Research Programs

University of Texas Medical Branch
    Biochemistry and Molecular Biology Graduate Program
    Graduate School of Biomedical Sciences
    School of Nursing

University of Texas at San Antonio
    The Graduate School

The following institutions have provided materials for dissemination:

Case Western Reserve University – School of Medicine
    Office of Multicultural Programs

Iowa State University
    College of Engineering, Summer Undergraduate Research Program

Rice University, Alliances for Graduate Education and the Professoriate (AGEP)

The Rockefeller University
    Office of Graduate Studies, Summer Undergraduate Research Program

University of Texas Southwestern Medical Center at Dallas
    Division of Basic Sciences

University of Washington
    Medical Scientist Training Program (M.D. / Ph.D.)

Vanderbilt University
    Graduate Programs in Biomedical Sciences

Student Poster Abstracts:

1. **Moisture Effects on the Properties of Artificially Prepared Soil Mixtures**
Adolfo Aranzales
Dr. C. Vipulanandan, Research Mentor, Department of Environmental & Civil Engineering, University of Houston
Dr. Farouk Attia, Research Mentor, Department of Engineering Technology, University of Houston
Abstract: Prior to the construction of any type of structure, the site's soil foundation must be studied to determine the capacity the soil possesses to resist the expected loads. If the soil's characteristics require improvement, standardized methods of stabilization are performed to achieve the desired strength and performance. Some of these techniques include compaction and the implementation of natural admixtures. Based on this concept, this study was aimed to investigate the effects of kaolinite and bentonite clays in clayey-sand at different moisture contents (MC), and to determine their efficiency as soil stabilization materials. To achieve the goals set in this project, several tests were performed on soil samples with different percentages of sand, bentonite and kaolinite. The information obtained was then analyzed to understand the effect of the varying clay percentages on the soils' maximum dry unit weight, shear strength, and compression capacity, and to relate these properties through the soil's optimum moisture content.

2. **Comparing EMAN Using Condor, Batch Queues With Performance Models, and PBS**
Emily De La Garza
Dr. Charles Koelbel, Research Mentor, Department of Computer Science, Rice University
Abstract: Many scheduling methods exist for Grid Computing, but the effectiveness of these methods remains unknown. The Grid environment takes advantage of large networks of computers where the user can distribute the workload across a parallel infrastructure. This is useful for computing large amounts of data in a shorter amount of time than it would take to compute on a single computer. Using the Electron Micrograph Analysis (EMAN) program, which takes noisy 2D images and creates a 3D model of the particle, I will analyze three different scheduling methods on the Grid; Condor, batch queues with performance models, and Portable Batch System (PBS). I will compare these three scheduling methods and determine which of these methods is the most efficient when scheduling jobs to the Grid.

3. **Formulating an IP Model for Solving Sudoku Puzzles**
Lauren Gracia
Dr. Illya V. Hicks, Research Mentor, Computational and Applied Mathematics, Rice University
Abstract: In this project I applied constraints to an IP (integer program) in order to create a code in MATLAB to solve specific Sudoku problems given by the user. This problem was solved by choosing appropriate variables, an objective function, and constraints to maximize the number of inputs needed to solve the puzzle. Sudoku puzzles are good examples of perfect graphs. Perfect graphs have the unique property that the maximum clique number (maximum number of vertices needed to make the graph complete) and minimum chromatic number (minimum number of colors needed to connect vertices of different colors with an edge) of the graphs are equal. I hoped to accomplish the task of creating a computer program in order to solve any Sudoku puzzle, but my program was not efficient and was time exhausting. Better methods of creating code will continue to be analyzed in future work. I also used a program called CPLEX to solve many difficult Sudoku puzzles efficiently.

4. **Sedimentary Environments And Depositional Model For Alluvial Fans In The Uinta Basin, Northeastern Utah**
Brittany R. Hanly, Desirée S. Wilson
Dr. Eric C. Carson, Research Mentor, San Jacinto College North
Abstract: Numerous alluvial fans have along tributaries draining into Indian and Sowers Canyons on the southern margin of the Uinta Basin in northeastern Utah have been analyzed to evaluate conditions that control their formation. Individual sediment layers within the fans display very poor sorting, random orientation of angular to sub-angular clasts, and generally muddy matrix. This suggests that these fans are formed by discrete episodic debris flows and hyperconcentrated flows, which transport sediment from the steep valley walls down onto the fans surfaces. The presence of numerous flow deposits either on top of charcoal-rich burn horizons or on top of soils horizons suggests that the timing and mechanism of fan construction is likely controlled by the dual influences of wildfire regimes and precipitation. This depositional model provides the basis for a larger study of long-term climatic controls on evolution of these landforms.

5. **Active Structural Control Using Manual PD tuning and Fuzzy Logic control system**

Zahid Hossein and Daniel Osakue

Dr. Weining Feng, Research Mentor, Department of Engineering Technology, UHD

Abstract: Civil Structures vibrate or resonate due to dynamic loads. Dynamic loads cause deflection and acceleration on the structure which may create disturbance or discomfort to the people or the worst case scenario the structure may collapse creating catastrophe. Researchers have worked on structural control system using PID (Proportional plus Integral plus derivative), Fuzzy logic, or Neural Network algorithms to achieve vibrations damping. Our research project uses a steel frame as a structural model and a periodical signal to generate an excitation force which will induce the resonant vibration of the frame. The objective is to implement an active control system to minimize the deflection and vibration of the frame with a low cost lab-made electromagnet. A combined Fuzzy logic and PD controller has been implemented where the proportional gain can be adapted by utilizing a fuzzy-logic based tuning mechanism, and hence much reducing the need to for manual tuning of PD controller. The overall system has shown promising performance with significant vibration damping.

6. **Chasing Arboviruses in Vector Mosquitoes**

Benedict Khoo, Jenny Martinez

Dr. Jeffrey Flosi, Research Mentor, Department of Natural Sciences, UHD

Abstract: Of the 80 mosquito species in Texas, 58 species reside in Harris County, Texas. Several of these species serve as disease vectors for arboviruses such as Saint Louis Encephalitis virus (SLEv) and West Nile Virus (WNV). SLE and WNV are flaviviruses that are acquired by ornithophilic mosquitoes taking their blood meal from birds. In June 2007, Harris County confirmed the first incidence of WNV for the season in an infected bird. In this study, the population dynamics and vector status of mosquitoes were investigated at the Glenwood Cemetery, Houston, Texas. This research included an evaluation of the efficiency of different adult mosquito traps situated in various environmental settings of the cemetery. The presence or absence of arboviruses in collected adult mosquitoes was also determined.

7. **Resource Partitioning Between the Nerodia and Agkistrodon spp. in a Riparian Environment**

Connie Larrson and Jeffrey Azkley

Dr. William Lutterschmidt, Research Mentor, Sam Houston State University

Abstract: Universal Transverse Mercator (UTM) coordinates and quantitative data consisting of 10 structural habitat, one temporal and three climatic variables were obtained from 28 snake localities. Cottonmouths (Agkistrodon piscivorus, n = 22) and water snakes (Nerodia spp., n = 6) were observed within Harmon Creek at the Sam Houston Center for Biological Field Studies (CBFS), Walker Co. Texas between June 11 and August 1 2007. Multivariate factor analysis revealed that cottonmouths do not have a habitat preference along Harmon Creek. Limited observation of Nerodia spp. did not provide enough statistical power for analysis. A Goodness of Fit test indicated a non-random distribution of cottonmouths along the creek and a T-test analysis revealed that both genera demonstrated temporal partition of activity. These results demonstrating temporal partitioning may support why Agkistrodon and Nerodia can occur sympatricly within the Harmon Creek ecosystem without partitioning habitat.

8. **Acrylate-Functional Polyester-Based Formulations Containing Multi-Walled Carbon Nanotubes (MWNTs)**

Shawn A. Luce, Merlin Mathews

Dr. Byron Christmas, Research Mentor, Department of Natural Sciences, UHD

Abstract: Carbon nanotubes come in two basic varieties: single-walled (SWNT) and multi-walled (MWNT). Carbon nanotubes are essentially sheets of carbon atoms rolled into a hollow tube-like structure. The SWNTs contain only one sheet of carbon. MWNTs, on the other hand, contain tubes within tubes. Carbon nanotubes reportedly impart significant thermal and mechanical property improvements when dispersed into polymer matrices. While SWNTs and MWNTs are basically the same, they may affect the resultant polymer film in vastly different ways. Work done previously in this lab has explored the effects of SWNTs in acrylate-functional polyester-based formulations. This project explores the differences that the less expensive MWNTs have on polyester formulation properties compared to those of SWNTs.

9. **Improvements In Airway Hyper-Responsiveness And Inflammation In An Asthma Model Via Promotion Of Anti-Oxidant Responses With 2-Cyano-3,12-Dioxooleana-1,9(11)-Diene-28-Oic Acid (CDDO)**

David Nanyes, Daniel Hochman, Shelby Schultz

Dr. Edward G. Brooks, Research Mentor, Department of Pediatrics, University of Texas Medical Branch

Abstract: Asthma is an increasing epidemic. The number of cases of pediatric asthma rose 72% from 1982-1994. It is projected that by 2020 9% of the U.S. population will suffer from asthma; roughly 30 million Americans (1). Oxidant air pollutants may play a role in asthma through the generation of intracellular reactive oxygen species (ROS). ROS induce cellular injury and promote inflammation and hypersensitivity that lead to airway hyper-responsiveness (AHR). 2-cyano-

3,12-dioxooleana-1,9(11)-dien-28-oic acid-TFEA (CDDO) a drug that appears to upregulate transcriptional anti-oxidant response elements (ARE) may be a useful anti- asthmatic agent through the prostaglandin J/Nrf2/ARE pathway (3). Hypothesis: In this study it is hypothesized that ROS plays a part in AHR and airway inflammation, and treatment with CDDO would attenuate this response. Balb-C mice were sensitized with ovalbumin 14 days prior to OVA challenge. Mice were then treated daily with CDDO and challenged with 1% OVA for 6 days and subjected to lung function testing on the 7th day. On day 8 mice were sacrificed, and bronchoalveolar lavage (BAL), lungs, and serum were collected for assessment of lung inflammation, cytokine and IgE production. CDDO reduces airway hyper-responsiveness, airway inflammation and IgE production in an animal model of allergic asthma.

10. **Validation of Fire Models: A Model of Thermally-Induced Electrical Cable Failure**
Kristopher Overholt
Dr. Kevin McGrattan, Research Mentor, National Institute of Standards and Technology, Gaithersburg, MD
Abstract: Fire Dynamics Simulator (FDS) is a computer fire simulation tool maintained by the National Institute of Standards and Technology (NIST) that utilizes computational fluid dynamics to predict fire characteristics such as the transport of smoke and heat in a fire. Ongoing validation work is being performed in order to ensure the validity of the results from the simulation when compared to a real-world experiment. This project involves the analysis and prediction of the thermal response of cables used in nuclear power plants. FDS was used to create an analytical model by matching the computer simulation results with data from a cable fire experiment performed by the Nuclear Regulatory Commission and Sandia National Laboratories. The model that was created allows for a more direct method of observing the effect of high temperatures throughout the cable, and ultimately, observing the conditions at which critical instrumentation cables will fail.

11. **Thermal Analysis Of Potential Electrolytes For Nanocrystalline Solar Cells**
Nicolle Patterson
Dr. Maria Benavides, Research Mentor, Department of Natural Sciences, UHD
Abstract: The thermal stability of four recently synthesized phosphonium-based ionic liquid samples was determined to evaluate their potential use as electrolyte materials for nanocrystalline solar cells. The thermal analysis was carried out by simultaneous thermal gravimetry (TG), differential scanning calorimetry (DSC) and mass spectroscopy (MS) using a Netzsch 409 STA CD instrument. Initial thermal analysis of ionic liquid samples of tetraoctyl phosphonium iodide, ethyl triooctyl phosphonium, n-butyl trioctyl phosphonium iodide, and n-butyl trihexyl phosphonium iodide revealed that these compositions decomposed at high temperatures ranging from 250 oC to 315 oC. These temperatures are indicative of electrolyte materials that possess significant thermal stability and are suitable for solar cell fabrication. Further analysis of these ionic liquid samples included varying parameters such as heating rates to assess their effect on various thermodynamic parameters, as well as the kinetic processes involved in the decomposition of these materials. As a comparison, thermal analysis of other known electrolyte materials samples synthesized by Ionic Liquid Technologies (specifically, 1-ethyl-3-methyl-imidazolium dicyamide, 1-ethyl-3-methyl-imidazolium thiocyanate, 1-hexyl-3-methyl-imidazolium iodide, and 1-methyl-3-propyl-imidazolium iodide) showed decomposition temperatures ranging from 252 oC to 275 oC.

12. **Transcribed Spacer Regions for the Texas Coastal Prairie Tallgrasslands**
Michael Salazar and Jose Arias
Dr. Phillip Lyons, Research Mentor, Department of Natural Sciences, UHD
Abstract: The once predominate Texas coastal prairie tallgrasslands has diminished due to farming and urbanization. Presently only 1 percent of native tallgrasslands are left along the gulf coast region. Here, we are interested in studying the fungal role of ascomycetes as it relates to fungal diversity of three distinctive types of soils: farmed, native, and restored prairie tallgrasslands. Soil samples were collected from native grasslands located at the University of Houston Coastal Center and from farmed and restored tallgrassland located in Sheldon Lake State Park. Using molecular genetic analysis of rDNA from ascomycetes, the internal transcribed spacer (ITS) sequences of operational taxonomic units (OTUs) can be identified. The unique relationships and the complexity of the fungal communities of individual soil samples can be analyzed further by aligning ITS regions of OTUs for developing phylagram to illustrate fungal relationships.

13. **Analyzing the Hepatic Function Using Tc – GSA**
Mark Smithers
Dr. Jeong-Mi Yoon, Research Mentor, Department of Computer and Mathematical Sciences, UHD
Abstract: This presentation is a follow up research on the study of "Analyzing the Hepatic Function using Tc-GSA." They are many factors already in existence to help evaluate the liver; however, because different liver disorders have the same symptoms, the preoperative evaluation does not imply the surgery procedure needed. Task is to find a better preoperative evaluation method. Using mathematical reason, we analyzed the results of the study using ODE to determine if there was a relation between Tc-GSA and the hepatic function.

14. **Fire Dynamics Simulator to show concepts of fire dynamics in the Enclosure Fire Dynamics Textbook**
Brian Terry
Dr. Alberto Gomez-Rivas, Research Mentor, Department of Engineering Technology, UHD
Abstract: Illustrations were made from definitions in the textbook *Enclosure Fire Dynamics* by Bjorn Karlsson and James G. Quintiere using an example fire in the Fire Dynamics Simulator-FDS. This would help students to visualize theoretical concepts of Fire Dynamics using simulated fires in FDS. The implementation of this procedure would collect a concept for instance flashover, and at the same time showing the moment of flashover in the simulation. A companion CD will be developed for the textbook that future students can use by themselves.

15. **Study of the Intermolecular Interactions of Tolmetin and N-Acetyl-L-Tyrosine Ethyl ester Complex**
Antonio Tito*, Claudia Jimenez-Lopez*, Agnieszka Kowalska**, Stanislaw Wysocki**
*Department of Natural Sciences, University of Houston-Downtown. Houston, USA
**Department of Food Chemistry, Technical University of Lodz. Lodz, Poland
Abstract: The formation of the non-steroid anti-inflammatory drug Tolmetin and N-Acetyl-L-tyrosine ethyl ester complex is reported by means of various theoretical and experimental studies, including quantum mechanical calculations in Gaussian and HyperChem, UV-Vis absorption, and fluorescence spectroscopy measurements. The experimental results and theoretical calculations determine the quenching mechanism of ATEE and the Gibbs free energy of complexation. Such results indicate the presence of two hydrogen bonds between the carboxyl group of Tolmetin and hydroxyl group of ATEE in the ground state. Tyrosine is the major amino acid constituent of the active site of cyclooxygenase as well as many other enzymes such as topoisomerases, thus it is most likely to interact with any drug that targets the enzymes active sites. Tyrosine interacts with the phosphoryl group of DNA during replication in cell division, which proliferates extraordinarily during cancer. Consequently, Tolmetin could possibly be considered as a potential drug inhibitor of tyrosine kinases.

16. **Radiocarbon Chronology For Deposition Of Alluvial Fans In The Uinta Basin, Northeastern Utah**
Desirée S. Wilson, Brittany R. Hanly
Dr. Eric C. Carson, Research Mentor, San Jacinto College North
Abstract: Investigation of alluvial fans along Indian and Sowers Canyons on the southern margin of the Uinta Basin in northeastern Utah identified 36 fans whose distal margins were exposed for analysis. Most of the sediments in these exposed fans are debris flow and hyperconcentrated flow deposits that are associated with wildfire occurrence. Radiocarbon dating of charcoal deposits from three fans (identified as LIC-4, RIC-1, and RIC-2) provides chronologic control on the timing and rates of sediment deposition. A radiocarbon date of 1930 ± 40 14C yr BP (BETA-232604) in fan LIC-4 suggests that over 4.5 m of sediment has accumulated in the past ~2000 calendar years. A second radiocarbon date of 460 ± 40 14C yr BP (BETA-232603) retrieved from LIC-4 indicates that as much as 4 m of sediment accumulated in the past ~500 calendar years. Similar radiocarbon dating on fans RIC-1 and RIC-2 constrains formation of those landforms.