Texas A&M University-Kingsville
Capability Statement

Institution: Texas A&M University-Kingsville

UEI No: 868154089   Cage Code: 1SQR7   NAICS ID: 611310   SIC: 8221
Federal EIN No: 74-6001530
Certificates, Registrations, Accreditations: ABET, ATMAE, SACS

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OVERVIEW

The Frank H. Dotterweich College of Engineering at Texas A&M University-Kingsville has been offering engineering degree programs since 1936 and has graduated thousands of students who have or had very successful professional careers. Nearly 70% of our undergraduates are Hispanics. The college offers a broad range of degree programs, which provide a solid foundation for entry into the engineering, technology management, and computer science professions. Our graduates are in high demand and they work in all major sectors such as energy, computer, electronics, communications, robotics, aerospace, petrochemical, environmental, manufacturing, construction, management, and information technology. We offer eleven undergraduate and twelve graduate degree programs. The college offers ten Master's and two PhD programs. The College maintains a strong bond with all stakeholders in the region, especially the local and regional industry, local/state/federal agencies, educational institutes of south Texas, as well as the alumni base who play an active role towards supporting the mission of the college.

RESEARCH CAPABILITIES

The College has several research centers, including NSF CREST Center for Sustainable Water Use (CREST-SWU). In recent years, the faculty in College of Engineering increased the calendar year externally funded research awards by nearly 10-fold (from $1.17M in 2016 to over $10M in 2020). Current federal and regional sources of funding in the college include NSF, NIH, NASA, DHS, DoE, NRC, DoD, EPA, DoEd, USDA, Texas GLO, and TxDoT among others. Several of our faculty members have ongoing, funded international collaboration grants.

Broaden Participation in STEM: The College maintains a strong bond with all stakeholders in the region, especially the local and regional industry, local/state/federal agencies, school districts and educational institutes of south Texas, to recruit, retain, and graduate underrepresented minority students in STEM majors. The College has several ongoing federal funded projects related to Broaden Participation, including NASA MUREP INCLUDES, NSF HSI, NSF REU, USDA REEU, etc.

- **Educational Research:** Workforce development in emerging fields such as aerospace engineering, cybersecurity, environmental engineering, nuclear engineering; STEM Education.
- **Electrical Engineering:** Control Systems, Communications, Electromagnetics, Micro and Nanoelectronics, Photovoltaics, Power Electronics, Power Systems, Robotics, Signal and Image Processing, and VLSI.
- **Chemical Engineering:** Chemical Process Simulation/Modeling, Experimental Systems Engineering, Industrial Wastewater Treatment, Multiphase Reaction Engineering, Reaction Kinetics,

Renewable/Sustainable Energy and Biofuel Production, Remediation of Hazardous Wastes, and Transport Phenomena.

- **Computer Science/Engineering:** Artificial Intelligence, Big Data, Bioinformatics, Cybersecurity, Internet of Things, and Software Engineering.
- **Environmental Engineering:** Air Quality and Pollution Control, Environmental Systems and Modeling, Solid and Hazardous Waste Management, and Water Quality Control.
- **Mechanical and Industrial Engineering:** Artificial Intelligence and Data Analytics, Dynamics and Control Systems, Nanotechnology, Materials and Manufacturing, Modeling and Simulation, Operation Research, Quality Control, Security Engineering, Solar/Wind/Wave Energy, and Supply Chain and Logistics.

FACILITIES

- **High Performance Computing Cluster (HPCC),** a data-intensive computing system platform, funded primarily by the National Science Foundation (NSF-MRI Award # CNS-0619810). The HPCC consists of eleven Dell servers: one Dell R-630, one Dell R 730/xd and nine Dell DSS-1500s. The R-630 serves as the "head node." The R-730 includes one NVIDIA Tesla K40M GPU. All of the machines run dual Intel Xeon E5-2650v4, 2.2 GHz, 12 core/24 thread CPUs and have 16GB RAM. Approximately 100 TB SAN storage and 6.2 Tera FLOPS of computing power is available.
- **Chemical and Environmental Research:** Adsorption/Desorption System, Analytical Measurements, Bioreactors, Desalination Unit, Dual Distillation Column, Electrodialysis Metathesis Desalination, Gas Chromatography, Hydro informatics, Inductively Coupled Plasma-Mass Spectrometry, Membrane Distillation, Microscopy and Spectroscopy, Particle Analysis, Photochemical Reactor, Reverse Osmosis System, and Rheology.
- **Electrical Engineering/Computer Science**: Asynchronous Digital Design, Cyber-Physical Power and Energy Systems, Electromagnetic Materials and Systems, Sustainable Energy Systems, and Vision, Imaging, and Photonic Systems.
- **Mechanical and Industrial Engineering:** Advanced Materials Processing and Characterization, Control Systems, Computer Numerical Control (CNC) Micro-Milling, Engineering Measurements, Heat Transfer and Heat Exchanger, Hydraulics Systems, Multi-material 3D printer, Robots, Three-axis Entec-CMC filament winder, UAVs, and Workstations for Simulations.

PAST PERFORMANCE

Since the beginning of FY 2020, the faculty in College of Engineering have secured over $15 million in external funding for a total of 53 grants. Notable federal funding agencies, with sample research projects include: **DOE** (Multilevel Cybersecurity for Photovoltaic Systems, $325,565), **DoD** (Studies on the Mechanical Behavior of Woven Hybrid Fiber Reinforced Polymer Nanocomposites Subjected to Marine Environmental Conditions, $659,999), **DHS** (Building Cyber Intelligence Workforce through AI-Based Cybersecurity Education and Training, $466,324), **NIH** (Improving the Long-term Mechanical and Tribological Performances of Polymers for Total Joint Replacement Applications,$291,500, Measuring functional similarity between transcriptional enhancers using deep learning, $367,891), **NSF** (CREST Center for Sustainable Water Use, $5,000,000, and Building Capacity: Proactive Integrated Pathways of Excellence for Seamless Transition of Engineering Minority Students, $2,392,470, Collaborative Research: Dry-Wet Phase Inversion Pathway of Graphene Oxide (GO)- Based Mixed-Matrix Membranes for Mineral Ions Separation by Membrane Distillation $300,023), **NASA** (Proactive Pathways of Excellence for Seamless Career Transition to Aviation Maintenance, $1,200,000), **USDA** (Research and Extension Experience in Energy and the Environment across Agricultural Disciplines, $500,000), **USED** (Research, Education and Financial Literacy Excellence for Minority-focused Engagement, $749,196).