



10th Annual U.S. Department of Energy Small Business Conference

The University of Texas – Pan American

Capabilities

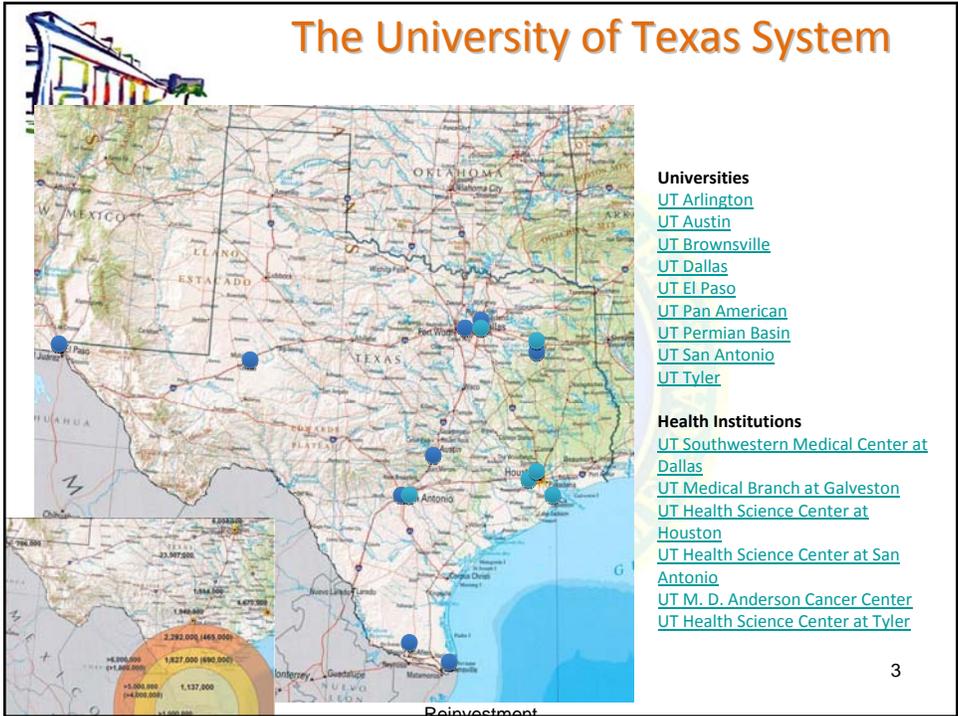
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Presentation Outline

- UTPA overview
- College of Science and Engineering
 - Organization
 - Statistics/Demographics
 - Overview of research
- Energy areas of interest
- Conclusions

The University of Texas System



Organization Chart



Chancellor: Dr. Francisco G. Cigarroa
 Interim President: Dr. Charles A. Sorber
 Provost: Dr. Paul Sale
 Dean COSE: Dr. Edwin LeMaster

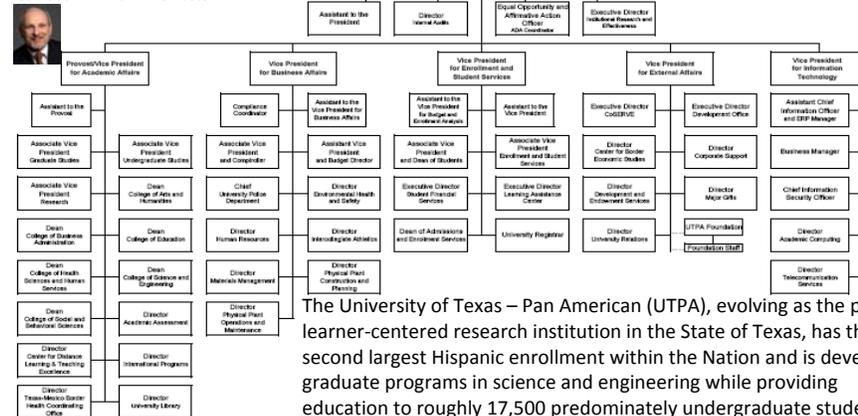


Chancellor
The University of Texas System

Executive Vice
Chancellor for Academic
Affairs
UT System

President
The University of Texas-Pan
American

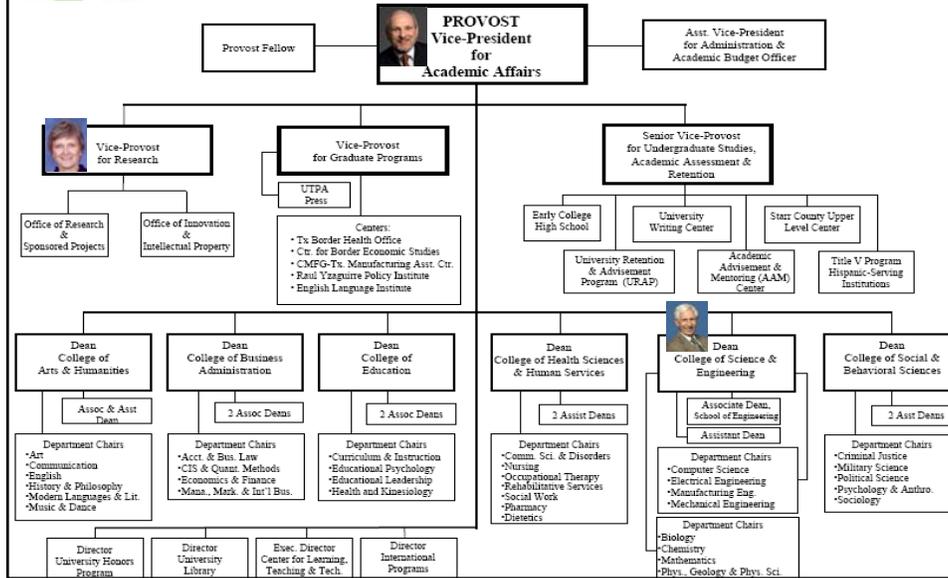
UTPA is 2nd, 4th, and 77th in the nation in the number of bachelor, master and doctoral degrees awarded to Hispanics.





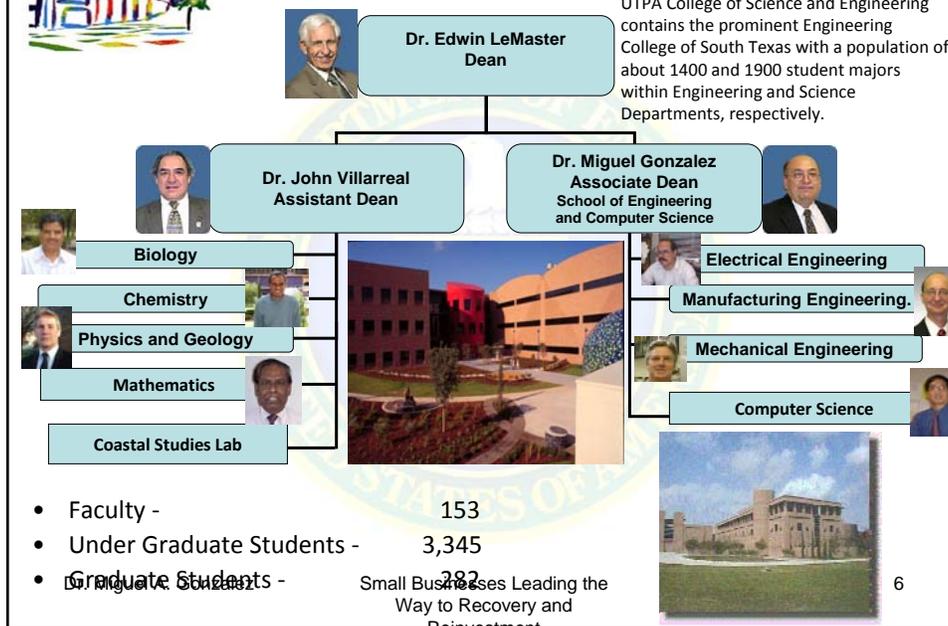
Organization Chart

DIVISION OF ACADEMIC AFFAIRS
AY2008-2009



COS&E Organization

UTPA College of Science and Engineering contains the prominent Engineering College of South Texas with a population of about 1400 and 1900 student majors within Engineering and Science Departments, respectively.



- Faculty - 153
 - Under Graduate Students - 3,345
 - Graduate Students - 282
- Small Businesses Leading the Way to Recovery and Reinvestment



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Computer Science Advisory Council















Way to Recovery and Reinvestment

Engineering Advisory Council


















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UTPA Engineering Enrollment

Number of Majors '08

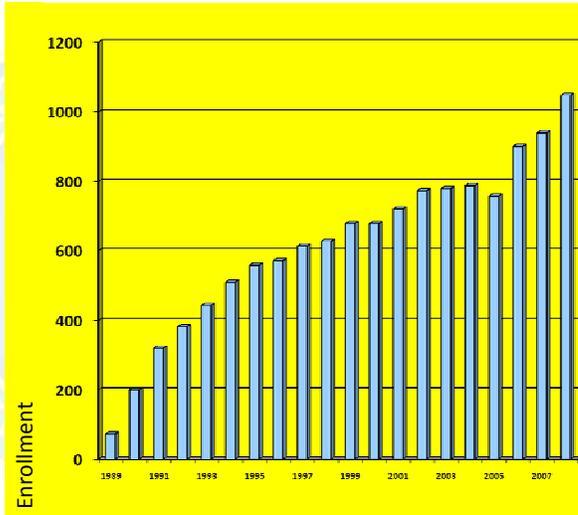
- Mechanical 540
- Electrical 214
- Manufacturing 93
- Computer Engineering 201

Demographics:

- Females 17%
- Hispanics 87%
- Anglo 3%
- Other 8.9%

6th largest enrollment of Hispanic engineering students in U.S.*

*Engineering Workforce Commission, 2008



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COLLEGE of Science and Engineering Department Sizes (Fall 2007)

Department	total	BS	MS
--Biology (incl. premed)	1390	1361	29
--Chemistry	313	292	21
--Mathematics	221	169	52
--Physics and Geol.	33	33	0
• Sub-total	1957	1855	102
--Mechanical Engr.	544	500	44
--Computer Science	366	298	68
--Computer Engr.	105	105	0
--Engr. Management	10	0	10
--Electrical Engr.	274	243	31
--Manufacturing Engr.	111	92	19
• Sub-total	1400	1238	172
--Undecided	66	66	0
• TOTAL	3433	3159	274

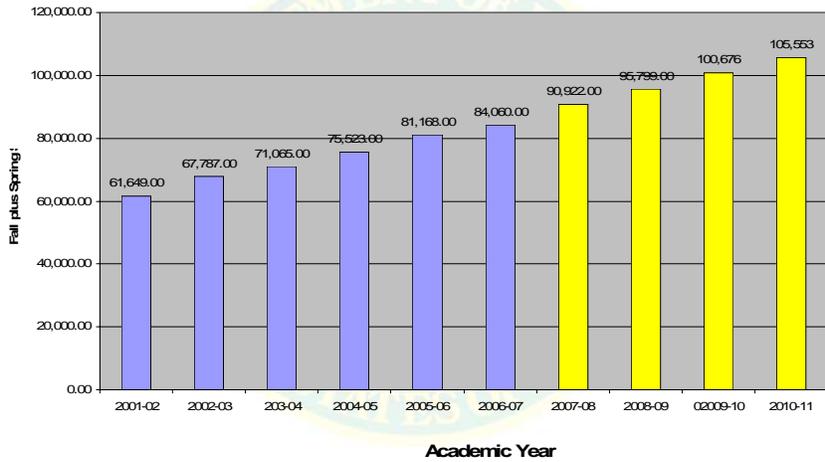
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COS&E Undergraduate SCH and Projected Growth

5 year growth is 36.3%, Annual growth is 7.2%



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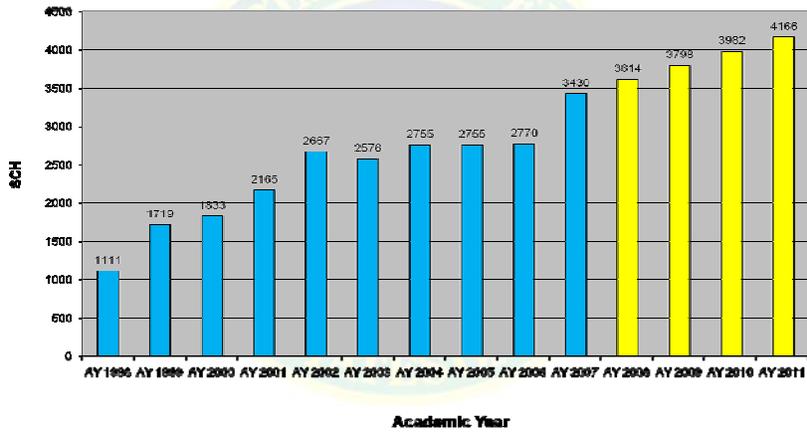
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COS&E Total Projected Graduate SCH Growth AY 1998 - 2011

5 year growth = 40.2% or 8% per year



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Collaborations

- **Research**
 - Purdue, Rice, UTHSC-SA, UTMB Galveston, UT Austin, Michigan State, Monterrey Tech, E-RAHC, USDA-ARS' Georgia Tech, Arizona U.
- **Developing New Collaborations**
 - UT Dallas, UT San Antonio, Texas A&M Corpus Christi, UTB, Tennessee State and Morgan State, Univ. of Nevada Desert Research Institute, South Texas ISD [summer research internships], Partnership with TAMU campuses and UTSA on Hispanic Leadership Development in Agriculture.
- **Teaching/Student Related Activities**
 - Michigan State, Monterrey Tech, UTMB Galveston, Baylor, UT El Paso, Ft. Valley State U., UT Southwestern Medical Institute
- **Industry Collaborations**
 - IBM Lifesciences Division, Boeing, Raytheon, Lockheed Martin in Harlingen, Ford, ALPS Automotive, Austin Star Detonator, TRW, Kenaf Production Corporation, Halliburton, Black and Decker
- **Internal Collaborations**
 - **CoSHHS:** P/O Program
 - **CoBA:** M.S. in Engineering Management and WIRED Entrepreneurship
 - **CoSBS:** New Intelligence Community Grant activities
 - **CoE:** Physics and Math teacher initiatives, MSIS and MS Math Ed.

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Science and Engineering Facilities

- **\$20 Million Engineering Building, \$27 Million Science Building**
- **Over \$10 Million in Teaching and Research Equipment**
- **Ph.D. Qualified Faculty**
- **Accredited by ABET : Bachelor's Degrees**
 - Electrical
 - Manufacturing
 - Mechanical
 - Computer Science



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Coastal Studies Laboratory

Current – boats, all-terrain vehicles, walk-in environmental chamber, flow-through seawater system with 100 ton storage, medium-scale micro algae production unit, medium-scale aquaculture research yard, radio telemetry station.

Future –Housing, increased research, economic development (eco-tourism), environmental improvement and possible major aquarium



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Teaching & Research Facilities

- **Electrical engineering**

- digital systems lab
- microprocessor lab
- electrical lab
- electromagnetics/microwave lab
- senior design lab
- automation/control lab
- low-power electronic lab
- VLSI lab
- Networking lab



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Teaching & Research Facilities Manufacturing and Rapid Prototyping Facilities

- **Manufacturing engineering**
 - rapid prototyping lab
 - Computer-Integrated Manufacturing lab
 - machine shop
 - injection molding lab
 - materials inspection lab
 - quality/reliability lab
 - Intel digital design lab



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Teaching & Research Facilities

- **Mechanical engineering**
 - wind tunnel
 - fluid dynamics lab
 - solar energy lab
 - heat transfer lab
 - vibration lab
 - materials lab



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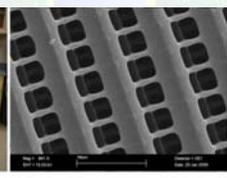
Teaching & Research Facilities

- **Physics and Geology**

- planetarium
- Photonics laboratory
- X-ray diffraction laboratory
- Nuclear laboratory



Ultrafast laser on optical table



3D photonic structure fabricated by ultrafast femtosecond laser



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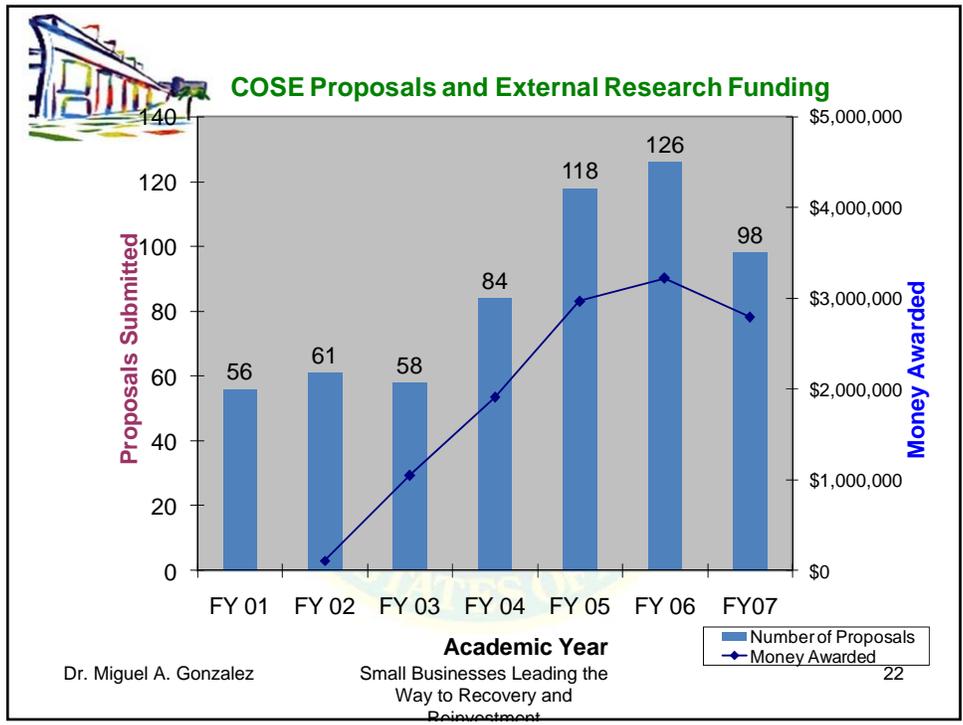
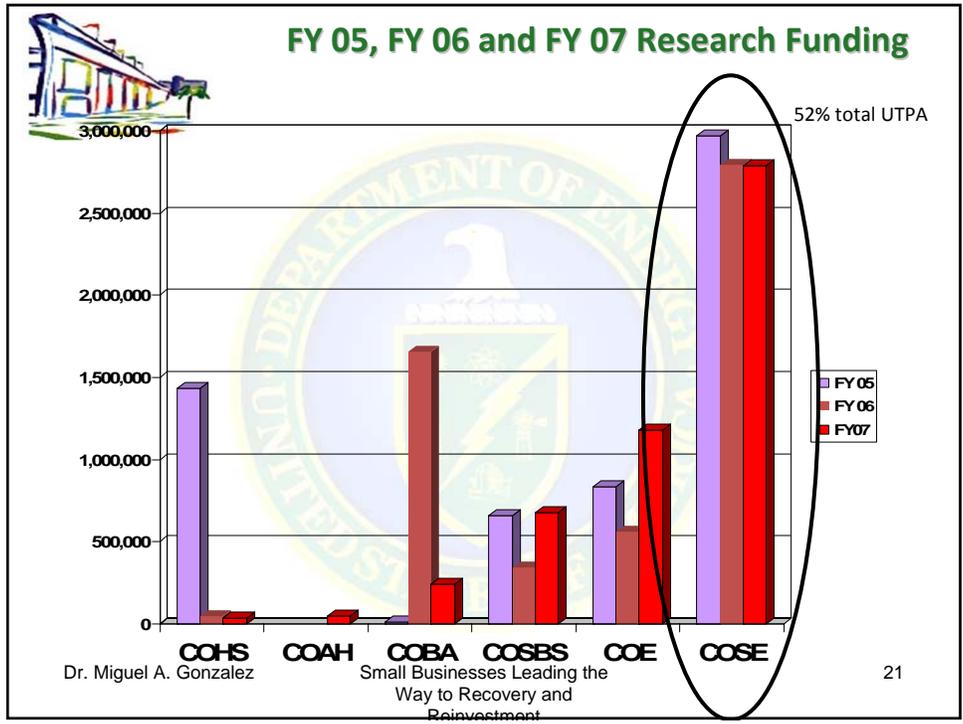
Research Activity

- Nanomaterials polymer composites with carbon nanofibers and nanotubes: Dr. Karen Lozano with collaborators. Current funding \$900,000/yr. Air Force and NSF
- Reconfigurable antennas for communications, Dr. Heinrich Foltz, EE, funding from Department of Defense
- GPS Sand Dune Migration on SPI: Dr. Rod Summy and Dr. Ruben Mazariegos
- Use of Ultrawideband Radar for Cancer Detection: Dr. Jungfei Li, Electrical Engineering
- Development of chemicals that have cancer fighting properties, Dr. Bimal Banik, 22 UG students involved in research. Current NIH funding \$750,000 for the SCORE grant.
- Bioremediation of metal contamination in soils: Dr. Mike Persans and Dr. Kristine Lowe, Biology. NSF funding.
- Rapid Response Manufacturing, Dr. Miguel Gonzalez and Dr. Doug Timmer, Mfg. Engr., \$1.2 Million EDC funding. New WIRED grant with STC for \$5 Million in Advanced Manufacturing and manpower training.
- Nanomanufacturing of Photonic Semiconductors using femtosecond pulsed laser, \$1 Million, Dr. Lin, Dr. Lozano
- UWR for Roadside Bomb detection, with UTSA by Dr. Foltz and Dr. Li, EE, \$50K from Department of Defense; "Biomedical applications of Microwaves" \$96K from ATP; "UWR applications", Dept. of Defense, \$283K.

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Materials

Nanomaterials

Dr. Banglin Chen, *Associate Professor*, banglin@utpa.edu
Dr. Dorina Chipara, *Assistant Professor*
Dr. Mircea Chipara, *Assistant Professor*
Dr. Karen Lozano, *Professor*

Phase Transitions

Dr. Steven Tidrow, *Associate Professor*, sctidrow@utpa.edu
Dr. Banglin Chen, *Associate Professor*, banglin@utpa.edu

Polymer (Electronic)

Dr. Jose Gutierrez-Gonzales, *Assistant Professor*, jigg@utpa.edu

Polymer (Synthesis & Deposition)

Dr. Javier Macossay, *Assistant Professor*, imacossay@utpa.edu
Dr. Jose Gutierrez-Gonzales, *Assistant Professor*, jigg@utpa.edu

Nanoporous

Dr. Banglin Chen, *Associate Professor*, banglin@utpa.edu
Dr. Aijie Han, *Assistant Professor*, hana@utpa.edu

Energy Storage/Conversion

Dr. Banglin Chen, *Associate Professor*, banglin@utpa.edu
Dr. Steven Tidrow, *Associate Professor*, sctidrow@utpa.edu

Polymer (Self-healing)

Dr. Dorina Chipara, *Assistant Professor*,
Dr. Mircea Chipara, *Assistant Professor*,



Devices

Wide Band Gap (High Voltage, High Temperature)

Dr. Hasina Huq, *Assistant Professor*, hhuq@utpa.edu

Microelectronics; VLSI

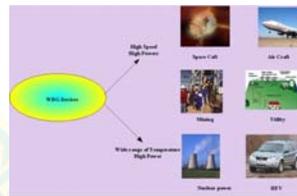
Dr. Hasina Huq, *Assistant Professor*, hhuq@utpa.edu

Intelligent Sensors and Actuators

Dr. Mounir Ben Ghalia, *Associate Professor*, benghalia@utpa.edu

RF Circuits and Antennas

Dr. Heinrich D. Foltz, *Associate Professor*, hfoltz@utpa.edu





Systems

Robotics

Dr. Mounir Ben Ghalia, Associate Professor, benghalia@utpa.edu

Wireless

Dr. Fang Liu, Assistant Professor, flu@cs.panam.edu

Radar Systems

Dr. Weidong Kuang, Assistant Professor, kuangw@utpa.edu

Asynchronous Digital Circuits

Dr. Weidong Kuang, Assistant Professor, kuangw@utpa.edu

Control

Dr. Mounir Ben Ghalia, Associate Professor, benghalia@utpa.edu

Low Power Integrated Circuits

Dr. Weidong Kuang, Assistant Professor, kuangw@utpa.edu

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Interactive Science



Figure 1 – Immersadesk Multimodal Virtual Environment (Butler et al. 2005)



Figure 2 – CAVE Used for Ship Design (Butler et al. 2005)

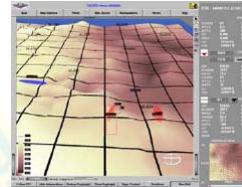


Figure 3 – The TALOSS Submarine Tactical Virtual Environment (Maxwell 2004)



Figure 4 – Virtual Environment for Air Strike Planning (Rosenblum 1995)



Figure 5 – Engagement Skills Trainer (Army PEO STRI, 2009)

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References:

- Army PEO STRI, 2009, Engagement Skills Trainer 2000, http://www.peostri.army.mil/PRODUCTS/EST_2000/home.jsp
- Butler, Alley, G. Dobson, K. Satter, E. Williams, S. Attaya, D. Bryna, "Collaborative Virtual Design, Manufacturing, & Training," Gulf Coast Region Maritime Technology Center, University of New Orleans Research Project No. 327-02-5138, Dec. 2005.
- Maxwell, Douglas, Naval Undersea Warfare Center, Newport, RI, 2004, Private communication, Dr. Alley Butler
- Rosenblum, Lawrence, Naval Research Laboratory, Washington, DC, 1995, Private communication, CDR Alley C. Butler, USNR.
- Satter, Kurt, Dec. 2005, "Competitive Usability Studies of Virtual Environments for Shipbuilding," PhD Dissertation, University of New Orleans, New Orleans, LA.



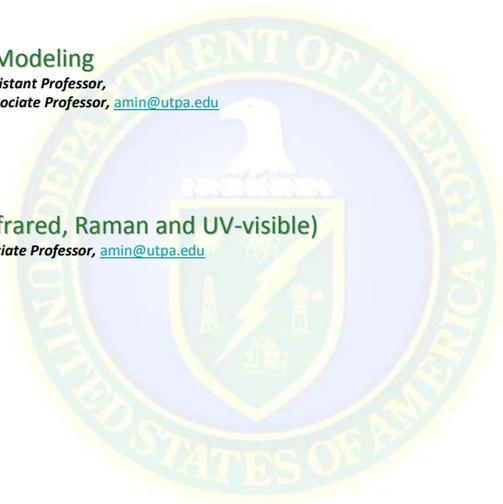
Biomolecular Systems

Simulation and Modeling

Dr. Nicholas Dimakis, *Assistant Professor*,
Dr. Mark Cunningham, *Associate Professor*, amin@utpa.edu

Spectroscopy (Infrared, Raman and UV-visible)

Dr. Elamin E. Ibrahim, *Associate Professor*, amin@utpa.edu



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Graphical Information Systems (GIS)

Species Distributions

Dr. T. Patricia Feria, *Assistant Professor*, tpferia@utpa.edu

Remote Sensing

Dr. Kenneth R. Summy, *Associate Professor*, krsummy@utpa.edu
Dr. Ruben Mazariegos, *Associate Professor*,



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Computer/Computation

Computer Security

Dr. Bin Fu, Assistant Professor, binfu@cs.panam.edu



Signal Processing

Dr. Weidong Kuang, Assistant Professor, kuangw@utpa.edu

Soft Error and Fault Tolerance

Dr. Weidong Kuang, Assistant Professor, kuangw@utpa.edu

Algorithm Design and Analysis; Computational Complexity

Dr. Bin Fu, Assistant Professor, binfu@cs.panam.edu

Interactive (Cognitive Science)

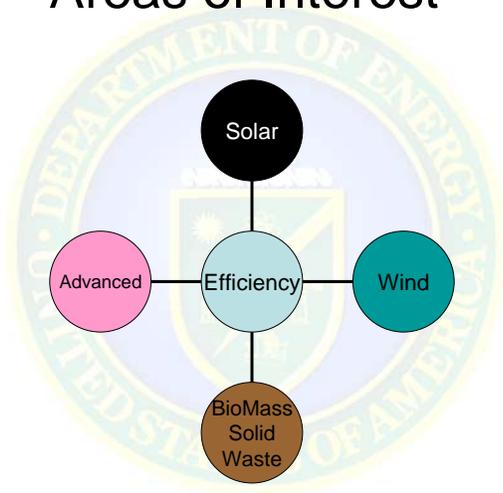
Dr. Richard Fowler, Professor, fowler@utpa.edu

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UTPA Energy Areas of Interest



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Focus Areas & People



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SOLAR

- **Dr. Horacio Vasquez**
 - **Small scale solar power systems & Integration with Wind Systems**
 - Asst. Prof. Mechanical Engineering
 - Mechatronics and Control
- **Dr. Constantine Tarawneh**
 - **Small scale solar power systems** for rural environments
 - Asst. Prof. Mechanical Engineering
 - Thermal – Fluids
- **Dr. Jaime Ramos**
 - **5 kW Photo-Voltaic (PV) system** to be installed on campus, to support a MICRO GRID facility
 - Asst. Prof. Electrical Engineering
 - Alternative Energy



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WIND

- **Dr. Horacio Vasquez**
 - **Generator Design**
 - Asst. Prof. Mechanical Engineering
 - Mechatronics and Control
- **Dr. Jaime Ramos**
 - **Wind speed and small turbine data gathering**
 - Asst. Prof. Electrical Engineering
 - Alternative Energy: **Course in Alt. Energy at UTPA**
- **Dr. Mounir Ben Ghalia**
 - **Controller Design for Optimization of Off-Speed Efficiency**
 - Assoc. Prof. Electrical Engineering
 - Robotics, Artificial Intelligence, and Controls
- **Dr. Subhash Bose**
 - **Low Speed System Design with Senior Design Students**
 - Prof. Manufacturing Engineering
 - Robotics and Controls
- **Dr. Kamal Sarkar**
 - **Low Speed System Design with SciTech Students**
 - Lecturer Mechanical Engineering
 - Nano-Materials



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WIND

- **Dr. John (Jack) Lloyd**
 - Proposal to the National Science Foundation (NSF) to establish an Engineering Research Center (ERC)
 - Research, design, and manufacture of large, highly efficient, low wind energy conversion systems
 - Partner with Michigan State University
 - Director Rapid Response Manufacturing Center
 - Research Professor of Engineering, Manufacturing Engineering
 - Thermal-Fluids and Design



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BioMass & Solid Waste

- Dr. James Li
 - Site selection and network
 - Asst. Prof. Manufacturing Engineering
 - Sustainable Engineering: Decision Analysis and Life Cycle Assessment
- Dr. Andrew McDonald
 - Biodiesel feedstock: the 'Physic Nut' (*Jatropha curcas*).
 - Asst. Prof. Biology
 - Plant Systematics and Botany



Efficiency

- Dr. John (Jack) Lloyd
 - Green Roof Technology
- Dr. James Li
 - Sustainable Engineering
 - Asst. Prof. Manufacturing Engineering
 - Decision Analysis and Life Cycle Assessment
- Dr. Steve Crown
 - HVAC systems
 - Assoc. Prof. Mechanical Engineering
 - Thermal – Fluids
- Marianella Franklin
 - Facilities planning: LEED certified / credentialed
 - LEED: Leadership in Energy and environmental Design
 - Physical Plant: Manager of Campus Sustainability
- Dr. Richard Costello
 - Facilities planning





Conclusions

- The University of Texas – Pan American is a rapidly growing Hispanic serving institution,
- Its mission focuses on developing into the premier learner centered research institution in the State of Texas.
- Within UTPA, the premier College of Science and Engineering of the South Texas Rio Grande Valley Region emphasizes outreach, recruitment and retention of our youth STEM areas in support of our mission, community and Nation.
- Mutually beneficial research opportunities exist within the rapidly growing undergraduate and graduate programs at UTPA.



Thank You

Questions?