UT Permian Basin
College of Engineering

Falcon Engineering Review

UT Permian Basin Engineering is the # 1 Best Value Engineering School in Texas

College of Engineering

NEWSLETTER | SPRING 2021

Welcome From the Dean

Dear Colleagues and Friends,

Greetings from the College of Engineering at The University of Texas Permian Basin! We are very excited to share with you the Spring 2021 edition of the Falcon Engineering Review. Our faculty and students continue to pursue multidisciplinary research, innovate new methods of teaching and retaining engineering students, and engage the community and K-12 institutions despite the challenges of the COVID 19 global pandemic.

I am happy to report that the UT Permian Basin College of Engineering is ranked #1 Best Value School of Engineering in Texas. This is a testament to the commitment of our faculty members and the University to quality engineering education.

With a total of $3.6 million since 2016 in funding support from The University of Texas System's STARs (Science and Technology Acquisition and Retention) program, the College of Engineering continues to outfit its laboratories with state-of-the-art research equipment and pursue emerging research in self-powered point-of-care biosensors, tools to make power systems resilient against physical anomalies and cyber threats, nuclear radiation detection, thermoelectric, water splitting, and techniques to screen optimal conditions for generating brittle and conductive fractures.

We have established the Texas Water and Energy Institute to provide a multidisciplinary and multi-institutional approach to complex issues dealing with produced water, wastewater, and drinking water. With a variety of board members from major industries and government agencies, the Institute is well-positioned for the development of fit-for-purpose technologies for the treatment of produced water. Our Monthly Virtual Lecture Series invites outstanding researchers, scientists, and officials from agencies, including the US Department of Energy.

The key to the success of our College of Engineering is our faculty. Dr. Ramiro Bravo, Associate Professor of Mechanical Engineering, was named one of The University of Texas System Board of Regents' Outstanding Teaching Award winners. This award is truly a testament to the quality and commitment of our faculty to educate and train students. Through a $750,000 grant award from the US Department of Education, "Engagement in Practice: Engineering Minority STudent Engagement Project (EM-STEP)," and STARs grant, a team of professors led by Dr. Mohsin Jamali is developing an innovative pedagogical five-prong approach to reduce high-Grade D, Grade F, Withdrawal, Incomplete (DFWI) rates in foundational engineering courses. The scholarship programs within the college, thanks to our industry partners, are providing much-needed support to students. In spring 2021, over $154,000 in scholarships were awarded to current engineering students.

One of the hallmarks of engineering education at UT Permian Basin is experiential learning – the integration of hands-on projects and research into teaching. Since its inception in 2018, over 60 students have participated in the Semester Undergraduate Research in Engineering Program. This paid research program enables students to work with professors on various projects. Kandus Box, a sophomore in electrical engineering is working on the Center-of-Gravity Mouse Project - to develop a sensor that could respond to someone shifting their weight in a chair by moving a mouse cursor on a computer screen.

Despite the interruptions in education, socio-economic, and health care systems due to COVID 19, our outreach and engagement with the community remain strong. We reinvented engineering summer camps and introduced a Virtual Girls-In-Engineering program for K-12 students, with the efforts of Dr. Anveeksh Koneru and Dr. Bibian Ogbuji. These camps benefit K-12 students by providing an introduction to engineering and also inspiring intellectual curiosity in students through hands-on projects. While the majority of the engineering summer camps across the nation were canceled due to the COVID-19 pandemic, we organized the Virtual Engineering Summer Camp, shipping the required project kits to the students, thereby providing step-by-step instruction of performing the project virtually while also providing hands-on experience for better learning.

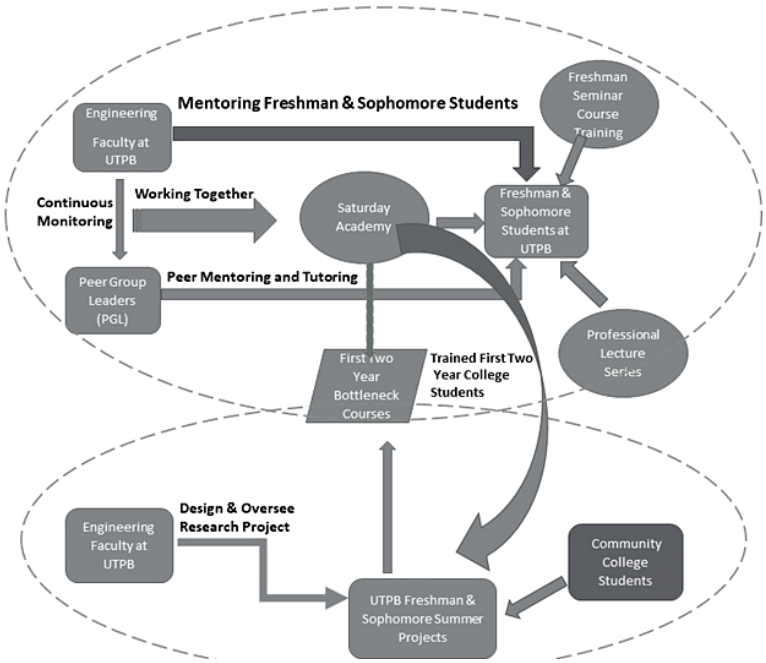
We hope that these initiatives, as well as others shared in this newsletter, will offer you reasons to be proud of the impact that we are making in our community and the nation. Thank you for your support and friendship.

Sincerely,

George Nnanna, Ph.D., P.E., ASME Fellow

Engagement in Practice: Engineering Minority STudent Engagement Project (EM-STEP)

Dr. Mohsin M. Jamali, Dr. Sepehr Arbabi, Dr. Ramiro Bravo, Dr. Hossein Hosseini, and Dr. Harishchandra Aryal



The US is in greater need of STEM graduates to keep its competitive edge. Various US government agencies have raised concerns about a shortage of STEM graduates for 35 years. It is equally important to keep the US in a technologically superior position. One way to grow the STEM workforce is to increase enrollment, retention, and graduation rates. It has been reported that incoming students are weak in Mathematics and thereby having great difficulty in engineering courses. As a result, students are dropping out of engineering programs resulting in low retention, and graduation rates. To address these concerns, it is proposed to reinforce mathematical concepts to engage, mentor, and tutor students. This project is aimed at enhancing recruitment, retention, and graduation rate. To meet this objective, Engineering Minority STudent Engagement Project (EM-STEP) is using an innovative five-prong approach of offering Saturday Academy, peer lead group, professional lecture series, freshman seminar, and summer research projects. Foundational courses with high "DFWI" have been identified. These are Fundamentals of Electric Circuit Analysis, Engineering Mechanics: Statics and Dynamics, Introduction to Fluid Mechanics, and Introduction to Thermodynamics. Students in these courses are from four engineering disciplines of Chemical, Electrical, Mechanical, and Petroleum Engineering. These courses are being taught in the Saturday Academy and twenty students are working as peer group leaders. We are also offering motivating lectures in the professional lecture series. A summer research project for an 8-week duration is also offered.

$3.6 Million Dollars in STARs Awards

Since 2016, the College of Engineering has received a total of $3.6M in awards. In August of 2004, The University of Texas System Board of Regents approved an allocation of funds to be awarded to System institutions to help attract and retain the best-qualified faculty. The STARs (Science and Technology Acquisition and Retention) program provides funding to help purchase state-of-the-art research equipment and make necessary laboratory renovations to encourage faculty members to perform their research at a UT institution. Here are some examples of recent awards:

Dr. Maedeh Mohammadifar is a recipient of the $300,000 STARs award (2020-2023). The grant will be used to establish a Microsystems and BioMEMS laboratory with a focus on three areas: BioMEMS/microfluidics, Self-powered Point-of-Care Biosensors, and Miniaturized Energy Harvesting Devices

Dr. Omar Beg Dr. Omar Beg is a recipient of the $300,000 STARs award. Natural disasters and weather-related calamities have severely ravaged the power grids affecting millions of people throughout the United States in the past. Moreover, modern power systems have evolved into cyber-physical systems owing to the complex communication networks that are vulnerable to cyber threats. Dr. Beg is working to develop, test, and validate the tools and techniques that will make such power systems more resilient against physical anomalies and cyber threats to benefit the nation.

Dr. Harish Aryal is a recipient of the $50,000 STARs award (2019-2020). The funds requested will be used to establish a Radiation Detection and Computation laboratory with focus on two areas: To develop a computational facility that supports nuclear tests via simulation which will serve a gateway to licensing the future generation advanced reactors, and Expand the existing laboratory capabilities for radioactivity measurements with improved detection system

Dr. Anveeksh Koneru is a recipient of the$150,000 STARs award. His research focus is related to improving the efficiency of energy conversion technologies like thermoelectrics and water splitting using photo catalysis. He has experience in using computational materials science softwares like Quantum ATK, Biovia materials studio; and materials packages such as Quantum Espresso and ABINIT to calculate material properties for given applications.

Dr. Zhengwen Zeng is a recipient of the $350,000 STARs award (2019-2020). The overall objective is to develop a lab testing technique to screen optimal conditions for generating brittle and conductive fractures in Permian Basin conditions in terms of field overburden, reservoir pressure and temperature, and fluid chemistry.

New Faculty

Dr. Harish Aryal

Assistant Professor of Mechanical Engineering – Nuclear Engineering Track

Research Interest: *Dr.* Aryal has expertise in modeling/simulation of different reactor systems and has worked with NRAD, ATRC, and AGN-201. He couples several disciplines of Physics, Mechanical, and Nuclear Engineering. His PhD focused on improving the hodoscope for advanced instrumentation for TREAT. In recognition of his excellence, he has been awarded numerous funding. Most recently, the Rising STARs grant (UT System) 2020.

Dr. Bibian Ogbuji

Assistant Research Professor of Texas Water and Energy Institute and Mechanical Engineering

Research Interest: Dr. Ogbuji's research emphasizes the development of database and application of data analytics and machine learning to predict the spatiotemporal variability of contaminants in produced water. Dr. Ogbuji's areas of expertise include machine learning, data analytics, programming, big data, platform implementation evaluation, digital strategy, database development, data processing, and visualization.

Dr. Lokesh Saharan

Assistant Professor of Mechanical Engineering

Research Interest: Dr. Saharan's primary research interests include rehabilitation robotics, smart materials, soft robotics, and additive manufacturing. Dr. Saharan has authored several research articles in peer-reviewed journals and conferences along with a book chapter. Before his PhD, he was an assistant professor in the department of mechanical engineering at the National Institute of Technology Kurukshetra (India).

Dr. Ehsanul Kabir

Senior Lecturer of Petroleum Engineering

Research Interest: Dr. Kabir's key research activities include designing a novel seat and stem tip combination for gas lift valves through experiment and CFD simulation, and recommendations to mitigate the issue of uneven proppant distribution in multisage hydraulic fractures.

Dr. Brian Flowers

Assistant Professor of Chemical Engineering.

Research Interest: Dr. Flowers' research focuses on the development of low-cost submersible sensor systems to monitor water quality parameters of the Meso-American Barrier Reef. Other areas of research include a microfluidic investigation into natural gas hydrate nucleation and prevention, novel solvents for carbon capture, and ionic liquid polymer membranes.

Dr. Maedeh Mohammadifar

Assistant Professor of Electrical Engineering

Research Interest: Dr. Mohammadifar's research interests includes microfluids, BioMEMS, Lab-On-Chip, point of care diagnostics, flexible electronics, bioenergy harvesting, biosensors, and wearable technologies. She is the recipient of a 300,000 grant from the UT system STARs program (2020-2023) and the of Arlen & Betty Edgar Endowed Fellowship in Engineering (2020-2022).

Latest News

Congratulations to Dr. Ramiro Bravo for winning the UT System Outstanding Teaching Award.

UT System Board of Regents named two UTPB professors as Regents' Outstanding Teaching Award winners. Dr. Ramiro Bravo has been a part of the Falcon family for 11 years and helped develop UT Permian Basin's Engineering program. He's an associate professor at the College of Engineering. Dr. Bravo commented, "I am pleased and honored by this award and to join past recipients at UTPB. I sincerely thank my colleagues at UTPB and The University of Texas System. This award is not a reflection of my abilities, but of the support, I received from my colleagues, my students, my dear family, and especially from my God Jehovah. I am very thankful to all of them."

ENGINEERS WEEK

Founded by the National Society of Professional Engineers in 1951, Engineers Week is dedicated to ensuring a diverse and well-educated future engineering workforce by increasing understanding of and interest in engineering and technology careers. Today, Engineers Week is a formal coalition of more than 70 engineering, education, and cultural societies, and more than 50 corporations and government agencies. The UT Permian Basin College of Engineering celebrated Engineers Week with the following speakers:

Speakers

Dr. George Nnanna

Topic: Introduction of Engineering Week

Dr. Forrest Flocker

Topic: Engineering: 1970 – 2021 and Beyond

Dr. Omar Beg, sponsored by **IEEE**

Topic: Model Validation of PWM DC-DC Converters

Dr. Rajib Mukherjee

Topic: Chemical Engineering @UTPB: A Brief Introduction

Dr. Chris Harich, **XRI**

Topic: Understanding the Role of Water in the Permian Basin

Dr. Anveeksh Koneru

Topic: Advances in Thermoelectric Materials

Sean Trotter, P.E., **Saulbury** sponsored by **Upsilon Tau Pi Beta**

Topic: Career Development and Industry Trends

Dr. Mohsin Jamali, sponsored by **IEEE**

Topic: Do's and Don'ts of Powerpoint Presentations

Over $154,000 in Scholarship Awards

SCHOLARSHIP AWARDS

The UT Permian Basin College of Engineering awarded over $154,000 in scholarships to engineering students for the Spring 2021 semester. With different scholarships that were funded by private donors – individuals, corporations, and foundations. Also, a total of $55,000 from the CENG scholarship was awarded to 40 engineering students in Spring 2021.

Here are examples of scholarships awarded by the college through our industry partners:

- Ortloff Endowed Scholarship for Chemical EngineersAPI Sour Crude
- Endowed ScholarshipBank of America
- Endowed ScholarshipGreen Family
- Endowed Scholarship
- Mark Nicholas Endowed Presidential Scholarship in Engineering
- SPEE Jack Ladd Memorial Scholarship in Petroleum EngineeringPermian Basin Association
- Pipeliners Endowed ScholarshipMark
- Nicholas Engineering Scholarship
- FundQEP Education Foundation Petroleum Engineering Scholarship
- Susan M. Grigson, P.E. Scholarship in Engineering
- Partners Scholarship/PickeringPBIOS Scholarship - Engineering
- ConocoPhillips Scholarship
- Robert L. Jackson, Jr. Memorial Scholarship
- RL Hamm, Jr. Memorial Book Scholarship for Petroleum Engineering
- Robert R. "Robin" Donnelly Engineering Scholarship
- Permian Basin Association of Pipeliners (PBAP) Scholarship - Non-EndowedChevron Legacy Scholarship

Student Profiles

Kandus Box
ELECTRICAL ENGINEERING

Kandus Box is a sophomore attending The University of Texas Permian Basin where she is majoring in electrical engineering. As of August 2020, she is a member of the physics undergraduate research program where she is working on the Center-of-Gravity Mouse Project. The purpose of the project is to develop a sensor that could respond to someone shifting their weight in a chair by moving a mouse cursor on a computer screen. From this experience, she will learn circuit design, practical skills of a digital weight sensor, and software development. This project will help to develop and fine-tune her abilities for her electrical engineering career.

Gabriel Leal
MECHANICAL ENGINEERING

Gabriel Leal is a senior studying mechanical engineering with an emphasis in petroleum. He is the president of the American Society of Mechanical Engineers UTPB chapter. As the president, his job is to organize events for the members and help students make industry connections. He also does research at the Texas Water and Energy Institute. His duties involve arranging experiments, analyzing, and evaluating data to develop produced water treatments. Outside of school, he loves to go out and play sports, hike, and spend time with his family and friends.

Onyemaobi Ubadire
CHEMICAL ENGINEERING

Ubadire is a sophomore at The University of Texas Permian Basin. He is part of the Student Government Association serving as the senator in chemical engineering and also a treasurer of The Chemical Engineering Chapter. Ubadire is currently enrolled in the SURE (Student Undergraduate Research in Engineering) program, performing research in the flaring of gases. His research studies the reason for gas flaring, its effect, and its solutions, focusing on how we can use these flared gases to generate a cheaper and more efficient form of electricity. His dream is to join the fight for renewable energy which will help reduce global warming.

Gelila Kassaya
PETROLEUM ENGINEERING

Gelila is an alumni of Petroleum Engineering. She was a research assistant of the Texas Water and Energy Institute. Her research focused on the characterization of produced and flow back water using various techniques (SEM-EDS, ICP-OES, IC, TOC, etc).

Latest News

U.S. News & World Report Ranking

- UTPB #32 for top public schools
- UTPB #60 for social mobility
- U.S. News rank: #68, Regional Universities (West)

Click for more info

Affordability

- UT Permian Basin Engineering is the #1 Best Value Engineering School in Texas
- UTPB #13 most affordable college of Engineering schools

Click for more info

Covid-19 Update

The University of Texas Permian Basin remains committed to helping our students receive the support they need during the COVID-19 pandemic. UT Permian Basin recently received an additional $920,008 in CARES Act funding from the federal government. These funds will provide support to students who had expenses related to COVID-19 including housing, course materials, technology, health care (including mental health), food, and childcare.

“The emergency funds we can provide students as a result of the CARES Act funding from the federal government makes a significant difference in the lives of our students. We are grateful for the funding and glad we can help facilitate getting it to students with financial needs,” said Dr. Rebecca Spurlock, VP of Student Affairs and Leadership.

Each request submitted will be reviewed by a committee to determine appropriate resources and response efforts for students who need assistance or emergency services. Award amounts may vary, and the maximum award is $750 per student, pending fund availability. Awards do not require repayments.

Presently, UT Permian Basin has provided more than $920,000 in funding through the CARES Act to students impacted by the pandemic.

Latest News

Girls in Engineering Program

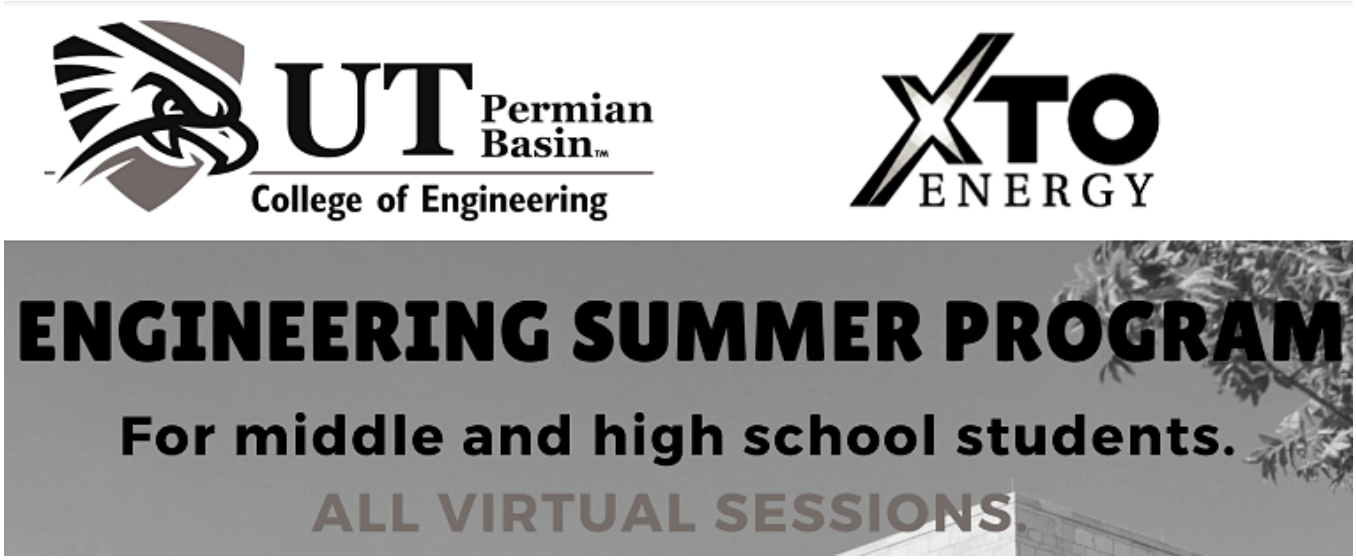
Theme: Opportunities and Challenges for Women in Engineering Field.
For Junior, Middle, and High School Students

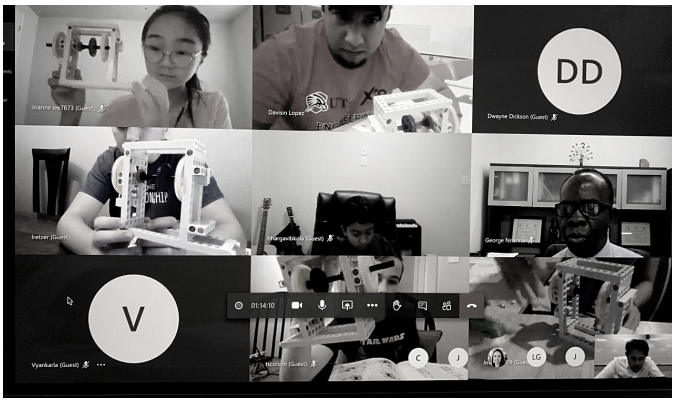
Under the leadership of Dr. Bibian Ogbuji, The University of Texas Permian Basin's Girls in Engineering (GIE) program aims to contribute to the increasing need for women's representation in science, technology, engineering, and mathematics (STEM). The goal of GIE is to inspire young women to pursue professions in engineering, educate girls on different engineering career pathways, increase social equality, and advance innovation.

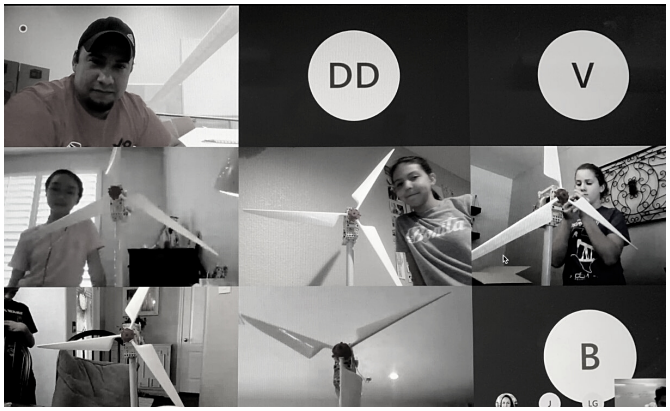
We cannot overestimate the impact of engineering on our lives. A study by Microsoft stated, "Girls are much more likely to consider a career in STEM if they have a role model who inspires them." Research conducted in 2018 by The University of California San Diego and The Center for Research + Evaluation reveals that women represent 25% of the STEM workforce over the past 30 years. To address the existing gender gap in engineering professions, the College of Engineering supports the GIE program for junior, middle, and high school students in the community and engages them to enhance creativity and promote economic growth.

The GIE program aims to eliminate gender stereotypes and limited female representation in the workforce. Therefore, creating an opportunity for equality, inclusion, and diversification of talent by closing the confidence gap, raising awareness that girls are capable of problem-solving ability, analytical skills, computer skills, and strategic thinking. In playing a small part in a national need, GIE targets young girls to provide mentors and role models of women in engineering and link their interest to an engineering job. GIE program is committed to empowering young girls to achieve their full potential and expand engineering image from a stereotype.

Engineering Virtual Summer Camp



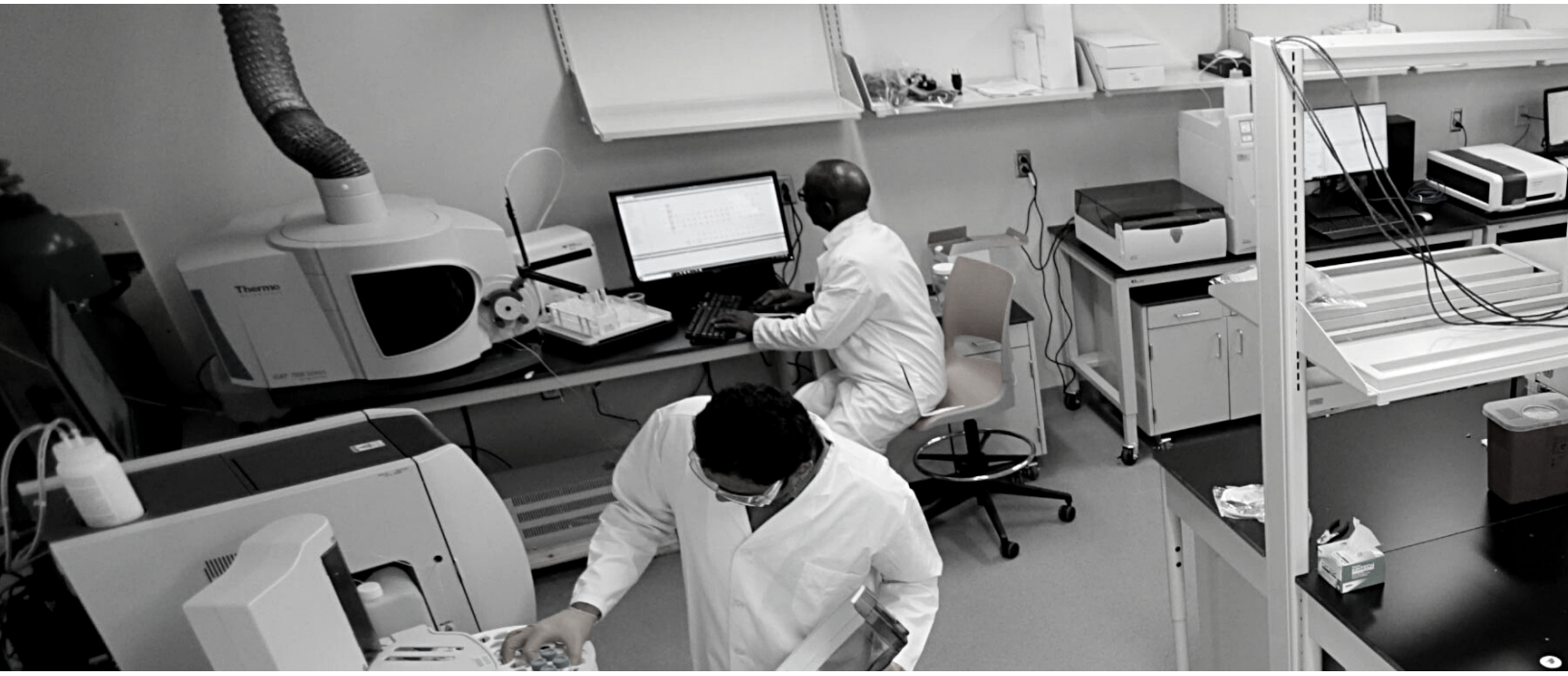




Projects

- **Wind Energy**
- **Robotics**
- **Chemical Titration**
- **Demonstration of Moment of Inertia**
- **Nuclear Power-Generation**

Texas Water and Energy Institute



What is TWEI?
The Texas Water and Energy Institute (TWEI) provides a multidisciplinary and multi-institutional approach to complex issues dealing with produced water, wastewater, and drinking water.

ABOUT TWEI
The work includes: water quality, water-energy interdependencies, water security, water infrastructure protection, and related social and policy issues. The vision of the institute is to develop fit-for-purpose energy efficient and cost-effective advanced technologies that are critical for the treatment of produced water. The goal is to minimize adverse environmental impacts including groundwater depletion and induced seismicity. The treated water will be recycled and reused for hydraulic fracturing,
irrigation, and municipal use to benefit the state and the nation.

VISION FOR THE FUTURE
The Texas Water and Energy Institute will promote convergent research by integrating expertise, knowledge, and tools from various disciplines of academia, industry, and government agencies to form a coherent innovation ecosystem and develop a productive workforce. Expertise and resources from multiple academic institutions will be leveraged to address research problems in: water intelligence, machine learning and data analytics, users and groundwater banking, recycle and reuse water treatment technologies, recycling options, chemical and physical characterization, renewable energy-based water technologies, energy assessments, performance evaluation of sustainable water, and treatment technologies.

GOAL
TWEI aims to develop a multi-institutional curriculum to educate a wide array of students in a broad range of related disciplines. This entails collaborative efforts with stakeholder entities including engineers, soil and biology scientists, social scientists, students, tribal nations, regulators, and policy makers.

CHALLENGES
The challenges with produced water treatment methods are economics of scale, reliability, waste and product generation, and energy consumption. Current industry practice is the subsurface disposal of produced water which leads to increased pressures that can contaminate overlying aquifers and may also result in induced seismicity. A global grand challenge is the management of produced water and a comprehensive strategy for reuse. These are two challenging concepts, partly because of public perception. The Institute will develop strategies to overcome social barriers of adoption and acceptance of using brackish water amongst different groups, from farmers to consumers.

Texas Water and Energy Institute Lecture Series

Brief Introduction

The UT Permian Basin Water Lecture Series. The purpose of the Lecture Series is to: A) create a learning environment where industry, academia, and government agencies can network, discuss the state-of-the-art treatment technologies, challenges, and opportunities with current oilfield water management strategies; and B) educate, engage, and broaden community participation on the techno-socio-economic and environmental benefits of reusing and recycling oilfield water.

ELENA SUBIA MELCHERT

DIRECTOR, UPSTREAM RESEARCH DIVISION OFFICE OF OIL AND GAS, OFFICE OF FOSSIL ENERGY U.S. DEPARTMENT OF ENERGY WASHINGTON

Ms. Melchert is a petroleum engineer with almost 40 years of experience in the oil and gas sector including, commercial upstream field operations, research and development, and domestic and international policy development [Latin America]. She is currently the Department of Energy's Director for the Upstream Oil and Gas Research Division that includes shale development and offshore spill prevention.

Abstract:
The Energy Policy Act of 2005 brought to DOE the mandate and funding to invest in the development of unconventional resources which ultimately led to the current focus on produced water. The development of shale resources in Oklahoma - particularly Mississippian reservoirs resulted - in greater volumes of produced water that when disposed of as wastewater into deep injection wells of the Arbuckle formation which resulted in induced seismicity. That led to the focus on reducing the amount of produced water that must be disposed of and the desire to transform produced water from waste to a resource. DOE is a part of the national dialogue of produced water challenges, research, and technology solutions.

MIKE HIGHTOWER

PROGRAM DIRECTOR, NEW MEXICO PRODUCED WATER RESEARCH CONSORTIUM BOARD OF DIRECTORS, NEW MEXICO DESALINATION ASSOCIATION

Mike is the Program Director of the New Mexico Produced Water Research Consortium, a joint effort by the NM Environment Department and New Mexico State University and on the Board of Directors of the New Mexico Desalination Association.

Abstract:
The 2019 New Mexico Produced Water Act established a regulatory and policy framework for the ownership and management of produced water in New Mexico, maintaining control of produced water use within the oil and gas sector with the Oil Conservation Division of the Energy Minerals and Natural Resources Department, and giving statutory control and regulatory authority for the use of produced water outside the oil and gas sector to the NM Environment Department (NMED). To help establish science-based regulations and policies for reusing produced water outside the oil and gas sector, the NMED entered into a Memorandum of Understanding in September 2019 with New Mexico State University to create the New Mexico Produced Water Research Consortium (Consortium). The Consortium's role is to establish a focused research and development program in collaboration with state and federal environmental and natural resource agencies, academia, industry, and non-profits to fill the science and technical gaps for fit-for-purpose treatment and reuse of produced water to support economic development while protecting public, environmental, and ecological health and safety.

Texas Water and Energy Institute Lecture Series

DAN MUELLER

PROFESSIONAL ENGINEER WITH 40 YEARS OF EXPERIENCE IN THE ENVIRONMENTAL FIELD ENCOMPASSING WATER RESOURCE ASSESSMENT, MANAGEMENT, AND POLICY.

Dr. Dan Mueller is a registered professional engineer with 40 years of experience in the environmental field encompassing water resource assessment, management, and policy. This includes surface water and groundwater hydrology, water and wastewater treatment, use of alternate water supplies, and water conservation. With degrees in aquatic biology (B.S.) and civil engineering (B.S. and M.S.) his experience includes projects driven by a wide range of regulatory programs water resource management issues.

Abstract:
The quantity of produced water resulting from oil and gas exploration and development can be significant and the vast majority of this wastewater is disposed of via underground injection wells. However, alternatives to underground injection including recycle back into the oil and gas well development process (sometimes requiring little to no treatment), or potentially reuse outside the oil and gas operations, or discharge (all requiring robust treatment and elevated levels of monitoring) are being considered – or in the case of recycling, being implemented to a greater extent.Addressing potential adverse impacts from produced water recycle is straightforward. Since this practice requires greater amounts of produced water are stored and transport, engineering controls, and processes must be in place to minimize leaks and spills and to rapidly identify and address leaks and spills when they do occur.
Reuse outside oil and gas operations, or potential intentional releases to surface waters or groundwater present a higher level of risk to human health and the environment requiring significantly more complex engineering, monitoring, and regulatory oversight to address potential adverse impacts.

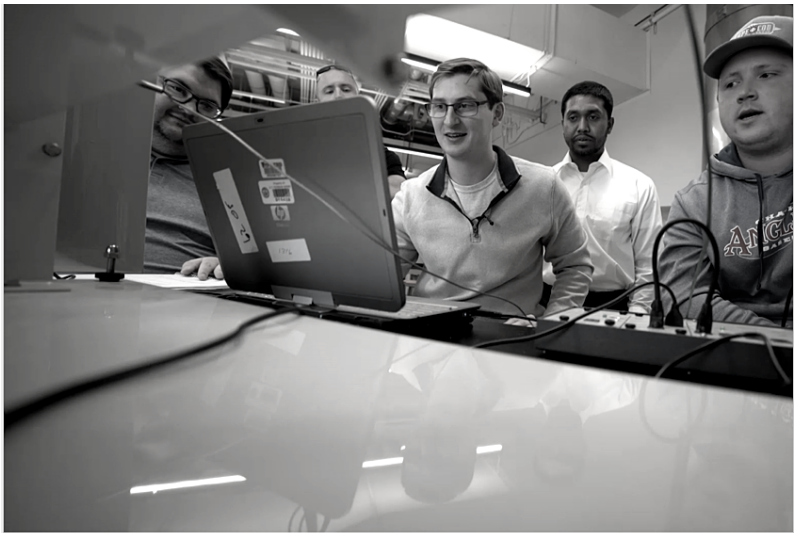
DR. MARK ENGLE

A PROFESSOR IN THE DEPARTMENT OF GEOLOGICAL SCIENCES AT THE UNIVERSIT OF TEXAS AT EL PASO

Dr. Engle is a Professor in the Department of Geological Sciences at The University of Texas at El Paso. He has nearly 20 years of experience working in government and environmental consulting. He holds a Ph.D. and M.S. in hydrogeology from the University of Nevada, Reno, and a B.S. from The Evergreen State College. His current research covers a broad range of fluid movement and chemistry, from geologic basins to the free troposphere. Dr. Engle has published nearly 100 journal articles, book chapters, and reports and is an associate editor of Applied Computing and Geosciences.

Abstract:
Produced waters are the most voluminous waste stream of hydrocarbon production, with the Permian Basin of New Mexico and Texas producing more than 10,000,000 barrels/day (1.7x10^9 L/day). Despite calls for better-produced water management in this semi-arid region, unpermitted produced water dumping remains a serious problem. This study focuses on the chemical and isotopic composition of 41 surfaces (0-5 cm) and core (0-30 cm) soil samples from 5 dumpsites in the Mescalero sand dunes, southeast New Mexico.

Accelerated Masters in Mechanical Engineering



What is an accelerated master's?
Qualified undergraduate students currently enrolled at the University of Texas Permian Basin College of Engineering can earn both bachelors of science and master of science in mechanical engineering in just five years

You'll save time by earning up to six credits for master's level courses taken while earning your bachelor's degree during your senior year.

Students must meet the general UT Permian Basin graduating requirements:

- Must complete prerequisite courses before starting graduate-level work
- Must have a GPA of 3.0 or better in the last credit of upper-level coursework.

UTPB.EDU/MSME

Program Features
The MSME Program offers their and non-thesis option with the flexible course for full-time students and part-time working professionals. It is anticipated that the degree may be completed in the two years of full-time graduate study.

- 30 credit hours for the thesis option
- 36 credit hours for the non-thesis option

For degree-seeking students:

- Complete a UT Permian Basin Graduate Application at applytexas.org ($40 application fee)
- All official transcript and GRE scores should be sent to:
  Office of Admissions
  UT Permian Basin
  4901 E University Blvd
  Odessa, TX 79762-0001
- International students should visit utpb.edu/admission-aid/apply-to-ut-permian-basin/international-student

For non-degree seeking students

- Proof of appropriate undergraduate degree
- No fee required
- Up to four courses may be taken as a non-degree seeking student

Research Institute and Centers

- Texas Water and Energy Institute
- Computational Materials Science Laboratory
- Advanced Manufacturing Center

Assistantships

- Teaching assistantship (fee remission and monthly stipends)
- Research assistantship (fee remission and monthly stipends)
- Graduate Research Experiences (hourly compensation)
- Scholarship Opportunities

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