



University of Houston-Downtown

Proceedings

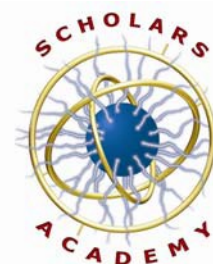
4th Annual

Student Research Conference

**Sponsored by the UHD Scholars Academy
College of Sciences and Technology**



**Friday, April 8, 2005
Special Events Center**



We are pleased to present the proceedings of the 4th Annual Student Research Conference sponsored by the UHD Scholars Academy. We are proud to have made this conference a campus-wide collaboration from the Colleges of Business, Humanities and Social Science, Public Service, and Sciences and Technology. Over 300 people attended this year's event held on Friday, April 8, 2005. An amazing total of 110 undergraduate authors and co-authors presented 65 papers in oral and poster presentations.

It is a pleasure to recognize the many individuals, organizations, and institutions supporting UHD students in their research endeavors. These include the National Science Foundation (0336612), the U.S. Army Research Office (W911NF-04-1-0024), the U.S. Department of Education (P120A020069), U.S. Office of Naval Research (N0014-99-1-0950), the Welch Foundation (BJ-0027), and UHD.

We greatly appreciate Drs. Byron Christmas, Vicky Estrera, and Larry Spears, who are Principal Investigators for the above mentioned grants that generously fund this conference and the majority of on-campus research at UHD within the College of Sciences and Technology. Plus, we would like to thank The Coca-Cola Company for partially sponsoring refreshments for the conference.

We are proud of the effort that these high-achieving students put into their research presentations, and we trust that each presenter found their experience challenging and rewarding. The research conducted by many of these students has served as a springboard for participation in local, regional and national conferences.

Many of our students conducted their research during summer internships at collaborating institutions, including Baylor College of Medicine, NASA Johnson Space Center, Sam Houston State University, the UHD SA Summer Undergraduate Research Program (S.U.R.P.), University of Texas Medical Branch-Galveston, and the UT Health Science Center at Houston. Faculty and staff members of these and many other academic institutions, as well as personnel at industrial facilities, have done much to support and mentor our students. In addition, we thank the UHD faculty and staff who have worked tirelessly to support undergraduate research experiences, as well as the SRC Planning Committee, and university administrators who have helped make this a successful event. We especially thank UHD President Dr. Max Castillo and Dean George Pincus of the College of Sciences and Technology.

Vicky Estrera, Ph.D.
Director
UHD Scholars Academy

The **UHD Scholars Academy (SA)** is an academically competitive program in the College of Sciences and Technology (CST) that promotes scholarship and student success for undergraduate students majoring in Science, Technology, Engineering and Mathematics (STEM).

One Main Street, 725-North; Houston TX 77002-1001
Phone: 713-222-5344; Fax: 713-222-5356; scholars@dt.uh.edu; www.uhd.edu/scholars



Sponsored by the UHD Scholars Academy
Funded by the National Science Foundation (0336612), U.S. Army Research Office (W911NF-04-1-0024),
U.S. Department of Education (P120A020069), U.S. Office of Naval Research (N0014-99-1-0950), and UHD.

**A showcase of academic excellence demonstrated by UHD students majoring within the
Colleges of Business, Humanities and Social Science, and Sciences and Technology.**

PROGRAM
Friday, April 8, 2005

- 8:00 - 9:00 am Continental Breakfast, Coffee House
- 9:00 am *Dr. Vicky Estrera, Director, UHD Scholars Academy, Lecturer in Biology*
Introductions, Auditorium
- 9:00 am *Dr. Max Castillo, President, UHD*
Welcoming Remarks, Auditorium
- 9:10 - 9:45 am *Dr. Christopher Matranga, Research Scientist, U.S. Department of Energy's National Energy
Technology Laboratory, Pittsburgh, PA; UHD Alumnus*
Keynote Speaker, Auditorium
- 9:45 - 10:45 am Oral Presentations, Session I, Auditorium
- 10:55 - 11:55 am Oral Presentations, Session II, Auditorium
- 11:55 - 1:15 pm Lunch break
- 1:15 - 4:30 pm Open Poster Session, Room A300
-

Conference Organizing Committee

UHD Committee Chairperson:

Dr. Ermelinda DeLaVina, Associate Professor of Mathematics

UHD Committee Members:

Dr. Richard Alo, Executive Director, Center for Computational Science, Professor of Mathematics

Dr. Byron Christmas, Associate Professor of Chemistry

Dr. Youn-Sha Chan, Assistant Professor of Mathematics

Dr. Vicky Estrera, Director, Scholars Academy

Dr. Weining Feng, Associate Professor of Engineering Technology

Mr. Rene Garcia, Program Coordinator, Scholars Academy

Dr. Marilyn McShane, Professor of Criminal Justice, Director, Institute for Community Justice

Dr. Lisa Morano, Assistant Professor of Biology and Microbiology

Dr. Janice Nath, Assistant Professor of Urban Teacher Education

Dr. George Pincus, Dean, College of Sciences and Technology

Dr. Herbert Rebhun, Associate Dean, College of Business

Ms. Anne Sherman, Director, Office of Sponsored Programs

Dr. Larry Spears, Professor of Chemistry, Director, Urban Center for Student Success in Science, Technology,
Engineering and Mathematics (UCSS/STEM)

Dr. Edwin Tecarro, Assistant Professor of Mathematics

Dr. Stephanie Turner, Assistant Professor of English

Dr. Akif Uzman, Chair, Department of Natural Sciences

Ms. Celeste Zamora, Media Relations Coordinator, Communications and Marketing

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Keynote Speaker

Dr. Christopher Matranga, Research Scientist, U.S. Department of Energy's National Energy Technology Laboratory, Pittsburgh, PA; UHD Alumnus, Class of 1997.

Keynote Presentation Title:

"Undergraduate Research and My Path to a Federal Research Facility"

Keynote Abstract:

Undergraduate participation in research programs is critical in enhancing the college experience for students, preparing them for post-baccalaureate education, and training undergraduates for careers in the work force. In this talk, I will discuss my experiences as a student at the University of Houston-Downtown and how the research I conducted there assisted me in college, graduate school, and in my current "real world" job as a research chemist with the U.S. Department of Energy. I will also discuss, at both a very general and slightly more technical level, my current research program with the U.S. Department of Energy.



Dr. Christopher Matranga's headshot above. At left, Dr. Matranga is pictured delivering his presentation within the UHD Wilhelmina Cullen Robertson Auditorium. Shown below is Dr. Matranga with Dr. Lisa Morano (right) and Ms. Sangeeta Gad.



UHD President, Dr. Max Castillo, opened the 2005 SRC, welcoming over 300 participants and guests.



Dr. Vicky Estrera introduced each of the eight oral presenters. In this picture, Dr. Estrera is introducing Mr. William Keele, a graduating senior in Computer Science.

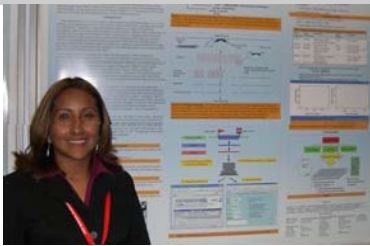
Oral Presentations



Stephanie Chadwick

“Rousseau and Conscience: Moral Evasion in the Holocaust”
UHD Faculty Mentor: **Dr. Tammis Thomas**
Project Location: University of Houston-Downtown

This independent study project is an analysis of Rousseau's philosophical writings on the human being and culture tested within the extremely distorted cultural context of the Holocaust. My analysis of Rousseau centers primarily on *Émile* but also considers *Discourse on Political Economy*, *General Society of the Human Race*, and *The Social Contract*. My project incorporates the work of important Holocaust scholars (Raul Hilberg, Theodor Adorno, and Daniel Goldhagen) and also analyzes seminal works of Holocaust literature, such as Elie Wiesel's *Night* and Peter Weiss's *The Investigation*. The focus of this presentation is Rousseau's conceptualization of conscience and the question of its effectiveness as a moral guide through examination of the actions of specific perpetrators in the Nazi mobile killing units documented by Daniel Goldhagen in *Hitler's Willing Executioners: Ordinary Germans and the Holocaust*.



Arelly Yhedid Gonzalez

“Preliminary Annotation of *Francisella tularensis* subspecies holarctica strain (OSU18)”
Co-Author: **Dr. Joseph F. Petrosino**
UHD Faculty Mentor: **Dr. Akif Uzman**
Project Location: Baylor College of Medicine

Francisella tularensis is one of the most pathogenic agents of γ -proteobacteria and is considered a prominent bioterrorist threat. *Francisella* subspecies, *tularensis* (Type A) and *holarctica* (Type B), cause tularemia, a disease that is often fatal in humans and animals. We report the preliminary annotation for the low-virulent subspecies *holarctica* strain (OSU18). We expect comparisons of the OSU18 sequence with the highly virulent subspecies *tularensis* strain (Schu 4) to elucidate genetic differences associated with pathogenicity. For example, *igIA*, a gene involved in intra-macrophage survival of subspecies *tularensis*, is disrupted in OSU18. Similarities in the two genomes show IS elements, as well as other deletions and insertions. Type IV pili proteins associated with virulence are present in both genomes. Moreover, a surprising number of pseudogenes have been identified. These results provide biological insights on *F. tularensis* and will provide genomic information for the development of a vaccine.



Iride Gramajo

“Lower Bounds on the Matching Number of Bipartite Graphs”
UHD Faculty Mentor and Co-Author: **Dr. Ermelinda DeLaVina**
Project Location: University of Houston-Downtown

This presentation is a summary of an undergraduate research project in graph theory that involved resolving conjectures on the matching number of bipartite graphs generated by a computer program called Graffiti.pc, designed by Dr. Ermelinda DeLaVina. One main objective of this project was to obtain a collection of lower bounds on the matching number involving other easily computed graph invariants, which collectively predict the matching number of bipartite graphs. We present the collection of lower bounds obtained. A couple of the results were found in texts and research papers, and some were mathematical applications of Hall's Marriage Theorem and Berge's M-Augmenting Path Theorem; however, many were resolved with seemingly original strategies.



William Keele

“Fuzzy Logic-Based AI for Real Time Strategy Games”
UHD Faculty Mentors: **Drs. Andre deKorvin and Ongard Sirisaengtaksin**
Project Location: University of Houston-Downtown

As graphics in the video game industry advance, Artificial Intelligence (AI) of computer players is expected to do the same. In Real Time Strategy (RTS) games, advanced AI used to be simulated through cheating, allowing the computer player to know more information than a human player would be allowed. In this project we attempt to produce a non-cheating Fuzzy Logic-based AI that will play an RTS game approximately the way a human would, and will be adaptable.



Giovanna Patino

“Analysis of the Thermomechanical Properties and Relative Reactivity of UV-Polymerizable Systems Containing Varying Amounts of Single-Walled Carbon Nanotubes”

Co-Author: **Ugo Anyanwu**

UHD Faculty Mentor: **Dr. Byron Christmas**

Project Location: UH-Downtown Center for Applied Polymer Science Research (CAPSR)

Single-walled carbon nanotubes (SWNTs) are self-assembling carbon nanocylinders with different chemical, electrical, and mechanical properties from those of diamond, graphite, and other carbon nanostructures. The objective of this project was to determine the effects of the addition of different amounts of SWNTs on the properties of UV-polymerizable formulations and of UV-polymerized films. The methods involved incorporation of varying amounts of grinded SWNTs into a UV-polymerizable formulation based on acrylated aliphatic urethane oligomer (ALU-350), Isobornyl acrylate (IBOA), 16-hexanediol diacrylate, Trimethylolpropane triacrylate (TMPTA), and 1-hydroxycyclohexylphenyl ketone (Irgacure 184).



Dave Roberts, Susan Fayas, Teresa Houang, Juan Ibarra, Crystal Smith, and Dawn Tan

“Contingent Fees Paid to an Attorney”

UHD Faculty Mentor: **Dr. Darshan Wadhwa**

Project Location: University of Houston-Downtown

In January 2005, the Supreme Court reversed two appellate court decisions that sided with taxpayers who excluded the portion of court awards that were paid to their attorneys on a contingent basis. The Court's decision supported position of the IRS that the entire award is to be included in the taxpayer's gross income and the contingent attorney fees are treated as a miscellaneous itemized deduction. In both cases before the Supreme Court, *Banaitis v. Commissioner* (340 F.3d 1074, 9th Cir. 2003) and *Banks v. Commissioner* (345 F.3d 373, 6th Cir. 2003), the appellate courts sided with the taxpayers ruling that the attorney fees were generated from a partial assignment of income producing property and therefore not an anticipatory assignment of income. The Supreme Court ruled that in both cases, since the taxpayers retained control of the income producing asset, they are not allowed to assign the income for tax benefit.

The court's decision brings to an end the split from the appellate courts dating back to 1959, *Contam v. Commissioner* (263 F. 2d 119, 5th Cir. 1959). However, recent legislation now allows some attorney fees to be an above-the-line deduction avoiding the alternative minimum tax disadvantage. The American Jobs Creation Act of 2004 allows attorney fees and related costs in cases involving certain civil rights claims, claims against the Federal Government, and Medicare claims, to be deducted from the taxpayers adjusted gross income rather than an itemized deduction. This paper discusses the issues leading to the appeal to the Supreme Court and how contingent attorney fees are treated after successful litigation or settlements.



Fransheneka Watson and Summer Rolin

“Students' Perceptions of Professors in Relation to Sexual Orientation and Political Ideology”

UHD Faculty Mentor: **Dr. Kristin Anderson**

Project Location: University of Houston-Downtown

Subtle forms of prejudice, specifically racial prejudice, have been widely studied by social psychologists in recent years. The present study examines the impact of professor sexual orientation and political ideology on students' perceptions of professors. Four versions of a mock *Psychology of Human Sexuality* syllabus were constructed. Versions varied by the professors' sexual orientation and political tone (conservative or liberal) of the course. Students responded to questions about the course workload and the professor's political biases. Heterosexual professors with conservative ideologies were seen as having a lighter workload than other types of professors. Lesbian and gay professors were viewed as more politically biased than were heterosexual professors teaching the same type of course. In other words, students use a double standard in their ratings of professors. Results of the present study support similar findings in the area of research on subtle forms of racial prejudice.



Sarah Xie-DeSoto

“Applied Resonance Principle To A Steel Frame”

Co-Author: **Sergio Gallardo**

UHD Faculty Mentor: **Dr. Jorge Tito-Izquierdo**

Project Location: University of Houston-Downtown

The natural frequencies of a two-story steel frame were obtained experimentally and theoretically in order to understand the resonance phenomena. This concept is very important to study the structures under dynamic loads, such as earthquakes, hurricanes or vibrations due to machinery.

Note: Above Student Researchers making oral presentations also presented a poster of their research.

Poster Presentations



Seyed Mohammad Abedi

“Compositional Effects on the Glass Transition Temperature of Obsidian”

UHD Faculty Mentor: **Dr. Ken Johnson**

Project Location: University of Houston-Downtown

Obsidian is volcanic glass. Its ability to flow during volcanic eruptions is largely a function of the glass transition temperature (T_g). This study is being conducted to determine the effects of chemical composition on the T_g in simple silicate systems. Synthetic obsidian are produced by fusing variable mixtures of SiO_2 , CaO , and Na_2O , and then undercooling the molten liquid to form an amorphous solid. Lack of microcrystallinity in the $\text{SiO}_2\text{-Na}_2\text{O}$, $\text{SiO}_2\text{-CaO}$, and $\text{SiO}_2\text{-CaO-Na}_2\text{O}$ glasses is verified using Laue x-ray diffraction, and their T_g s and heat capacities are being measured by differential scanning calorimetry. These data can then be compared with those of natural obsidians. The results will allow us to determine the chemical compositional effects on the ability of obsidian magmas to flow upon eruption, and may explain why some obsidian eruptions were explosive, whereas others were not.



Godwin Aduba

“Isolation of the Upstream Regulatory Region of Two Fibroblast Growth Factor Receptor Genes”

UHD Faculty Mentor: **Dr. Akif Uzman**

Project Location: University of Houston-Downtown

The activation of fibroblast growth factor receptors 1 and 4 (FGFR1 and FGFR4) stimulates morphogenetic movements in neural tissue and play a key role in patterning the differentiation of the central nervous system during embryogenesis. The timing and tissue specificity of gene regulation is regulated by the combinatorial action of transcription factors. To learn which factors bind to the FGFR genes, we seek to isolate and analyze the upstream regulatory regions of these genes in *Xenopus laevis*. In these experiments, adaptors were ligated to the ends of genomic DNA, previously digested with restriction endonucleases. Using primers complimentary to FGFR1 and FGFR4 sequence and primers complimentary to the adaptor, the DNA was amplified by polymerase chain reaction (PCR). The PCR procedure was repeated with nested primers to more specifically amplify the FGFR upstream regulatory regions (URRs).



Karla Alvarez

“Using Stella Software to Model Blood Glucose Levels in Response to Daily Meals and Exercise”

Co-Author: **Ms. Mitsue Nakamura**

UHD Faculty Mentors: **Dr. Akif Uzman and Ms. Mitsue Nakamura**

Project Location: University of Houston-Downtown

A computer modeling program, Stella, was used to develop a computer simulation of blood glucose levels, which are constantly changing throughout the day depending on the dietary and exercise status of the individual. The major hormones responsible for oscillations in blood glucose levels are insulin and glucagon. When the pancreas detects high levels of glucose it secretes insulin to bring the glucose level to a normal range of about 90-100 mg/dL. Glucagon is secreted when the levels of glucose in the blood have fallen too low and need to reach normal levels. The current Stella model simulates a person's body and increases the glucose levels after the consumption of 3 meals and 2 snacks and decreases the blood glucose levels after 2 sessions of exercise. When the model detects blood glucose levels out of the normal range it will either decrease or increase the blood glucose level to normal.



Adolfo Aranzales, Derrick Archer, Lauren Gracia, Estefania Gutierrez, Cynthia Olvera

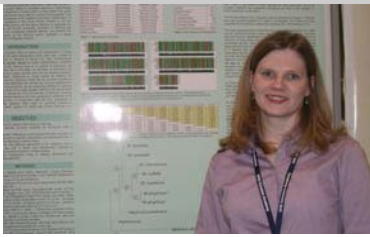
“Biological Weapons”

Co-Authors: **Christina Mindiola and Jennifer Bustos**

UHD Faculty Mentors: **R. Garcia, M. Nakamura, S. Mouchaty, L. Spears**

Project Location: University of Houston-Downtown

Biological weapons play a big role in recent history, but these have been around for a long time. A concern that arises from the existence of biological weapons is the use of these weapons for terrorist attacks. There are agencies that study diseases that might be used as biological weapons in case of an outbreak occurring. Keeping these diseases for study raises several moral and safety issues, but there are reasons to continue these studies.



Lee Anne Barkley
“Analysis of Taxa Within Texas *Mimosa* Based on the Plastid rbcL Gene”
Co-Author: **Juan Razo**
UHD Faculty Mentor: **Dr. Deanna McCullough**
Project Location: University of Houston-Downtown

The classification of *Mimosa* species based on traditional physical characteristics has led to confusing taxonomic keys which have been revised a number of times. This project seeks to elucidate taxonomic relationships among *Mimosa* species indigenous to Texas based on their plastid rbcL gene sequences. RbcL gene sequences were used to construct a molecular phylogenetic tree to provide the basis for comparison with traditional taxonomic classification of *Mimosa* species. Key questions in this study include whether or not the introduction of the *Schrankia* genus into the genus *Mimosa* is supported by molecular data, whether the former *Schrankia* members of *Mimosa* are different enough from each other to each be considered separate species, and whether the species currently belonging to the *Mimosa* genus represent a single monophyletic clade based on molecular analysis.



Prince Buzombo
“Analysis of *Xylella fastidiosa* in the Native Plants of Texas”
UHD Faculty Mentor: **Dr. Lisa Morano**
Project Location: University of Houston-Downtown

The study of natural hosts of the plant pathogen *Xylella fastidiosa* represents an important approach in the prevention of Pierce’s disease in grapevines. Wild plants located in the vicinity of Gulf Coast vineyards constitute a considerable reservoir of *Xylella fastidiosa*, xylem-inhabiting bacteria, and therefore are a primary source for bacterial transmission to grapevines. Native plant samples surrounding a Gulf Coast vineyard were screened for bacterial levels using Enzyme-linked Immunosorbent Assay (ELISA). Plants such as *Ilex vomitoria* (Yaupon holly), *Neptunia oleracea* (Water mimosa) and *Lagerstroemia indica* (Crape myrtle) were very positive. The positives were confirmed by Indirect Immunofluorescence microscopy (IF) and/or Polymerase Chain Reaction (PCR). Interestingly, the high level of *Xylella fastidiosa* within these plants does not result in any plant pathology. The asymptomatic appearance of wild plants with *Xylella fastidiosa* infection and the number and types of host species with the bacteria suggests that *Xylella fastidiosa* has been endemic to this region for many years.



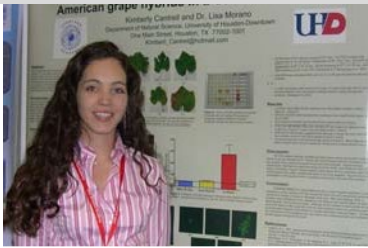
Wendy Callejas
“Phototaxis and Aerotaxis in a Calcifying Alga”
Co-Authors: **Lan Doan**, UT-Dental Branch; **Dr. Pauline J. Duke**, UT-Dental Branch;
and Dr. Mary Marsh, UT Health Science Center at Houston
UHD Faculty Mentor: **Dr. Poonam Gulati**
Project Location: University of Texas Dental Branch at Houston

In previous studies, we determined that cells of *Pleurochrysis carterae* do not start to move in a measurably oriented manner until a certain cell density is reached, concomitant with the start of bioconvection (convection due to movement of microorganisms.) The process begins with the accumulation of cells at the surface of the medium, which require that the cells swim up. The objective of the current study was to determine if other taxes, specifically photo- and aerotaxis, cause the surface accumulation of cells. Using a stock cell culture of *P. carterae*, Plymouth strain 136, grown overnight in F/2 medium (18 °C), the oxygen and light exposure to the cells were controlled. Results showed phototaxis being stronger than aerotaxis since *P. carterae* cells tended to grow more towards the light source than the air bubble within the flasks. Upswimming both in the lab and in nature is likely due to phototaxis and/or aerotaxis, not geo- or gyro-taxis.



Wendy Callejas, Diamantina Escobedo, Lesslie Hernandez, Ariana Paniagua, Mary Vallesteros
“Human Chips: Will You Be Next?”
Co-Author: **Mai Nguyen**
UHD Faculty Mentors: **R. Garcia, M. Nakamura, S. Mouchaty, L. Spears**
Project Location: University of Houston-Downtown

Overpopulation plays a big role in the way the world functions and will soon reach a level where there will not be enough resources to maintain life. This concern produces poverty, corruption, and scarcity, where there are not enough natural resources to support the growing population, and therefore society is forced to take unlawful drastic measures. A countless number of environmental and social problems arise from the overpopulation issue to the extreme of people eating each other.



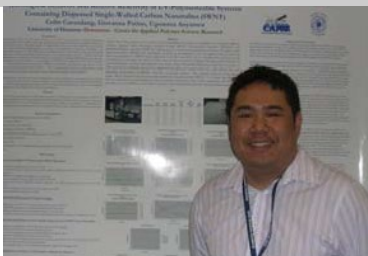
Kimberly Ann Cantrell

“Investigation of *Xylella Fastidiosa* Levels within Three American Grape Hybrids in a Gulf Coast Vineyard”

UHD Faculty Mentor: **Dr. Lisa Morano**

Project Location: University of Houston-Downtown

Xylella fastidiosa (Xf) is a bacterial plant pathogen of grape varieties that causes Pierce’s disease (PD), resulting in death to vines and millions of dollars in damage. This research analyzed three American hybrid grape varieties that are known to be tolerant to PD. Using ELISA, Electrochemical Detection (ECD), Indirect Immunofluorescence Microscopy (IF), and PCR, we monitored the Xf level in petioles. One-way Analysis of variance (ANOVA) of ELISA data indicated that the variety Cynthiana had a significantly higher value of Xf (P=.0002) than the other two varieties. PCR and ECD results supported the ELISA data.



Colin Carandang

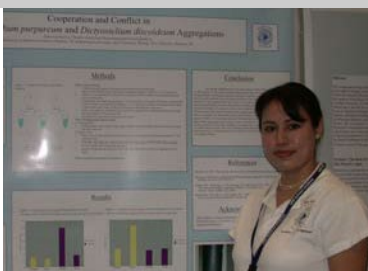
“Understanding Rheological Behavior and Relative Reactivity of UV-Polymerizable Systems that Contain Single-Walled Carbon Nanotubes (SWNTs)”

Co-Authors: **Ugomma Anyanwu and Giovanna Patino**

UHD Faculty Mentor: **Dr. Byron Christmas**

Project Location: UH-Downtown Center for Applied Polymer Science Research

A study was conducted on the rheological properties of aliphatic-acrylate UV-polymerizable formulations with varying concentrations of single-walled carbon nanotubes. The SWNT concentrations varied from 0.1% to 0.16% by weight, while the formulations had a composition of 65-35 ratio by weight of urethane oligomer to mixture of three monomers (isobornyl acrylate, hexanediol diacrylate, and trimethylpropane triacrylate). With the increase in SWNT concentration, we observed the effects of shear rate and thixotropic behavior. These findings indicate the relatively strong dipole-induced dipole attractions among the acrylate-functional components and the SWNTs. Relative reactivity of formulations and their thermomechanical properties were also studied. These initial results will help determine the effective dispersion techniques to be used when dispersing functionalized single-walled carbon nanotubes in the same UV-polymerizable formulation.



Dulce Carbajal

“Social Cooperation in *Dictyostelium purpureum* Aggregations”

Co-Authors: **Chandia Jack, Joan Strussmann, David Queller**

UHD Faculty Mentor: **Dr. Lisa Morano**

Project Location: Rice University Department of Ecology and Evolutionary Biology

When faced with starving conditions, the usually free-living social amoeba, *Dictyostelium*, aggregate into a multicellular slug. Some of the cells become sterile stalk cells and others become spores. In *D. discoideum*, nonclonemates aggregate together and do not migrate as far towards light due to conflict between the clones. *D. purpureum* cells commit to stalk earlier in development and might show less conflict. We studied the behavior of *D. purpureum* aggregations of pure clones and chimeras as they migrated across a plate towards light. Interestingly, we found that chimeras produced correspondingly more fruiting bodies, perhaps indicating that they frequently do not form chimeras. Furthermore, all three types of slugs traveled similar distances and produced similar numbers of fruiting bodies of similar size, though few actually traveled very far. This leads us to believe that *D. purpureum* clones do not mix to form chimeric slugs, perhaps due to recognition between *D. purpureum* amoeba or due to the intrinsic cost of forming chimeras equal to benefits.



Daisy Cherian

“Molecular Analysis of Fungal Communities in Coastal Prairie Grasses”

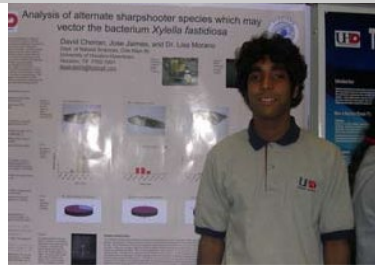
Co-Authors: **Lesley Leggett and Dr. Phil Lyons**

UHD Faculty Mentor: **Dr. Phil Lyons**

Project Location: University of Houston-Downtown

The Coastal Prairie Research Project has an ambition to identify and classify fungal communities thriving in the soils of disturbed coastal tallgrass prairie at Sheldon Lake State Park and to compare it to fungal communities in the soil of native tallgrass prairie at the University of Houston Coastal Center (UHCC). To aid in rapid identification, a clonal library containing sequences of the rDNA extracted from axenic fungal cultures from the roots and rhizospheres of indigenous plants is being established to compare with the fungal rDNA sequences

cloned directly from the root and root rhizospheres of these same plants. Twenty-five different sequences have been compiled. These fungal rDNA sequences are now being classified into distinct fungal operational taxonomic units and efforts are underway to identify fungi represented by the different sequences.



David Cherian

“Analysis of Alternate Sharpshooter Species Which May Vector the Bacterium *Xylella Fastidiosa*”

Co-Author: **Jose Jaimes**

UHD Faculty Mentor: **Dr. Lisa Morano**

Project Location: University of Houston-Downtown

Xylella fastidiosa is the bacterium that causes Pierce’s disease (PD), a plant pathogen infecting and destroying grape vineyards throughout Texas and California. *X. fastidiosa* colonizes the xylem of plants, causing water stress and death. PD is believed to be transmitted through sharpshooter insects, principally the glassy-winged sharpshooter (*Homalodisca coagulata*). The goal of our study was to identify alternate vectors of PD in Texas beside *H. coagulata* using ELISA tests and PCR methods. We found from our studies four species of sharpshooter insects in high numbers in Texas vineyards: *Oncometopia orbona*, *Paraulacizes irrorata*, *Cuerna costalis*, and *Carneiocephala flaviceps*, and two of the species, *O. orbona* and *C. costalis*, had individuals with significant *X. fastidiosa* levels as measured by ELISA and confirmed by PCR. This preliminary work suggests that the potential harm of sharpshooters differs from species to species and not all may vector the disease or vector it to the same level.



Eric Contreras, Alicia Corazon, Marlin Matthews, Kristi Pennington

“The China Syndrome of Today”

Co-Authors: **Tammie Clanton and Daniel Brenes**

UHD Faculty Mentors: **R. Garcia, M. Nakamura, S. Mouchaty, L. Spears**

Project Location: University of Houston-Downtown

After watching *The China Syndrome*, our group explored the inner, as well as outer, workings of a nuclear power plant. We discussed the importance of Uranium-235 in a nuclear plant and also the nuclear fission process that occurs. We noted the many different advantages of nuclear power and the main disadvantages. Some part of our study was also devoted to the incident at the Chernobyl nuclear power plant.



Leslie Cook

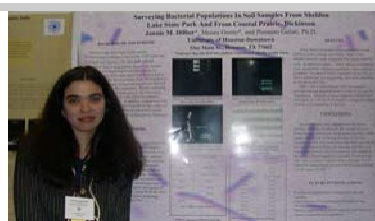
“Characterization of Basidiomycete rDNA Operational Taxonomic Units of Texas Coastal Prairie Soils”

Co-Authors: **Tittu Mathew and Dr. Phil Lyons**

UHD Faculty Mentor: **Dr. Phil Lyons**

Project Location: University of Houston-Downtown

The Coastal Prairie of the U.S. upper Gulf Coast is predominantly a tall grass prairie ecosystem. We are interested in the structure and function of fungal communities in these soils. To study soil basidiomycete communities within tall grass prairie, we used rDNA sequence variation to identify basidiomycete operational taxonomic units (OTUs) in soil from farmed and native prairie. Fifty seven basidiomycete rDNAs were amplified by PCR from soil DNA extractions using basidiomycete specific primers. From these, we identified 16 distinct basidiomycete OTUs. Four of these OTUs were common to both sites, two were unique to the farmed site, and ten were unique to the native prairie site. The rDNA sequences for each OTU were digested *in silico* with different enzymes to generate restriction fragment patterns, which were reproducible by actual digestions and electrophoresis of the digests. Using this approach, we intend to develop OTU profiles of coastal prairie soils which can be used for many kinds of ecological studies.



Jannie Marie Dilber

“Surveying Bacterial Populations in Soil Samples from Sheldon Lake State Park and from Coastal Prairie, Dickinson”

Co-Authors: **Moses Osoro and Dr. Poonam Gulati**

UHD Faculty Mentor: **Dr. Poonam Gulati**

Project Location: University of Houston-Downtown

An area of Sheldon Lake State Park (SLSP) that has been farmed for many years is being restored to its original state of coastal prairie, which is native to southeast Texas. This restoration should have great potential for increasing plant and animal life. In our investigation, the bacterial populations at various soil sites in the agricultural and surrounding areas of SLSP were evaluated. In addition, we investigated soil samples from an untouched coastal prairie at a site in Dickinson, Texas, owned by UH. Analysis of these samples was done utilizing molecular techniques. The genes for 16s ribosomal RNA were isolated from the soil samples and sequenced. The sequence data obtained was used to identify various bacteria by sequence comparisons. The results of this study are reported, indicating a preference of this agricultural soil for the growth of certain bacteria.

Photo unavailable.

Mary Anne Fogarty

“Texas Borderlands: A Changing Culture in the Early 20th Century”

UHD Faculty Mentor: **Dr. Jane Creighton**

Project Location: University of Houston-Downtown

For over a century, the Lower Rio Grande valley has been a contact zone, that is, “a social space where cultures meet, clash, and grapple with each other” (Mary Louise Pratt). The borderlands dividing Texas and Mexico have experienced transculturation in the form of social change, cultural conflict, and the repression of the Mexican ranch society as Anglo-American communities grew and expanded into these lands.

Two literary works – *Dew on the Thorn* by Jovita Gonzaléz and “The Hammon and the Beans” by Américo Paredes depict this contact zone theory. Gonzalez’s novel follows historical events as the Anglo and Texas-Mexican rancho cultures clash over land ownership and differences in their societies. In Paredes’s short story, a young girl confronts the dominant Anglo culture by using language and rhetoric to bridge the chasm created by the segregation of both cultures.

These literary works bring meaning to Pratt’s theory and stimulate further study.

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Edgar Fuentes

“Same-Sex Desire and Compulsory Heterosexuality in Robert Musil's *The Confusions of Young Törless*”

UHD Faculty Mentor: **Dr. Tammis Thomas**

Project Location: University of Houston-Downtown

Although my directed study project focuses on the homosexual-heterosexual binary of the *Männerbund* in early twentieth-century German culture and literature, my conference presentation will be limited to Robert Musil’s *The Confusions of Young Törless*. My analysis of Musil’s novella is grounded in the following scholarship on the *Männerbund*: Klaus Theweleit’s *Male Fantasies*, George Mosse’s *Nationalism and Sexuality: Respectability and Abnormal Sexuality in Modern Europe*, and Michael Kane’s *Modern Men: Mapping Masculinity in German and English Literature*. The segment I have chosen to present at this conference makes an original contribution to the body of scholarship surrounding Musil’s novella in that it focuses on Judith Butler’s theory concerning the achievement of compulsory heterosexuality. More specifically, my presentation will analyze the performance of masculinity as a fear-driven process through which same-sex desire is disavowed.



Sergio Gallardo

“Reinforced Concrete Beam Test”

Co-Author: **Sarah Xie-DeSoto**

UHD Faculty Mentor: **Dr. Jorge Tito-Izquierdo**

Project Location: University of Houston-Downtown

A Reinforced Concrete T-Beam was designed, manufactured, and tested in order to understand its structural behavior for different load levels. All the work was done in the Laboratory of Structures of the University of Houston-Downtown. The f_c of the concrete was obtained using cylinders. The Modulus of Elasticity and the Strength of the concrete were obtained experimentally. The steel used was a #7 rebar, with standard structural properties.

See photo above.

Sergio Gallardo

“Dynamic Test on Simple Supported Beam”

Co-Author: **Sarah Xie-DeSoto**

UHD Faculty Mentor: **Dr. Weining Feng**

Project Location: University of Houston-Downtown

Structures have natural frequencies that may be determined using experimental or analytical methods. In this paper the first three natural frequencies of a simple supported beam are found using an experimental method and compared with the analytical result. The beam is made of aluminum with a hollow cross section of 1 inch, the span is 96 inches and the supports are type pin, permitting rotation and axial displacement. It can be appreciated that the experimental results agree with the theoretical results with a difference of 0.08% to finite model, 0.5% to the hand calculation for the first mode, 4.3% for the second mode, 3.6% to finite model, exact value to hand calculation. Therefore the experimental method used is acceptable.



Celina Y. Guillen

“Bacterial Inhibition by Fungi in Coastal Prairie Soils”

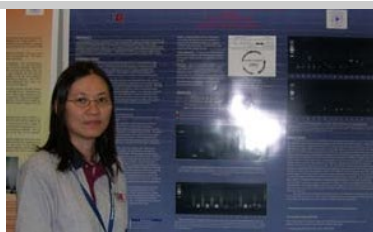
Co-Authors: **Stephanie Cabrera and Dr. Phil Lyons**

UHD Faculty Mentor: **Dr. Phil Lyons**

Project Location: University of Houston-Downtown

Interactions between different microorganisms are an important aspect of soil microbial ecology. Substances produced by many fungal species inhibit the growth of certain bacteria in the soil. This project aims to identify fungal species that inhibit the growth of different bacteria isolated from Coastal Prairie soils. Of approximately thirty-five fungal species analyzed for their antibacterial capabilities, four demonstrated consistent antibiosis. Two species inhibited all of the five bacterial isolates they were tested against and two species inhibited only one isolate. Thin Layer Chromatography and other analytical techniques are now being used to identify the antibiotic

properties and chemical structures of the toxins responsible for inhibition.



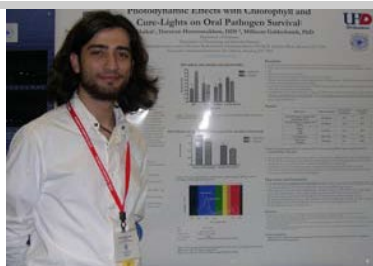
Ngan Ha

“Gene Regulation at Multiple Foci”

UHD Faculty Mentor: **Dr. Akif Uzman**

Project Location: University of Houston-Downtown

Gene regulation plays an important role in the development of the central nervous system. To understand this developmental process, we sought to compare the upstream regulatory regions (URR) of several neural-inducing to identify DNA sequences that might coordinately regulate gene expression. We are isolating the URRs (from *noggin* and *chordin*) using polymerase chain reactions (PCR) with gene-specific primers and either different arbitrary primers or designed primers for specific adaptors. Although these URRs have not been isolated, many interesting artifacts are reported here, along with some new approaches to obtaining URRs for these genes.



Fadi Haikal

“Photodynamic Effects of Soluble Chlorophyll and Cure-lights on Oral Pathogen Survival”

Co-Author: **Dr. Goldschmidt**, UT-Dental Branch

UHD Faculty Mentor: **Dr. Poonam Gulati**

Project Location: University of Texas-Dental Branch

Use of antimicrobials has led to increasing resistance in many microorganisms. Photodynamic therapy involving light activated dye is an alternative way to kill those microorganisms. Our study investigated the effect of an activated soluble chlorophyll eluted from Clorets chewing gum (CHC) on the kill of *Streptococcus mutans* (SM), and *Streptococcus salivarius* (SS) using the following light sources, 3M-ESPE Freelight LED, 3M-ESPE Freelight 2, Allegro light, LEDemetron I, and Demetron Optilux 401. Cell suspensions were exposed to each light source mentioned above for 80 sec and CHC from an eluate of 8 tablets / 10mL PBS. The Demetron Optilux cure light 401 was the most effective in killing cells with a 95% kill for SS and 100% kill for SM. Under our experimental conditions, on average, SM cells were found to be more sensitive to photodynamic effect than SS.



Malik Muhammad Hassan

“Network Security and Intrusion Detection Systems (IDS)”

UHD Faculty Mentor: **Dr. Ping Chen**

Project Location: University of Houston-Downtown

We have set up an Intrusion Detection System (IDS) based on SNORT in the Distributed Network Security lab at UH-D. In today's networked environment security has emerged as a primary focus of concern. The Internet, which is based on TCP/IP, is not very secure by nature and was not provisioned for the expansion it has achieved today. Computer networks are always vulnerable to various kinds of threats; attacks like Data Scavenging, Probing and Scanning, IP and TCP spoofing, DDoS, etc. can be devastating to network performance and security. An Intrusion Detection System (IDS) can alert the network admin of the incoming hacking attempts and help take action against the rogue devices by isolating them through the process of generating a “black-hole” around them. An IDS is has emerged as a very effective weapon in a Network Security Manager's arsenal against any hacking attempt.



Sean Hattenbach

“Evaluation of Biofilm Formation on Antibiotic Delivery Materials”

UHD Faculty Mentor: **Dr. Poonam Gulati**

Project Location: University of Houston-Downtown

Biofilms are complex stationary communities composed of microorganisms and their exopolymer secretions. They form on materials such as solid complex media, medical devices, and within human tissue after surgical procedures. Biofilms formed within humans, on devices or on tissues, can cause infections that result in secondary operations to remove necrotic tissue and clear the infection. The present study was initiated to test the efficacy of different microsphere materials containing antibiotics to combat bacterial infections. Three techniques were employed to measure biofilm formation on microspheres. First, a colorimetric assay using crystal violet was employed to detect dye attachment to biofilms in well-plates. Second, the attached bacteria were scraped, plated on nutrient agar medium, and counted as colony-forming units. Biofilms were additionally observed using scanning electron microscopy. All results indicate that biofilms do form on microspheres, but variations exist between the materials tested.



Moses Hernandez and Daniel Valadez

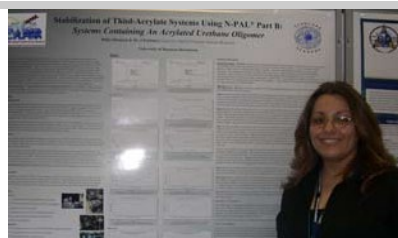
“The Application of Virtual Environment Technology to a Publicly Accessed Directory Service”

Co-Author: **Lac Nguyen**, NASA

UHD Faculty Mentor: **Dr. Ongard Sirisaengtaksin**

Project Location: University of Houston-Downtown

As virtual environment technology becomes more advanced, it can be applied as a solution to common obstacles. One such obstacle is preventing people on college campuses from getting lost during visits. In coordination with the virtual reality lab in NASA, we have been working to create a realistic virtual representation of the University of Houston-Downtown campus. 3D modeling was initiated in October 2004 with plans for completion by December 2005. After completion of the model, animated "flight paths" for the camera will be created for every possible route between the viewer's current location, a fixed point at a central kiosk, and their destination. The model contains both outdoor and indoor elements that comprise the environment of our commuter campus. The textures and other details will be as specific as possible to maintain a genuine resemblance of the campus. The virtual representation of the school will help students and visitors find their destinations through use of automated touch-screen kiosks.



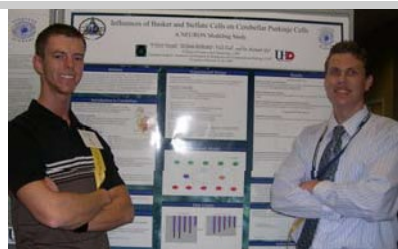
Hilda Hinojosa

“Stabilization of Thiol/Acrylate Systems Containing an Acrylated Urethane Oligomer Using N-PAL”

UHD Faculty Mentor and Co-Author: **Dr. Byron Christmas**

Project Location: UH-Downtown Center for Applied Polymer Science Research

Using *tris*-nitroso-N-phenylhydroxylamine (N-PAL) as a free radical polymerization inhibitor, an investigation was conducted to characterize the shelf-life stability and relative reactivity of UV-polymerizable, thiol/acrylate-based formulations containing various concentrations of N-PAL. These formulations were characterized for their relative reactivity using differential photocalorimetry (DPC) techniques. The shelf-life stability data generated thus far indicate that N-PAL provides adequate stability without significantly reducing the relative reactivity of the formulations.



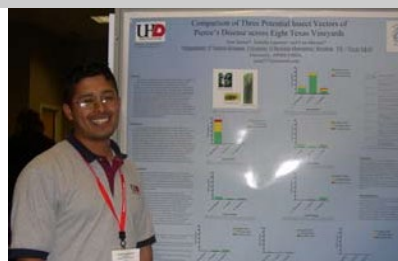
William Holtkamp and William Stegall

“Influences of Basket and Stellate cells on Cerebellar Purkinje cells”

UHD Faculty Mentors: **Dr. Richard Alo, Sangeeta Gad, Yash Gad**

Project Location: University of Houston-Downtown

The cerebellum is a vital object in the brain for everyday activities. In the cerebellum, the Purkinje cells are the only output, which responds to the rest of the brain. There are two types of cells, Basket and Stellate, which inhibit the Purkinje cell. Not many studies have focused on these cells and their function remains unknown. What do these cells do? Why are they in the body? These questions were what this study tries to explain. The Basket and Stellate cells seem to act as a fuse in order to not allow the Purkinje cells receive mass amounts of excitation. Our tests prove this theory to be true and in fact prove the interneuron cells (Basket and Stellate) to have great effects on Purkinje cells.



Jose Jaimes

“Comparison of Three Potential Insect Vectors of Pierce's Disease across Eight Texas Vineyards”

Co-Authors: **Isabelle Lauziere, Dr. Lisa Morano**

UHD Faculty Mentor: **Dr. Lisa Morano**

Project Location: University of Houston-Downtown

The glassy-winged sharpshooter (GWSS) (*Homalodisca coagulata*) is a vector of the plant pathogen *Xylella fastidiosa* (Xf), which causes Pierce's Disease (PD) in grapevines. Although a recent threat in California, the GWSS is native to Texas, according to current genetic studies. For these reasons, study of sharpshooters infecting Texas vineyards and evaluation of the Xf level within the insects is critical for understanding the ecology of the vector and epidemiology of PD. ELISA tests were performed on insects collected on traps from 8 Texas vineyards and guaranteed clean lab insects. Among the insects collected were *H. coagulata*, *Graphocephala versuta*, and the spittle bug, *Clastoptera xantoccephala*. Frequency of sharpshooter species varied with location, as did the percentage of infected sharpshooters. Evaluation of environmental variables suggests insects increase with poor weed control. Data also indicates that all three species can reach high numbers in the vineyard and are capable of carrying high Xf levels.



Jonathan Keele, Victoria Morillon, Shafeeq Noorudeen, Jennie Orellana
“An Insight into In vitro Fertilization and Germline Gene Therapy as Presented in *Gattaca*”

Co-Author: **Patricia Ramon**

UHD Faculty Mentors: **R. Garcia, M. Nakamura, S. Mouchaty, L. Spears**

Project Location: University of Houston-Downtown

Using information presented in the movie *Gattaca* and individual research on the underlying theories presented in the movie, we discovered the Scientific methods used and applied them to ethical issues and how far off science is from being able to implement such methods. The key research topics were: in vitro fertilization and genetic manipulation of an embryo. The movie presented a situation in which one's genes could be manipulated beyond the abilities of a normal human, and our research shows how close we are to this technology and how it will affect society.



Amna Khan, Lou McLean, Diana Quinones, Glenn Castaneda, Israel Mondragon

“Offer in Compromise”

UHD Faculty Mentor: **Dr. Darshan Wadhwa**

Project Location: University of Houston-Downtown

Offer in Compromise (OIC) is an agreement between the taxpayer and the Internal Revenue Service (IRS) as an alternative in settling a tax liability for payment less than the full amount owed. The primary purpose of OIC is to achieve collection of potential collectible at the earliest possible time and at the least cost to the federal government.

Before the IRS can grant an OIC, the taxpayer must first provide reasonable documentation to verify his/her ability to pay the outstanding tax liabilities. The three options when filling an OIC with the IRS are: 1) doubt as to collectibility, 2) doubt as to liability, and 3) effective tax administration (ETA). Additional requirements in filling an OIC are: 1) non-refundable \$150 application fee or Form 656-A, 2) Form 433-A (individual or self-employed), and 3) Form 433-B (corporation).

Once the IRS receives the OIC, an examiner will evaluate the offer and will make a decision on whether to consider the offer or if additional information from the taxpayer is needed. If OIC is granted, the taxpayer will be notified by mail and must comply with all the agreements and guidelines written in the acceptance paper. If OIC is rejected, the taxpayer will be notified by mail with an explanation for the rejection. The taxpayer can appeal the decision to the Office of Appeals within thirty days from the date of the letter, and/or submit another offer with another application fee.



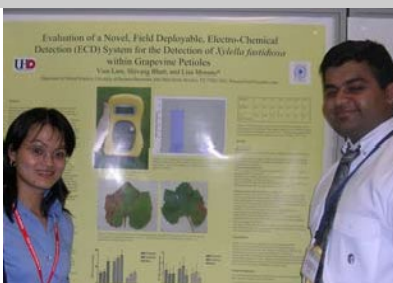
Jeeba Kuriakose

“Analysis of the Upstream Regulatory Region of a Novel Gene, *ashwin*, in *Xenopus laevis*”

UHD Faculty Mentor: **Dr. Akif Uzman**

Project Location: University of Houston-Downtown

Spatial and temporal gene expression is regulated by the binding of transcription factors to the 5' upstream regulatory region (URR) of a gene. The objective of this research project is to isolate the sequence of the URR of a gene *ashwin*, an early neural patterning gene in *Xenopus laevis*, and to analyze this sequence for potential transcription factor binding sites, which may elucidate how *ashwin* is regulated temporally and spatially. Obtaining the URR of *ashwin* primarily employs PCR walking; anchored primers along with arbitrary primers were used for specific amplification of the regulatory region. In a PCR reaction, the anchored primers are used to select specifically the gene of interest (*ashwin*) from the genomic DNA (*Xenopus laevis*). Comparative analysis of URR of homologous genes of *ashwin* has been done to look for potential conserved domains. Currently the obtained sequence of the URR is being analyzed for known transcription factor binding sites.



Vien Lam and Shivang Bhatt

“Evaluation of a Novel Technology for the Detection of *Xylella fastidiosa* cells”

UHD Faculty Mentor: **Dr. Lisa Morano**

Project Location: University of Houston-Downtown

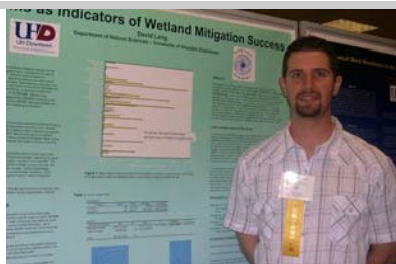
The new electro-chemical detection (ECD) system uses movement of electrons through antibody-antigen complex to detect the bacterium *Xylella fastidiosa* (Xf) within grape petioles. Using a hand-held meter and pre-coated chips, the test is more efficient than standard ELISA. Comparison of 18 Cabernet Sauvignon petioles from a vineyard with Pierce's disease (PD) to 18 petioles guaranteed PD-free petioles showed that the ECD reading per g tissue to be higher for PD petioles (31.3 vs. 6.2 microamps). This difference is statistically different using a t-test ($p < 0.0001$). In another trial, ECD was used to evaluate the petioles from three different grape varieties: Blanc du Bois, Black Spanish, and Cynthiana. ANOVA on ECD data from nine symptom variety categories with 6 replications showed that ECD could detect distinct significant differences between several of the categories ($p < 0.0001$). ECD appears to give more sensitive readings over a range of bacterial levels, potentially giving fewer false positives.



The IRS recently issued final regulations applicable to taxpayer who has not owned and used the property as the taxpayer's principal residence for two of the preceding five years or who has excluded gain from the sale or exchange of a principal residence within the preceding two years.

After May 6, 1997 for sales or exchanges of residence married taxpayers may exclude up to \$500,000 of gain (\$250,000 for single taxpayers) of their residence. In order to obtain exclusion of gain, taxpayers must have owned and occupied the residence as their principal residence for two out of the last five years prior to sale. As per general rules, if taxpayer owns less than two years, no exclusion of is available.

The taxpayers can prorate the \$250,000 and \$500,000 exclusion if the sale is due to a change in place of employment a change in health or unforeseen circumstances even if a taxpayer does not meet the two years requirement. In order to permit a reduced maximum exclusion to a taxpayer for any of these three circumstances, a taxpayer may meet a safe harbor test or pass a general facts-and-circumstances test.



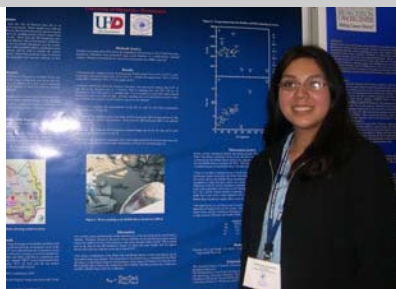
David Lang

"Diatoms as Indicators of Wetland Mitigation Success"

UHD Faculty Mentor: **Dr. Brad Hoge**

Project Location: University of Houston-Downtown, Greens Bayou Wetlands Mitigation Bank, and Anahuac National Wildlife Refuge

Diatoms were chosen to assess wetlands mitigation success in the Greens Bayou Wetlands Mitigation Bank, a project of the Harris County Flood Control District. Diatoms respond rapidly to environmental changes; thus diatom succession provides a good model of wetland mitigation success. Samples were collected from surface water and the first 10 centimeters of soil at the GBWMB and the Anahuac National Wildlife Refuge, a relatively undisturbed wetland comparable to those at the GBWMB. Results show statistically different assemblages at the GBWMB compared the ANWR. These results suggest the GBWMB, although planted with climax community plants, is still undergoing succession.



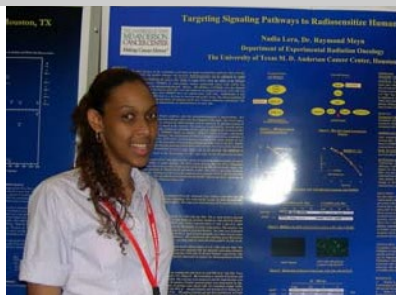
Lisa Leija

"Dissolved Metal Abundances in the Buffalo and White Oak Bayous, Houston, Texas"

UHD Faculty Mentor: **Dr. Ken Johnson**

Project Location: University of Houston-Downtown, Texas Tech University

Uncertainties regarding water data quality from the city of Houston have led to an investigation of the dissolved metal abundances in area bayous. Water samples were collected from the Buffalo (BB) and White Oak (WO) Bayous, filtered, and analyzed for dissolved metals by ICP-AES (plasma spectrometry). Throughout the sampling period, T(H₂O) ranged from ~13 to 30 °C, and there was little variation in pH. Water from the WO headwaters were uniform, whereas the BB headwaters are distinctly different, with several elements exhibiting a positive correlation with T(H₂O). Water from the San Jacinto Monument, near the estuary, contains much higher dissolved metal abundances, which probably reflects contributions from tributaries and runoff. Mass balance calculations will be used to estimate the relative contributions of the BB and WO at their confluence. These data expand the range of elements analyzed from bayou waters, and display some geographic and seasonal variations in their compositions.



Human tumor cells arise because of the constitutive activation of signal transduction pathways that activate downstream proteins, which can further enhance cell survival. Radiosensitization can be enhanced by signal transduction inhibitors and by inhibiting the cancer cells' ability to repair DNA. First the ability of the Mitogen Activated Protein Kinase inhibitor, PD98059, to radiosensitize human epidermoid cancer cells (A431) was examined. Second, the effects of the phosphatidylinositol-3 kinase-AKT inhibitor, LY294002, were investigated on phosphorylated AKT levels and survivin in A431 cells. Last, the influence of antisense Ku70 on A431 cells was examined. Preliminary findings suggest that PD98059 does not radiosensitize A431 cells. Additionally, it was observed that treatment with LY294002 lead to a decrease in survivin and pAKT levels. The downregulation of Ku70 was observed with increasing concentrations of antisense Ku70 over 72 hours following transfection. The drugs LY294002 and antisense Ku70 may hold promise as radiosensitizers of A431 cells.



Whitman Liu

“The Use of Trimethylolpropane Trimethacrylate (TMPTMA) as a Stabilizer for UV-Polymerizable Thiol/Acrylate Systems”

UHD Faculty Mentor: **Dr. Byron Christmas**

Project Location: UH-Downtown Center for Applied Polymer Science Research

An investigation is being conducted to determine the stabilizing effects of TMPTMA, a trifunctional monomer, on binary acrylate monomer compositions containing a multifunctional thiol. Its effects on relative reactivity of the systems are also being investigated. The relative reactivity of each formulation will be measured using differential photocalorimetry (DPC) and the shelf life stability was determined by means the time required for the gelation of each formulation to begin.



Qudus Abayomi Majiyagbe

“Development of an Intraductal Cell and Gene Therapy Approach For Treatment of Early Stage Breast Cancer”

Co-Authors: **Nikeshia Harrington (1), Nicole Cain (2), Ricardo C. Moraes(1) and Michael T. Lewis, Ph.D (1)**; Breast Center, Baylor College of Medicine, Houston, TX 77030(1), Luther College Decorah, Iowa 52101(2).

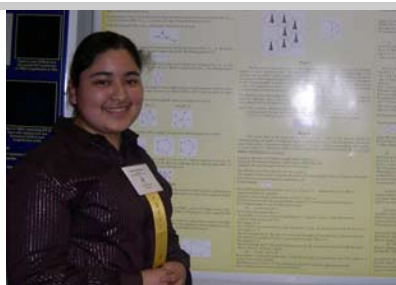
UHD Faculty Mentor: **Dr. Poonam Gulati**

Project Location: Baylor College of Medicine

Gene and cell therapy hold promise for the treatment of early stage breast cancer. Significant technical limitations exist for both approaches that includes; low efficiency of gene delivery, and adverse immune responses. In principle, it should be possible to obtain a patient's own breast cells, genetically modify them to perform a therapeutic function, and reintroduce those cells into the breast via intraductal methods. Reintroduced cells would be incorporated into existing ductal and alveolar structures and survive to attack cancer. We propose to conduct a “proof-of-principle” study in a mouse model which could be adapted for use in women.

To simulate normal human breast epithelium isolated from a given patient, we will use genetically “tagged” mammary epithelium isolated from mice that express the Enhanced Green Fluorescent Protein (EGFP). EGFP expression will serve as a marker for these cells when reintroduced to a host mammary gland.

Red Fluorescent Protein (RFP), into the EGFP primary mammary epithelial cells. The reporter now serves as a surrogate for the “Therapeutic gene of interest”. Epithelial cell-cell contacts can be disrupted *in vivo*; the removal of disrupting agent allows dissociated cells to reconstitute a normal ductal system. We will use intraductal injection to reintroduce the EGFP epithelial cells transfected with RFP reporter gene into an intact mammary gland that expresses a third genetic tag, Enhanced Cyan Fluorescent Protein (ECFP).



Claudia Martinez

“On the Chromatic Number of a Graph”

UHD Faculty Mentor: **Dr. Ermelinda Delavina**

Project Location: University of Houston-Downtown

During Fall 2004, I conducted research in graph theory under the guidance of Dr. DeLaViña. The first phase of the project was to resolve conjectured lower and upper bounds of the chromatic number of simple connected graphs. This phase served as practice for gaining an

understanding of the chromatic number and the various invariants that affect the chromatic number of a graph. The second phase was on lower and upper bounds of the chromatic number of connected triangle free graphs. During this phase I had to prove conjectures or disprove conjectures by finding a smallest counterexample. The final phase of the project was a modification of the first two phases; in this phase we fixed the chromatic number and maximum degree and resolved conjectures on the upper and lower bounds of girth and independence number of triangle free connected graphs. This presentation is a summary of the results of the three phases of the project.



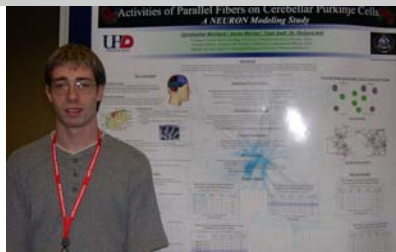
Rodolfo Alberto Moreno

“Localization Studies of Plant cation/H⁺ exchangers (CAX)”

UHD Faculty Mentor: **Dr. Akif Uzman**

Project Location: Baylor College of Medicine Children's Nutrition Research Center

Cation sequestration and translocation is important for growth, development, transduction of signals and other plant processes. In the model plant Arabidopsis there appears to be 11 genes coding for CAX (cation exchanger) transporters. These transporters were initially characterized by their functions when expressed in yeast; however, little data is currently available regarding their function(s) in plants. This study focuses on characterizing the expression and physiological function of these transporters in plants. To accomplish this goal, several preliminary experiments need to be performed. One of these experiments consists of basically locating where these transporters are tagged with a reporter molecule called green fluorescent protein (GFP). This GFP locates these transporters by illuminating them under ultraviolet light. These tagged transporters are inserted into plants by transformation. The localization of these transporters aids in determining the functional properties of these biologically important proteins.



Aaron Murray

“Activities of Parallel Fibers on Cerebellar Purkinje Cells”

Co-Authors: **Christopher McIntyre**

UHD Faculty Mentor: **Ms. Sangeeta Gad**

Project Location: University of Houston-Downtown

In the cerebellum, stored in the Purkinje cell layer are very large, flask-shaped cells with huge dendrites extending upward to the molecular layer. Based upon research by Erik De Schutter and James M. Bower in their paper, “*Simulated responses of cerebellar Purkinje cells*”, they put forth that Purkinje cell responses are independent of the dendritic location of the granule cell synaptic inputs. This theory was systematically tested with the neuron modeling software package developed by Michael Hines and John W. Moore at the Department of Neurobiology, Duke University. The effects on these studies with the addition of inhibitory collaterals should enhance small differences in excitation on all experiments. The study also covers the effects when five or more Purkinje cells are chained together in a coherent web.



Mai Nguyen, Jennifer Bustos

“Qualitative Analysis of Tumor-Immune Non-Linear ODE System”

Co-Author: **Ron Hoppe**

UHD Faculty Mentor: **Dr. Jeong-Mi Yoon** (far left in picture)

Project Location: University of Houston-Downtown

The growth of an immunogenic tumor will be presented by a mathematical model of a tumor-immune system. In this research, we studied how to interpret the “sneaking through” state or the dormant state through the numerical simulation of the chosen model. Also, we studied how to represent the behaviors of the local and global bifurcations by changing the values of chosen parameters.



Moses Osoro

“The Study of Soil Bacterial Patterns During Restoration of Coastal Prairie at Sheldon Lake State Park”

Co-Authors: **Jannie Dilber, Dr. Poonam Gulati**

UHD Faculty Mentor: **Dr. Poonam Gulati**

Project Location: University of Houston-Downtown

Agricultural areas at Sheldon Lake State Park (SLSP) were selected for restoration to Coastal Prairie, which is native to Southeast Texas. Soil samples were collected from various sites in the agricultural and surrounding areas, and bacterial DNA was analyzed using molecular techniques. The gene for 16s ribosomal RNA was amplified using bacterial primers, and the amplified DNA was cloned and sequenced. Several species were identified by sequence comparison (poster, Dilber, et.al). This technology is now being used to isolate and identify archaea using archaea-specific primers. It is expected that archaea will be found in the SLSP soil samples. In addition, biochemistry-based kits from Biolog that are specific for identification of environmental bacteria are being used. This technology should allow identification of bacteria that were isolated by culturing. Identification of bacteria in these soil samples will be compared to soil samples taken at various

times during the restoration process.



Sohail G. Penkar

"Study and Apply Brute Force Attack on Advance Encryption Standard/Rijndael"
UHD Faculty Mentor: **Dr. Ping Chen**
Project Location: University of Houston-Downtown

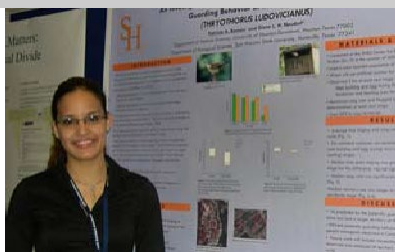
The Advanced Encryption Standard (AES) or Rijndael was adopted by the National Institute of Standards and Technology (NIST) on November 26, 2001, replacing Data Encryption Standard (DES). AES occupies one of the most important places in today's cryptography. It is an example of 128-bits fixed block substitution-permutation network with a variable key size of 128, 192, or 256-bits. Although the algorithm itself is simple, making it fast and easy to study, it is also very secure from external attacks. The primary objective is to study and compare the Rijndael algorithm with others, like Blowfish algorithm. The secondary goals are to modify the AES utility in the C/C++ programming language and use it to conduct a brute force attack on 8, 16, and 32-bit keys AES encrypted files, and also estimate the time it will take to use brute force attack on 64 and 128-bit keys.



Amy Kristen Pieri

"Why Accessibility Matters: Examining the Digital Divide"
UHD Faculty Mentor: **Dr. Molly K. Johnson**
Project Location: University of Houston-Downtown

This poster seeks to reveal the impact of visual design on web access for people with disabilities. Examining technology and accessibility provides a valuable opportunity to explore societal values pertaining to electronic media and accepted norms. As technology evolves, people with disabilities face increasing difficulty accessing electronic information, creating a digital divide. The development of global accessibility design standards signifies the scope of this digital divide. Researchers suggest two responses to the issue: assistive technologies to translate inaccessible information and universal design to develop accessible information needing no translation. Distinguishing between assistive technology and universal design is key when exploring reactive versus proactive responses to digital accessibility issues. Creating accessible digital design is not just a civil rights issue; closing the digital divide would benefit commerce, education, media, and society. Equality in electronic access has the power to shape our future.



Patricia Azucena Ramon

"An Investigation of the Use of Song and Territory Defense in Paternity Guarding Behavior of the Carolina Wren"
Co-Author: **Dr. Diane Neudorf**, Department of Biological Sciences, Sam Houston State University
UHD Faculty Mentor: **Dr. Lisa Morano**
Project Location: Sam Houston State University

A banded population of Carolina Wrens (*Thryothorus ludovicianus*) was observed at Sam Houston State University's Center for Biological Field Studies in Walker County, Texas, to determine if males use paternity guarding behavior. Paternity guards are used by males to prevent the loss of paternity due to copulations that occur outside of the pair bond, i.e., extra-pair copulations (EPCs). Song behavior and territory size were quantified over the breeding cycle for 5 males. Males sang at higher rates when their mates were fertile (nest building and egg laying stages) than when their mates were nonfertile (incubation and nestling stages). Males also defended larger territories during their mates' fertile stages. The results are suggestive of a paternity guard function for song and territory defense in the Carolina Wren.



Juan Carlos Razo

"Reassessment of Texas *Mimosa* Based on Analysis of the Internal Transcribed Spacers (ITS-1, ITS-2) of the RRNA Gene"
Co-Author: **Joshua Burr**
UHD Faculty Mentor: **Dr. Deanna McCullough**
Project Location: University of Houston-Downtown

Mimosa is a major genus of the subfamily Mimosoideae (Fabaceae). There are over three hundred species in the tropics of both hemispheres but most occur in the New World. North American representatives are in greatest abundance in Texas. Taxonomy of many species of *Mimosa* has changed repeatedly because of similarity of morphology and the difficulty in assessing which characters are informative. The genus *Schrankia* has been incorporated into the genus *Mimosa*, first as *M. quadravalvis* with each member relegated to variety status and now these members have been given species status within the genus *Mimosa*. This study attempts to answer questions

concerning taxonomic designations and relationships within the Texas *Mimosa*. The rDNA gene partial ITS-1 and complete ITS-2 regions were cloned and sequenced for *M. emoryana*, *M. hystricina*, and *M. strigillosa*. Sequences from six other members of the Mimosoideae plus one more distantly related taxon were obtained from the NCBI database and used for construction of a preliminary phylogenetic tree.



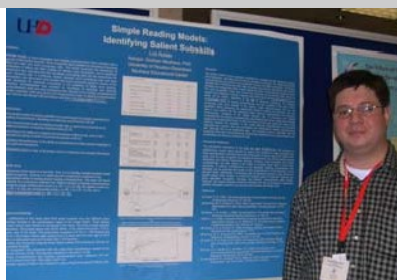
Brian Rodriguez and Kanisha Patel

“An Investigation of the Effects of Inert Gases on UV-Polymerizable Systems”

UHD Faculty Mentor: **Dr. Byron Christmas**

Project Location: UH-Downtown Center for Applied Polymer Science Research

Based on the fact that the free radical polymerization of acrylate-functional systems are oxygen inhibited, the effects on the relative reactivity of acrylate functional, aliphatic urethane-based formulations of changing from an oxygen-containing atmosphere to a carbon dioxide atmosphere and then to a nitrogen gas atmosphere has been investigated. While nitrogen atmospheres have been used for decades to overcome oxygen inhibition during UV-polymerization, recent reports indicate that carbon dioxide might be preferable as an “inerting” atmosphere for various reasons. The hypothesis for this work is that CO₂ will, indeed, be more effective as an inerting atmosphere because of its higher density relative to nitrogen gas environments.



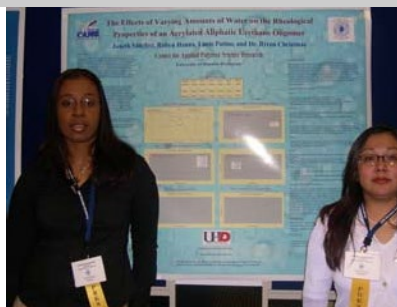
Luis Roldan

“Simple Reading Models: Identifying Salient Subskills”

UHD Faculty Mentor: **Dr. Graham Neuhaus**

Project Location: University of Houston-Downtown, N.E.C.

Simple models of word recognition and reading comprehension were validated with a group of third grade students. Word recognition was modeled as consisting of decoding skill and letter and word processing rates. The model supported the importance of uniting letters into letter clusters for efficient word recognition, and a significant interaction also indicated that fast alphabetic processing rates did not compensate for poor decoding skill. A curvilinear relation between word processing rate and word recognition was discovered and showed that word processing speed in excess of the rate necessary for adequate processing is not predictive of better word reading. Reading comprehension was modeled as consisting of decoding and listening comprehension skills and word processing rate. Results of the reading comprehension model supported Joshi and Aaron’s (2000) componential model of reading comprehension over Hoover and Gough’s (1990) and Dreyer and Katz’s (1992) simple views of reading.



Muna Saqer

“Design Lab Packages on PC Cluster for Parallel Computing and Networking Courses”

UHD Faculty Mentor: **Dr. Hong Lin**

Project Location: University of Houston-Downtown

A study was conducted to investigate the effects of varying amounts of water on the viscosity and other rheological properties of an acrylate-based urethane oligomer. The percentage of water ranges from 1% to 10%, based on the oligomer’s mass. The viscosity of the formulations was measured by using a Brookfield digital rheometer at 25.0oC. Also, the thermomechanical properties of the polymerize films will be tested with a dynamic mechanical analyzer (DMA). The main goal of this investigation is to provide a method to reduce the viscosity of oligomer in order to improve its handling characteristics. A secondary goal is to investigate the rheology of these water-oligomer blends to gain insight into the water-oligomer interactions.

The concept of message passing is to achieve parallelism through a function that explicitly transmits data from one process to another. For

this project, I will provide an interface for existing parallel computers. I am designing a lab package on a 16-node cluster to support the learning process for parallel computing and networking courses. The lab package will provide students with an interactive environment in which experiments can be done on selected subjects. Students can upload a program onto the cluster, run it, monitoring the result, and compare the result to theoretical predicts.

Photo unavailable.

Ping Tang

“Data Mining on Business Financial Reports”

UHD Faculty Mentor: **Dr. Pina Chen**



Justin Varghese

“Diatom Succession Within the Greens Bayou Wetlands Mitigation Bank”

UHD Faculty Mentor: **Dr. Brad Hoge**

Project Location: University of Houston-Downtown, Greens Bayou Wetlands Mitigation Bank, and Anahuac National Wildlife Refuge

A program to extract executives' financial data from the Security and Economic Commission's corporate financial report database about income, grant, pension and stock, etc. Build an income database for senior executives of all companies. This database can help monitor and analyze business financial fraud.

Diatoms are microorganisms that live in both water and soil. They can serve as indicators of ecosystem succession. Diatom assemblages from two areas with different hydrology within the Greens Bayou Wetlands Mitigation Bank were determined. Samples were also taken from the Anahuac National Wildlife Refuge, an established, pristine wetland. Diatoms were more abundant and more diverse in the ANWR. Similar trends were found between areas within the GBWMB. Further comparison of assemblages from the ANWR with those of the GBWMB may indicate how close the bank is to its climax community.



Tek Williams

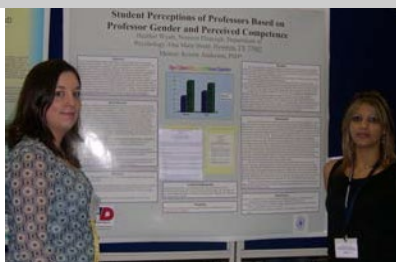
“Cheating: Yes, Unicellular Organisms Do It Too”

Co-Authors: **Dr. Gad Shaulsky and Vedangi Sample**

UHD Faculty Mentor: **Dr. Akif Uzman**

Project Location: Baylor College of Medicine

Altruistic behavior is exhibited in Dictyostelium during reproduction. This form of group selection, also observed in higher organisms, ensures that genetic traits shared by a related group of individuals persist through subsequent generations via the sacrifice of some members. Certain mutations often become over-represented compared to other mutants. Mutants were created using restriction enzyme-mediated integration. Cultures containing different mutants were randomly mixed, then allowed to undergo 10 rounds of replication. Cultures were then characterized using cheating assays to screen for dominant mutants. Dictyostelium strain AX4 was used to compare the level of cheating. Swindling one's way into the spores ensures that one's genetic make up will be directly passed on to the next generation.



Heather Wyatt and Nesreen Elsayegh

“Students' Perceptions of Professors Based on Professor Gender and Perceived Competence”

UHD Faculty Mentor: **Dr. Kristin Anderson**

Project Location: University of Houston-Downtown

Previous research demonstrates that female and male professors are evaluated differentially by students. The current study investigates the effect of gender and perceived professor competence on students' ratings of professors. Four versions of a hypothetical *Psychology of Human Sexuality* syllabus were constructed. Versions varied by the professors' gender, and whether the syllabus contained typographical and grammatical errors. Students responded to questions about the professor's knowledge of the material and organization. Consistent with predictions, students perceived female professors with errors on their syllabi as less organized and knowledgeable than male professors with the same type of syllabi. On the other hand, female professors who had no errors on their syllabi were perceived by students as more knowledgeable and organized than male professors with the same type of syllabi. Thus, students appear to use a double standard in their ratings of professors. Results of the present study support similar findings in the area of research on subtle forms of prejudice.



Dr. Christopher Matranga engages with Dr. Pam Auburn, a conference guest from Carbon Nanotechnologies, Inc.



SRC student presenters with guest participants (left to right): Mr. Chris Miller (University of Houston), Ms. Theresa Chatman (Rice University), and Ms. Sangeeta Gad (UHD).

Dr. Vicky Estrera, UHD Scholars Academy Director, interacting with Dr. Tom Goka, University of Texas Houston Health Science Center.



Support staff and student assistants registering conference participants and guests.



Above, Dr. Ermelinda DeLaVina, SRC Committee Chair, with oral student presenter, Ms. Iride Gramajo.



Above and right, visitors and students awaiting the opening speech by UHD President Max Castillo.





UHD Student Research Conference poster presenters interacting with their colleagues and external guests during the open poster session.

Undergraduates within the College of Sciences and Technology at UHD are engaged in research on and off-campus year-round. Students are encouraged to participate in full-time paid research programs and internships during the summer months. UHD students look forward to the opportunity to present their research projects at the Student Research Conference held on the UHD campus each spring. During each fall semester, the College provides a Graduate School and Internship Fair to further promote graduate and research programs.

Special thanks to the major sponsors of this conference and a majority of research at UHD: National Science Foundation (0336612), the U.S. Army Research Office (W911NF-04-1-0024), the U.S. Department of Education (P120A020069), U.S. Office of Naval Research (N0014-99-1-0950), the Welch Foundation (BJ-0027), and UHD.



The **UHD Scholars Academy (SA)** is an academically competitive program in the College of Sciences and Technology (CST) that promotes scholarship and student success for undergraduate students majoring in Science, Technology, Engineering and Mathematics (STEM).

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