

Petroleum Engineering  
Newsletter Fall 2024

# FUELLING

THE FUTURE

ENGINEERED FOR  
**WHAT'S NEXT.**



Cullen College of Engineering  
UNIVERSITY OF HOUSTON

# Letter from the Chair



Dear Friends, Alumni, Colleagues,

I am pleased to share some highlights and advancements from our department over the past six months. We have been diligently working to enhance both our teaching and research missions. Exciting developments are on the horizon, and we look forward to sharing more news with you in the coming months.

Our graduate and undergraduate programs continue to rank among the top ten petroleum engineering departments. Our faculty members are actively securing competitive grants from the Department of Energy (DOE), National Science Foundation (NSF), and oil & gas industry companies to support our Joint Industry Projects.

Responding to current industry developments and challenges, we are designing and offering courses that provide our students with a comprehensive and in-depth preparation to meet ever evolving workforce demands or pursue advanced studies in graduate school.

I encourage you to explore the following stories, and please feel free to reach out if you see opportunities for collaboration.

Warm Regards,

**Dimitrios G. Hatzignatiou, Ph.D., CEng, EURING**

Interim Department Chair  
Professor of Petroleum Engineering  
Petroleum Engineering Department, Cullen College of Engineering  
University of Houston

## UH PE **BY THE NUMBERS**



**FACULTY** (FALL 2022)

**5** NATIONAL ACADEMY OF ENGINEERING MEMBERS

**3** NATIONAL ACADEMY OF INVENTORS FELLOWS



**UH PE IMPORTANT FACTS**



ABET AND SACSCOC ACCREDITED BSC DEGREE PROGRAM



SACSCOC ACCREDITED GRADUATE (MS & PH.D.) DEGREE PROGRAMS



7TH BEST ENGINEERING JOB WITH HIGHEST REPORTED MEDIAN SALARY

### UH PETROLEUM ENGINEERING GRADUATE PROGRAM RANKED NO.7 IN **U.S. NEWS & WORLD REPORT RANKINGS**

The University of Houston's Graduate Petroleum Engineering Program ranking has improved two spots, to 7th overall of U.S. Petroleum Engineering Departments, in the latest yearly rankings by the U.S. News & World Report. Our undergraduate Petroleum Engineering Program continues to rank 6th among the U.S. Petroleum Engineering Departments.

Overall, the Cullen College of Engineering was ranked 68th graduate school in the nation. This fall, the college has enrolled a total of 2,279 new undergraduate and graduate students (+1.8% stronger than Fall 23), of which 1,642 are new undergraduates (+4.5%). With this, Cullen College this fall is 10,079 students strong (+1.1%), making us the second-largest college at UH.

The University of Houston is a Carnegie-designated Tier One public research university recognized by The Princeton Review as one of the nation's best colleges for undergraduate education. UH serves the globally competitive Houston and Gulf Coast Region by providing world-class faculty, project-based learning, high impact research and strategic industry partnerships. Located in the nation's fourth-largest city, UH serves more than 45,000 students in the most ethnically and culturally diverse region in the country.

For the full list of rankings from U.S. News and World Report, please visit: <https://www.usnews.com/best-graduate-schools/top-engineering-schools/petroleum-engineering-rankings> and <https://www.usnews.com/best-colleges/rankings/engineering-doctorate-petroleum>. ⚙️



### UH PETROLEUM ENGINEERING PROGRAM HOSTS SPE/PEDHA WORKSHOP

This past August, the University of Houston Petroleum Engineering Department hosted the 2024 SPE (Society of Petroleum Engineers) / PEDHA (Petroleum Engineering Department Heads Association) workshop at our UH Petroleum Engineering Technology Bridge facilities.

The workshop took place on August 8 and 9, 2024 with the theme “Fueling the Future: Petroleum Engineering Industry/Education in a New Era”. This was a very timely workshop considering the ongoing energy transition initiatives and associated opportunities for the oil and gas industry in view of the global climate changes.

The workshop included seven sessions, four keynote speakers, and attended by 84 attendees – 53 from academia and 31 from industry.

Petroleum Engineering department heads and chairs, faculty, students, and oil and gas industry leaders and experts discussed and shared their views of how the petroleum engineering programs in the USA and abroad need to be positioned to address the ongoing changes and to better prepare students to meet the industry needs, lead the energy transition, and address global climate challenges.

Further information on the SPE/PEDHA workshop can be found at <https://jpt.spe.org/energy-exec-emphasizes-core-petroleum-engineering-skills>. ⚙️





## UH PETROLEUM ENGINEERING SUMMER 2024 EXTERNSHIP PROGRAM

The Petroleum Engineering Department offers a summer externship program in collaboration with industry partners. This past summer, two projects were conducted in partnership with Occidental Petroleum Corporation (Oxy) and SOS Sand Technology (SOS-STI).

The UH-Oxy extern project was mentored by **Dr. Zeinab Zargar** from the UH Petroleum Engineering Department and Woody Keating from Oxy. The project focused on a key industry challenge—simulating the geological storage of carbon dioxide in saline aquifers. Accurate numerical simulations are crucial for assessing safety and predicting the behavior of CO<sub>2</sub> storage over time. While fine grid simulation models yield realistic predictions of CO<sub>2</sub> plume distribution, they demand significantly higher computational resources. The UH-Oxy project aimed to optimize the prediction of CO<sub>2</sub> plume growth through an upscaled model, improving accuracy for saline aquifer simulations. UH Petroleum Engineering students **Mohamad Sarhan, Moaz Hiba, and Usman Mustapha** contributed to this project and successfully presented their work findings to the Chief Petro-Technical Officer and Low Carbon Ventures team at Oxy.

The UH-SOS-STI extern project was mentored by **Dr. George Wong** from the UH Petroleum Engineering Department and Chris Denton from SOS-STI. The project focused on the feasibility of applying subsea sand separation for Paleogene developments in deepwater, Gulf of Mexico (GOM). Producing Paleogene reservoirs without sand control increases the risks of sand production and associated HSE's (health, safety and environmental) impacts. Subsea sand separation might be a potential solution.

The UH-SOS-STI project addressed the following: (a) Create and populate a critical information database of existing Paleogene projects in GOM. (b) Evaluate existing sand separation equipment for subsea-production applications. (c) Assess the performance of SOS-STI sand separation system for representative flow conditions identified in Part (a) and for a wide range of sand production conditions (particle size and particle concentration). (d) Develop a risk matrix for the application of subsea sand separation in deepwater. UH Petroleum Engineering students **Mohamed Ammar, Winnings Oketie, Casey Jason** contributed significantly to this project and effectively delivered their outcomes to both the SOS-STI team and Shell's Deepwater Production team. ⚙️

### 2024 SPE ATCE **UH PETROLEUM ENGINEERING ALUMNI RECEPTION**

During the 2024 Annual Technical Conference and Exhibition (ATCE) of the Society of Petroleum Engineers (SPE) that took place in New Orleans, LA from September 23-25, 2024, our Petroleum Engineering Department hosted a UH Alumni Reception.

The reception was attended by several alumni, colleagues, donors and friends and it was a great success. This is the time that we get another opportunity to interact with all of you to share some of our success stories and hear your achievements and progress in your work place.

Please do not hesitate to reach out if you may have any questions or be able to assist you. We are always looking forward to hearing from our Alumni and Friends! ⚙️



# UH PETROLEUM ENGINEERING PROFESSOR **CARBONSAFE II DOE PROJECT BRINGS \$1.25 MILLION IN FUNDING TO UH FOR CARBON CAPTURE & SEQUESTRATION**

The U.S. Department of Energy (DOE) recently awarded a collaborative team that includes researchers from University of Houston, New Mexico Tech, Texas Tech University, University of Texas Permian Basin, Los Alamos National Lab and operators from Omnia Midstream company an approximately \$11.5 million grant to investigate the development of a Permian Regional Carbon Sequestration Hub in Texas.

The portion of the University of Houston funding is \$1.25 million and includes faculty from Petroleum Engineering Department (**Dr. Birol Dindoruk, Dr. Christine Ehlig-Economides, Dr. Mike Myers and Dr. Ganesh Thakur**) and Earth and Atmospheric Sciences Department (**Dr. John Castagna, Dr. Rob Stewart and Dr. Yingcai Zheng**) led by **Dr. Dimitrios G. Hatzignatiou**.

This is one of the first projects globally that will investigate and address the sequestration of stationary-points captured CO<sub>2</sub>, transported to the injection sites and sequestered in two depleted natural gas fields in the Permian Basin. The fields operator is Omnia Midstream out of Tulsa, OK.

DOE funded projects under the CarbonSAFE II phase will perform a technical and economic feasibility study on a storage complex capable of storing a minimum of 50+ million metric tons of anthropogenically-sourced CO<sub>2</sub>. Typical activities under Phase II projects will include drilling, geophysical logging, and hydraulic (water injection) testing of stratigraphic test wells; passive and active seismic or other geophysical surveying; sampling and chemical analysis of formation fluids and groundwater; and modeling of CO<sub>2</sub> injection into targeted geologic storage reservoirs. ⚙️



## INTERACTION OF PHASE BEHAVIOR AND FLOW (IPB&F) CONSORTIUM

The 13 member consortium was initiated in Q3 of 2021 and there are already three in-person annual review meetings at the Petroleum Engineering department.

Over the last three years we were able to convince our members and even some of the non-member companies about our deployment minded technologies that can easily be utilized, said **Dr. Dindoruk**, the consortium director. The CCUS related element that is integral part of this research is also supplemented with a partner driven initiatives that helps the consortium in several dimensions.

Currently the consortium is focusing on the following four interrelated sub themes/key problems:


**1. Characterization of the complex native and non-native reservoir fluid systems, including but not limited to:** a. Critical near-critical systems; b. CO<sub>2</sub> and phase behavior of CO<sub>2</sub> with various fluids of interest; c. Graded systems; d. EOR applications: Miscibility assessment and behavior for various injectants, including the CO<sub>2</sub> theme (CCS/CCUS)

applications; e. Phase behavior in nanoporous materials and unconventional.

**2. Development and utilization/deployment of new measurement tools and techniques:** a. Methodology development; b. Hardware and sensors; c. Numerical techniques including advanced computational methods and molecular simulation.

**3. Hybrid methods, physics enhanced data analytics:** a. Deployable tool development to be used in the company for QC and estimation of various properties.

**4. Gas storage in subsurface and artificial porous and/or adsorptive systems:** a. Natural gas /H<sub>2</sub> storage in subsurface or other media for various applications; b. CO<sub>2</sub> sequestration; c. Hydrogen storage; d. Reactive transport (multi-scale) for CO<sub>2</sub>/CCUS theme and as well as corrosion modeling; e. Characterization of cap-rock for CO<sub>2</sub> storage.

For further details please refer to the following site: <https://dindoruk.egr.uh.edu/> 





## STUDENT SUCCESS



*Pictured: A Participants in the 2024 SPE Regional Paper Contest, hosted at the University of Houston.*

PETROLEUM ENGINEERING

## UH SPE STUDENT CHAPTER RECOGNIZED WITH PRESIDENTIAL AWARD FOR OUTSTANDING STUDENT CHAPTER

The University of Houston's student chapter of the Society of Petroleum Engineers (SPE) was recently awarded the 2024 Presidential Award for Outstanding Student Chapter (PAOSC) in the Technical Dissemination category. This category considers chapter participation in activities and experiences like field trips, research programs, symposiums, technical presentations and training courses.

The UH SPE Student Chapter officers, SPE President **Abdulrahman Abdulwarith**, SPE VP Internal **Christina Castillo**, SPE VP External **Fatemeh Tale**, Treasurer **Sara Clement** and Secretary **Arati Agri** worked very hard and diligently with the SPE faculty Advisor **Dr. Ganesh Thakur** to achieve this so well deserved award. This reflects the cooperative spirit and synergy among students, student organization, faculty and staff. ⚙️

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## UH PETROLEUM DOCTORAL STUDENT RECEIVES **UH CHEVRON ENERGY GRADUATE FELLOWS AWARD**

University of Houston, the Energy University, is proud to announce the second cohort of UH-Chevron Energy Graduate Fellows – eight graduate students who are actively involved in innovative energy-related research across the UH campus. Funded by Chevron, the program supports graduate students’ research efforts through a one-year, \$12,000 fellowship which includes mentoring by faculty experts and the opportunity to engage with subject matter experts at Chevron.

**Mohamed Ammar**, a Ph.D. student and research assistant under mentorship of **Dr. Birol Dindoruk** at Cullen College of Engineering, Petroleum Engineering Department, has been named one of the eight recipients of the UH Chevron Energy Graduate Fellows Awards for 2024–2025.

Ammar holds a master’s degree in petroleum engineering from Texas Tech University and has several years of experience as a reservoir engineer in the industry. His research focuses on developing advanced techniques for measuring CO<sub>2</sub> and hydrocarbon gas minimum miscibility pressure, which is critical for enhancing oil recovery and ensuring effective carbon storage. His work is fundamental to promoting sustainable energy practices and mitigating environmental impacts. Ammar is also involved in the use of CO<sub>2</sub> for EOR and its storage in residual oil zones (ROZs) and unconventional resources. ⚙️

### MONTES TABBED FOR FALL 2024 SPE SCHOLARSHIP

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**Richard Montes** is a UH senior student majoring in Petroleum Engineering. He is also the president of the UH Student Chapter of the American Association of Drilling Engineers (AADE) and recipient of the Society of Petroleum Engineers Scholarship for the Fall 2024 semester.

Richard graduated from Elkins High School in Missouri City, Texas. I became interested in petroleum engineering because both my brothers work in the oil and gas industry, he said. I always wanted to become an engineer and especially a petroleum engineer since I want to contribute to the society and have my work directly impact the developments of a company.

"I chose to attend the University of Houston because of its reputation and the experience the petroleum engineering professors bring into the classroom. This was a factor that weighted my decision to attend UH's petroleum engineering

program," he included.

Richard described his experience and service as a Petroleum Engineering student. My experience so far at UH has been great. I like my courses and the knowledge I gain in the classroom and beyond. As an AADE officer, and in coordination with other UH Petroleum Engineering Student Chapters, we are planning several functions that benefit our fellow petroleum engineering students. We also try to share our knowledge with high school students about petroleum engineering and our experience as petroleum engineering students at UH.

Richard had an internship last summer with ConocoPhillips, and has already been offered and accepted a full-time job with the same company to start soon after his graduation this coming May 2025. ⚙️



*Pictured: Richard Montes*

## CASTILLO TABBED FOR FALL 2024 HOLDER SCHOLARSHIP

**Christina Castillo** is a sophomore Petroleum Engineering student at University of Houston who serves as VP- Internal for the UH Society of Petroleum Engineers (SPE) student chapter organization. She is from Tyler, Texas and transferred to UH in Fall 2023. Christina's Dad is a petroleum engineer and she developed an interest early on in his career's flexibility and its project-based format.

Christina also has family in Houston and is familiar with the city. She was drawn to UH petroleum engineering's close knit community, the support of the faculty and students and the networking possibilities for her future in the oil & gas industry.

She is the Fall 2024 Holder Scholarship recipient based on her excellent academic achievement and her community service to petroleum engineering.

Her best advice for incoming students is "get as involved as you can in your university community to obtain the best advantage for your future". ⚙️

*Pictured: Christina Castillo*



# CULLEN

## 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 \$40 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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