The University of Texas – Pan American

Capabilities
Dr. Miguel A. Gonzalez

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

Universities
UT Arlington
UT Austin
UT Brownsville
UT Dallas
UT El Paso
UT Pan American
UT Permian Basin
UT San Antonio
UT Tyler

Health Institutions
UT Southwestern Medical Center at Dallas
UT Medical Branch at Galveston
UT Health Science Center at Houston
UT Health Science Center at San Antonio
UT M. D. Anderson Cancer Center
UT Health Science Center at Tyler

The University of Texas – Pan American (UTPA), evolving as the premier learner-centered research institution in the State of Texas, has the second largest Hispanic enrollment within the Nation and is developing graduate programs in science and engineering while providing education to roughly 17,500 predominately undergraduate students.
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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
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)

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

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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**
  - CoHSHS: 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.

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
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.

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
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

Teaching & Research Facilities
Mechanical engineering

• Mechanical engineering
  – wind tunnel
  – fluid dynamics lab
  – solar energy lab
  – heat transfer lab
  – vibration lab
  – materials lab
Teaching & Research Facilities

- **Physics and Geology**
  - planetarium
  - Photonics laboratory
  - X-ray diffraction laboratory
  - Nuclear laboratory

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.
FY 05, FY 06 and FY 07 Research Funding

COSE Proposals and External Research Funding
## Materials

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

### Nanoporous
Dr. Banglin Chen, Associate Professor, banglin@utpa.edu
Dr. Aijie Han, Assistant Professor, han@utpa.edu

### Phase Transitions
Dr. Steven Tidrow, Associate Professor, sctidrow@utpa.edu
Dr. Banglin Chen, Associate Professor, banglin@utpa.edu

### Energy Storage/Conversion
Dr. Banglin Chen, Associate Professor, banglin@utpa.edu
Dr. Steven Tidrow, Associate Professor, sctidrow@utpa.edu

### Polymer (Electronic)
Dr. Jose Gutierrez-Gonzales, Assistant Professor, jjgg@utpa.edu

### Polymer (Synthesis & Deposition)
Dr. Javier Macossay, Assistant Professor, jmacossay@utpa.edu
Dr. Jose Gutierrez-Gonzales, Assistant Professor, jjgg@utpa.edu

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## Devices

### Wide Band Gap (High Voltage, High Temperature)
Dr. Hasina Hsu, Assistant Professor, hhuq@utpa.edu

### Microelectronics; VLSI
Dr. Hasina Hsu, Assistant Professor, hhuq@utpa.edu

### Intelligent Sensors and Actuators
Dr. Mounir Ben Ghalla, Associate Professor, banghalla@utpa.edu

### RF Circuits and Antennas
Dr. Heinrich D. Foltz, Associate Professor, hfoltz@utpa.edu

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Interactive Science

Figure 1 – Immersive Multimodal Virtual Environment (Boelter et al. 2013)

Figure 2 – CAVE Used for Ship Design (Boelter et al. 2013)

Figure 3 – TALOSS Submarine Tactical Virtual Environment (Maxwell 2006)

Figure 4 – Virtual Environment for Air Strike Planning (Romeshnian 1997)

Figure 5 – Engagement Skills Trainer (Army PEO-STEI 2009)

References:
Maxwell, Douglas, Naval Undersea Warfare Center, Newport, RI, 2004, Private communication, Dr. Allen Boelter
Romeshnian, Livestock, Naval Research Laboratory, Washington, DC, 1995, Private communication, CSR, Allen C. Barke, UNDRC.
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

Graphical Information Systems (GIS)

Species Distributions
Dr. T. Patricia Feria, Assistant Professor, tferia@utpa.edu

Remote Sensing
Dr. Kenneth R. Summy, Associate Professor, krsummy@utpa.edu
Dr. Ruben Mazariegos, Associate Professor,
Computer/Computation

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

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

Solar

Wind

BioMass Solid Waste

Advanced Efficiency
Focus Areas & People

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
**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
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?