



Texas A&M University-Kingsville Capability Statement

Institution: Texas A&M University-Kingsville

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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 University is in the process of obtaining approval to start MS programs in Architectural Engineering, and Space and Aeronautical Engineering with an expected start date of Spring 2026. 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) and NRT-HDR: Transdisciplinary Research and Education for Air and Water Resources Solutions in Coastal Communities (TREAWS). In recent years, the faculty in College of Engineering increased the calendar year externally funded research awards with annual amount of over ~6.0 M in FY 2022 to over \$7.2M in FY 2024. Total annual award amounts of active grants in last three fiscal years were FY 2022: \$24.7M, FY 2023: \$23.2M and FY 2024: \$27.77M. 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.

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 students in STEM majors in the following areas.

- **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), High Performance Computing Center:** The TAMUK High Performance Computing Cluster 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. The nodes are interconnected by a Mellanox SX6025F, 56 Gb/s, FDR Infiniband, 36-port switch. All nodes run on CentOS 7 operating system and are controlled by the Bright Cluster Manager 7.3. All of the standard CentOS development tools are installed along with mpich, mvapich2 and open mpi. Approximately 100 TB SAN storage and 6.2 Tera FLOPS of computing power are available. To further enhance its computational capabilities, TAMUK acquired an advanced HPC/AI/ML testbed supported by the Department of Defense acquisition grant. This state-of-the-art system-a GPU server-is equipped with NVIDIA HGX H200 8-GPU accelerators, offering significant improvements in memory bandwidth and AI performance over previous models. The server supports up to 1TB of DDR5 memory, fast NVMe storage, and PCIe Gen4 expansion, enabling large-scale simulations, AI training, and digital twin development. This next-generation system complements TAMUK’s existing HPC cluster and will support computational research in fluid-structure interaction, energy systems, biomedical modeling, and hypersonic, while enabling real-time, data-driven decision-making capabilities.
- **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

In the last three fiscal years (FY 2022-2024), the faculty in College of Engineering have an average of 48.67 active awards with an average award amount of \$24.57M. Average annualized funding amount is \$6.66M. There are 16 awards with funding in excess of \$500K. Notable federal funding agencies, with sample research projects include: **DOE** (Data-Driven Modeling and Control of Systems with Plasma-Surface Interactions, \$500,000), **DoD** (Study of damage mechanics and material response of composite armor by multi-scale modeling and testing, \$799,986; Model-Based Design of Smart Structures for High-Voltage Applications, \$600,632), **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 Engagement, Quality Assurance, and Mental Readiness for Remote Learning, \$749,631).