

# FUELING THE FUTURE

PETROLEUM ENGINEERING DEPARTMENT NEWSLETTER • FALL 2021

UNIVERSITY OF  
**HOUSTON**  
PETROLEUM ENGINEERING



# Letter from the Chair



**Dear Colleagues,**

While we continue to closely monitor the effects of COVID-19 in the greater Houston area and beyond, we have now resumed full-in person functionality at the University of Houston campus. Despite the challenges from the last year, the University of Houston has continued to excel, including enrollment levels reaching record numbers and an increase of 40% in research grants. This publication highlights some of the specific achievements of the Cullen College's petroleum engineering department from the last six months. If you would like to know more about any of these projects, or wish to collaborate, I invite you to contact me directly.

Warm Regards,

**Mohamed Soliman, Ph.D., P.E., NAI**

Department Chair and William C. Miller Endowed Chair Professor  
Petroleum Engineering Department  
Cullen College of Engineering  
University of Houston



# Top 10

The Cullen College of Engineering's Petroleum Engineering Department was named among the nation's Top 10 in the latest edition of U.S. News & World Report. The department's national ranking improved from No. 11 to No. 9. **Mohamed Soliman**, the William C. Miller Chairman for Petroleum Engineering, is pleased about the progress it has made since being established as an independent department in 2016.

"Achieving this milestone is due to the hard work of everyone in the department – faculty, staff, and students," Soliman said. "Our faculty are producing top research and attracting funding from industry, both national and international companies, and national organizations. Our students and student organizations are very active, winning many students awards, organizing activities with industry, and increasing involvement with national labs. Our staff is doing a superb job supporting these activities." 

# NEW FACULTY



## PE WELCOMES NEW FACULTY FOR FALL 2021

**Zeinab Zargar** joins the department as a lecturer. Zargar has worked as a research assistant in Petroleum Engineering at the Cullen College of Engineering since 2018. She earned her doctorate in Petroleum Engineering from the University of Calgary in Alberta, Canada in 2017. 

## LEE AWARDED TWO GRANTS TO FURTHER EVOLVE ENERGY INDUSTRY

**Kyung Jae Lee**, Ph.D., an Assistant Professor in the Petroleum Engineering Department at the Cullen College of Engineering, has received funding for two recent grants totaling more than \$350,000.

A grant approved by the American Chemical Society, "Mechanisms of Wettability Alteration by the Interactions between Kerogen and Hydraulic Fracturing Fluid and Its Impact on Fluid Transport in Organic-Rich Shales," received funding of \$110,000. The research began in September 2021, and continues through August 2023.

Her second proposal, "Analysis of Geochemical Factors Affecting Bentonite Swelling Pressure and Development of Prediction Model," has been funded by the Korea Atomic Energy Research Institute for \$280,000. The purpose of the research is to determine the stability of an engineered barrier system (EBS) for the safe isolation of high-level radioactive waste. The research will be done through the end of 2023. 



## MMP CALCULATOR DEVELOPED BY PETRO'S DINDORUK ALREADY IN HIGH USE

**Birol Dindoruk**, Ph.D., the American Association of Drilling Engineers Endowed Professor in the Petroleum Engineering Department at the Cullen College of Engineering, has developed an online calculator for minimum miscibility pressure (MMP), which has already received more than 12,000 visits since being brought online in May.

The calculator is based on a March 2021 paper, "Prediction of CO<sub>2</sub> Minimum Miscibility Pressure Using an Augmented Machine-Learning-Based Model," published in the *SPE Journal*. Dindoruk, UH Petroleum Engineering chairman Mohamed Soliman, and UH graduate student Utkarsh Sinha are the authors.

According to their paper, MMP is one of the key design parameters for gas injection projects. The physical parameter measures local displacement efficiency, while subject to some constraints due to its definition. MMP is also used to tune compositional models, along with proper fluid description constrained with other available basic phase behavior data, such as bubble point pressure and volumetric properties. 

## ACADEMIC-INDUSTRY PARTNERSHIP BETWEEN UNIVERSITY OF HOUSTON (UH) AND OIL INDIA LTD. (OIL) HAS IMMENSELY BENEFITTED BOTH SIDES – PHASE 3 COMPLETION

An innovative partnership between UH and Oil India Ltd. (OIL) has offered benefits for both partners, improving Oil India fields and boosting production there while providing UH researchers and graduate students with research opportunities and practical experience.

The \$4.80 million partnership, launched in late 2016, completed its third phase in June 2021, a project to enhance oil recovery in oilfields in the Indian state of Assam, using carbon dioxide captured from nearby petrochemical plants. That project, slated to continue through 2022-23 (implementation time), is designed to both increase the country's ability to fulfill its energy needs and to reduce its carbon footprint. The collaboration has included training opportunities for Oil India executives and employees, both in Houston and in India.

The project is led by **Ganesh Thakur**, Distinguished Professor of Petroleum Engineering and director of Energy Industry Partnership. 



## UH GEOLOGY, PETRO PERSONNEL WIN 2021 AAPG JULES BRAUNSTEIN MEMORIAL AWARD

The American Association of Petroleum Geologists awarded the University of Houston's **Michael Fonseca**, **Lori Hathon** and **Tom Lapan** the Jules Braunstein Memorial Award. It recognizes the best poster session paper presented at the association's Annual Convention and Exhibition the previous year.

Fonseca graduated in December 2020 with a Master of Science in geology. He now works for the environmental consulting company, GeoSyntec Consultants. He is first author for the poster, "A Real-time Method to Identify



Brittle Zones in Carbonate Rich Mudrocks Using Bulk and Trace Element Geochemistry: A study in the Eagle Ford, Niobrara, Haynesville, and Woodford Formations."

Fonseca said that Lori Hathon, an assistant professor in the Petroleum Engineering Department, was extremely inspirational to him during his graduate degree. He worked closely with Hathon, using high-resolution thin section images collected in her lab to identify carbonate phases. The two then used Rice University's electron microprobe, operated by Gabi Costin, to collect quantitative trace and major element geochemical data from the carbonate phases identified in the thin-section images. 

## FROM IRAN TO KANSAS TO TEXAS, ZEINALI CONTINUES TO LEARN

University of Houston Master's student **Leila Zeinali** has strived to continue learning, first in her native Iran, then in Kansas and now at the Cullen College of Engineering. After entering the program in the Fall of 2012, Zeinali said she immediately immersed herself in the study of fluid mechanics, reservoir rocks, oil production, and completion classes, and other fundamentals of the field and felt so excited.

"My experience at UH has been no less than fantastic," she said. "As someone with a mathematics background, I saw how Petroleum Engineering related to math. However, it was more intriguing how different parts of the industry, from exploration to refinery, work hand-in-hand to deliver energy to the consumer. Among the valuable courses in Petroleum Engineering, I would like to single out the Capstone Project where we designed hydraulic fracture optimization for a Kinder Morgan CO<sub>2</sub> segment. That was my first experience working in a multidisciplinary team in the industry."



She credits her membership in the Society of Women Engineers, the American Association of Drilling Engineers and the Society of Petroleum Engineers as vital to her educational and professional development, and encourages other students to take advantage of Houston's proximity to the established energy industry. 



## PETRO'S JENNIFER STEWART **TRADES CALL SHEET FOR SUBSEA**

The transition from Broadway to the Houston energy industry might seem like an unusual one for some, but for **Jennifer Stewart**, it was one facilitated by her sister, Rebecca, and her mother, Judith.

Stewart initially graduated from Brigham Young University with a degree in Musical Theatre, and she moved to New York City to pursue a childhood dream of being on Broadway. She is now studying Petroleum Engineering at the University of Houston's Cullen College of Engineering.

Stewart is on schedule to graduate in December 2021, and currently has a 3.94 GPA. In addition, she received the 2021 Cynthia Oliver Coleman Women in Engineering Rising Star Award, served as UH Tau Beta Pi president and membership chairwoman for 2020, and was named the Outstanding Petroleum Engineering Student at the Houston Engineers Week Awards in 2020 and 2021. Stewart was also awarded one of the Texas Energy Council's scholarships for 2020, the first UH student to earn the honor since 2013. She recently completed a summer internship for Wood PLC on their subsea team. 

## UH SPE EARNS HIGHEST PETROBOWL FINISH, PRESIDENTIAL AWARD



The University of Houston's student chapter of the Society of Petroleum Engineers continues to make headlines, as a chapter-best third place finish in the prestigious PetroBowl competition comes on the heels of its first-ever Presidential award designation.

The PetroBowl competition pitches SPE student chapter teams against each other in a series of quick-fire trivia rounds, answering technical and nontechnical industry-related questions. The competition tests the knowledge of students on the entire energy value chain – upstream, downstream, marketing, geopolitics, history, alternative energies, human factors engineering, energy statistics, sustainability and more.

"Being top placed in the competition is a testament to the depth of the curriculum in Energy here at UH," said **Lotanna Ohazuruike**, the president of the UHSPE chapter and the captain of their PetroBowl squad. "For the past three years, we have been in the Top 16 teams globally. Coming in third this year was a huge improvement in our team performance. I have to give a big thanks to my fellow teammates for the excellent job we did – Master's student **Nhung Nguyen** and undergraduate **Kevin Tran**."

The strong placement in PetroBowl comes shortly after the student chapter was notified in May 2021 that it had been chosen for the Presidential Award.



# The University of Houston

## Cullen College of Engineering

The University of Houston Cullen College of Engineering addresses key challenges in energy, healthcare, infrastructure and the environment by conducting cutting-edge research and graduating hundreds of world-class engineers each year. With research expenditures topping \$35 million and increasing each year, we continue to follow our tradition of excellence in spearheading research that has a real, direct impact in the Houston region and beyond.



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# Research **MILESTONES**