

Department of  
**PETROLEUM ENGINEERING**  
**NEWSLETTER**

 **COLORADO SCHOOL OF MINES**  
EARTH • ENERGY • ENVIRONMENT

September 2021



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One of our many virtual PE Department meetings over the past year.

## PE DEPARTMENT LEADERSHIP

Department Head — Jennifer Miskimins  
 Associate Department Head — Xiaolong Yin  
 Department Manager — Nellie Link

## PE STAFF

Program Assistant — Rachel McDonald  
 UG Program Manager — Terri Snyder  
 Research Administrator — Denise Winn-Bower  
 Lab Coordinator — Joe Chen

## FACULTY

Linda Battalora  
 Mansur Ermila  
 Alfred (Bill) Eustes, Emeritus Professor  
 Yilin Fan  
 Hossein Kazemi  
 Mark Miller  
 Erdal Ozkan  
 Yu-Shu Wu  
 Luis Zerpa

## PROFESSOR OF PRACTICE

Jim Crompton  
 Elio Dean  
 Will Fleckenstein, Appointed in Academic Affairs  
 Tim Sorensen

## RESEARCH FACULTY

Tadesse Weldu Teklu  
 Phil Winterfeld

## MESSAGE FROM THE DEPARTMENT HEAD

Greetings! I hope this newsletter finds you happy and healthy in these continued interesting times. We are starting to see things return a little bit to normal on campus, but I know that's not that case everywhere. I hope that wherever you currently sit around the globe, you and yours are doing well. I'm also not really sure if we know what "normal" is going to be here at Mines – as with so much around the world, the pandemic has definitely impacted our operations and how we approach things – but we will continue to thrive no matter what!

In Fall 2020, we in PE (and Mines in general) ran about 50% of our courses either in-person or in a hybrid mode with both in-person and virtual components. This past spring, we upped that number to around ~70%. Of course, this all came with some challenges, but overall, Mines did a great job with managing such and our students benefited from it. I am very proud to say that we were able to run our field sessions in May 2021 completely in-person! This was no small feat, and I just want to give some kudos to the multiple people that it took to make this happen, and to our PE students for having the patience to deal with the additional steps that we had to take. We will be returning to 100% in-person classes this fall (minus courses that are actually designed to be fully online), and I think I can speak for the entire faculty when I say that we are eager to get back into the physical classroom!

The past year has brought some changes in our faculty ranks. Dr. Bill Eustes retired from Mines in December 2020 after 26 years of teaching in the PE department. He is greatly missed, but he has not gone far (Conifer, Colorado) and graciously allows us to call him up and task him with some special projects (SEVERAL special projects!). Dr. Jorge Sampaio also decided to retire in May 2021 after six years with the department. He is also staying in contact with us, but from a slightly farther distance, as he has retired to Australia to be closer to family. If you are keeping track, you'll realize that the departure of these two gentlemen left a fairly sized gap in our drilling and completions faculty ranks. Therefore, I am pleased to announce the arrival of our newest Mines' PE faculty, Tim Sorensen, who has been hired as a Professor of Practice to handle our drilling courses starting this fall. Tim is a proud Mines' graduate, and we are very happy to have him back home in Golden!

Teaching was challenging this past year with the various COVID protocols in place, but our faculty stepped up to the challenge while continuing to do all of the other things that make them extraordinary. We have several new research initiatives that have or are kicking off including projects in geothermal, methane emissions, foam EOR, CCUS and cryogenic injection, just to name a few. Work always continues in our fundamental PE areas, but as you can see from this list, we are expanding our research portfolio to address some innovative areas that fit right into our areas of expertise. We are very happy to announce one specific project that will be one of the largest funded projects ever in our department (around \$4.8MM) in the area of geothermal at the Utah FORGE project ([utahforge.com](http://utahforge.com)). Stay tuned for more information there and on all of our research programs in our various social media outlets.

Perhaps the most exciting thing that we get to bring to your attention in this newsletter is – drum roll please – the Mines Petroleum Engineering Department will be celebrating its 100th anniversary in 2022!! Yes, your very own PE department will be celebrating its centennial birthday starting on January 1, 2022. As behooves such an occasion, we are planning several special events throughout the calendar year, so please stay tuned for announcements about such and a calendar of events which will be posted on our department's website ([petroleum.mines.edu](http://petroleum.mines.edu)) and on our social media platforms. One item that you can go ahead and put on your calendar is the annual alumni reception that will be held in conjunction with the SPE Annual Technical Conference and Exhibition, which just happens to be back in Houston on October 3-5, 2022. More details to follow on that and all of our 100th anniversary events!

Speaking of SPE ATCE, you probably know that this year's (2021) is in Dubai, UAE, from September 21-23. We have chosen not to have a formal alumni event in Dubai this year due to the continued travel restrictions so many are facing. However, some of Mines' faculty and staff, including myself, and a small group of students do plan on attending. So, if you are there, please look us up – we'd love to see you!

I sincerely hope that the past year has been a positive one for you and your families. I know that 2020-2021 has had more challenges than most of us ever dreamed of, but please know that we are thinking about you and hoping that all of our alumni are doing well. As always, drop us a note via whatever your preferred means is – we love hearing from you!! And definitely hope to see you on campus, at a conference, or somewhere sometime soon!

Go Orediggers!

Jennifer



# DEPARTMENT STATISTICS

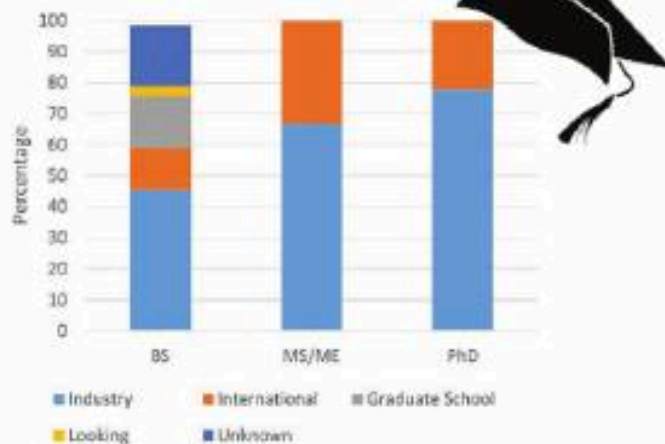
## Student Data

### PE STUDENT ENROLLMENT

|                                | 2017-18    | 2018-19    | 2019-20    | 2020-21    |
|--------------------------------|------------|------------|------------|------------|
| <b>Undergraduate Program</b>   |            |            |            |            |
| Freshman                       | 43         | 73         | 78         | 38         |
| Sophomores                     | 67         | 54         | 92         | 78         |
| Juniors                        | 89         | 73         | 69         | 77         |
| Seniors                        | 261        | 178        | 105        | 94         |
| <b>Total Undergraduates</b>    | <b>460</b> | <b>378</b> | <b>344</b> | <b>287</b> |
| Spring Graduating Class        | 132        | 90         | 71         | 49         |
| <b>Graduate Program</b>        |            |            |            |            |
| ME                             | 21         | 16         | 11         | 6          |
| MS                             | 36         | 31         | 36         | 28         |
| PhD                            | 51         | 49         | 49         | 33         |
| <b>Total Graduate Students</b> | <b>108</b> | <b>96</b>  | <b>96</b>  | <b>67</b>  |
| Spring Graduating Class        | 36         | 12         | 14         | 15         |

### PE PLACEMENT RATES

2019-2020



### PE AVERAGE STARTING SALARY

2019-2020

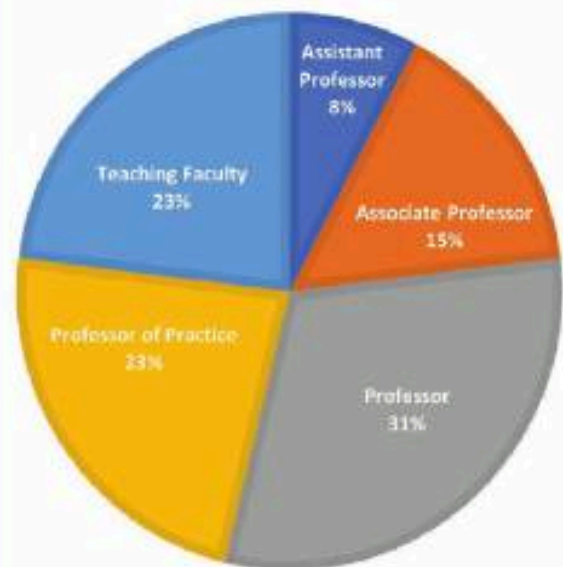


## Department Data

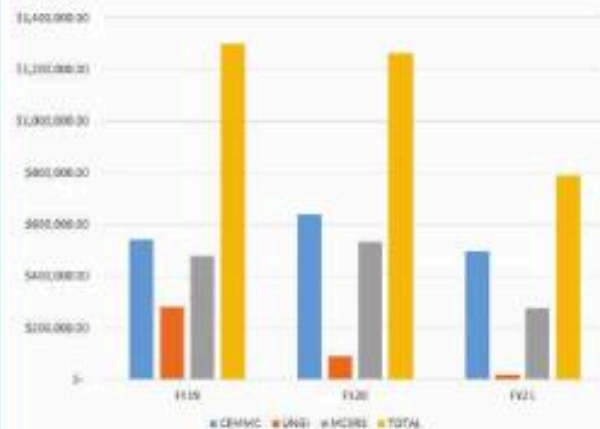
### PE FACULTY BY TITLE

SUMMER 2021

TOTAL FACULTY: 13



### PE RESEARCH EXPENDITURES BY CENTER



# PROGRAM ADVISORY BOARD (PAB)

## PAB Members

Thanks to the PAB members for their support and advocacy! They work as a whole and on subcommittees to support the department with curriculum development, mentorship opportunities, the alumni survey and developing partnerships and data sharing with industry.

Our members in 2020-2021 were: David Bryant, BHP Billiton; Kevin Chambers, Chevron; Patrick Disher, Apache; Pat Hogelin; Susan Howes, Subsurface Consultants & Associates, LLC; Jessica Iriarte, Well Data Labs; Basak Kurtoglu, Quantum Energy; Fersheed Mody, E&P Technology Consultant; Vicky Jackson Nielsen, Hess; James Page, Oxy; Amanda Rebol, Kimmeridge Energy; Clifford Sanden; Adam Sayers, Axia Energy; Mark Sonnenfeld, Cimarex; Sandy Stash, Lucid Energy; and Barry Thomas, ConocoPhillips.

Pictured right are our PAB members in alphabetical order.



## PAB Survey Results

The Program Advisory Board (PAB) for the Petroleum Engineering (PE) Department at Mines sent their annual survey to 2727 Mines PE alumni for whom the department has contact information. About 12% responded, with representation from each decade back to the 1950s. A presentation comparing the 2021 Alumni survey results with the 2020 survey results was reviewed by the PAB at their May 2021 meeting. You can see the presentation at <https://petroleum.mines.edu/advisoryboard/>

The survey asks the same questions each year so that the PAB can use the trends in the results to better advise the PE Department. The results are presented in three groups, by years of Full Time Experience: 0-4 years, 5-9 years and > 10 years. Responses from the most recent graduates are necessary to confirm achievement of Program Educational Objectives, important for Accreditation Board for Engineering and Technology (ABET) accreditation.

One new trend that was remarkable this year was the prevalence of comments related to Environmental, Social and corporate Governance (ESG), particularly from the survey respondents with more than 10 years of industry experience.

- I think it would be helpful to add a thoughtful (and reasonable) course on environmental, social, and governance considerations and how they impact decision-making, a company's social license to operate, and determining overall investment/project risk.
- The industry is evolving and emissions and ESG ... will be a big focus moving forward. Exposure and knowledge build on key components to environmental/emissions would set Mines apart. Learning about greenhouse gases, CO<sub>2</sub>e, etc. natural gas/diesel substitution rates, methane slippage, grid power, etc.
- Combined ESG/Ethics/Environmental course
- ESG - Curriculum is a must have now
- Don't lose sight of land use issues and environmental engineering.
- Increased focus on social and environmental consequences of industrial activity

One of the goals for the survey committee is to explore ways that the PAB can encourage alumni outside the USA to respond to alumni surveys. Most of the responses received in the past 3 years to the survey are from former students who are citizens of the USA. Is it possible that we are missing responses from students who have returned to their countries of origin and haven't stayed in touch with Mines?

### ALUMNI SURVEY

We want to continue to strengthen the department, and this requires a few minutes of our alumni's time. Please follow the below link to a short survey. Your participation is greatly appreciated!

<https://forms.office.com/r/K7Y27gt2p3>



# FACULTY CHANGES

## Drs. Eustes and Sampaio Retire

We had to say goodbye to Drs. Eustes and Sampaio this year. Dr. Eustes decided to retire...sort of. He's not teaching, but Dr. Eustes is now an associate professor emeritus working on a couple special projects.

Dr. Eustes' decades at Mines meant there were a lot of people he touched. We put the word out every where we could think of and had people from every stage of Bill's life at Mines attend the virtual reception.



Dr. Sampaio really liked his retirement gift.

Dr. Sampaio had only been with the department for about 6 years, but still made a great impact during that time. He taught the completions course solo in the spring before retiring.

Both of these men retiring meant we had no experts in drilling, which led to a search for a new drilling professor...



These are just some of the many people who attended Dr. Eustes' virtual retirement party.

## Welcome Prof. Tim Sorensen

Hello Orediggers! There are no words to fully describe how overjoyed I am to have come full circle back to Mines as faculty. I began this journey as an undergrad at Mines in 1998, where I thought I wanted to be a physics major. That changed once I took Physics II, and I decided to be a geophysicist instead, then finally settled on geology. After graduating I went into the oilfield as a wellsite geologist and mudlogger. A year later I returned to Mines, but strayed across the street from Berthoud Hall to get my master's degree with Dr. Miskimins as my advisor. The petroleum sector then pulled me full force to Houston, where I spent the next 14 years. The great majority of that time was spent working for ExxonMobil as an engineer, with instruction of both new hire and mid-career engineers as one of my favorite responsibilities.

I grew up here in the Denver metro area, and it's lovely to be back. Mines always felt like home, and at the risk of sounding cheesy, I think it always will. But what exactly am I doing here? Great question, so let's talk about drilling! I'll be taking on the PEGN 311 and 361 classes, among others, as my primary focus. Drilling engineering has always been a somewhat misunderstood petroleum specialty, and for good reason. A large amount of fieldwork is involved and it is the alloy of fine-detail specialties such as facilities engineering and inexact sciences such as reservoir engineering and geology which make it so unique. The other side of drilling which makes it such an adventure is the ability to cope when things go wrong, which they inevitably do. If you ever come across a well with no problems at all, please call me, or better yet write a paper about it! Safety, risk management, and field decision-making are always at the forefront of my mind.

As the industry changes and evolves, drilling engineering must change with it. Wellbores are still needed for new fields and old fields, but newer applications in geothermal, sequestration, and disposal are on the rise. Add to this the enormous quantity of wells requiring abandonment and/or remediation, and drilling's place in the constantly shifting petroleum industry is plain. I plan to incorporate more of these topics into the drilling curriculum, allowing our students to meet these challenges head-on.

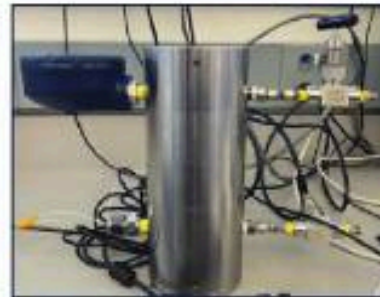
I prefer a direct, open communication style, so please reach out to me anytime (tsorens@mines.edu). Let us continue this amazing journey together!



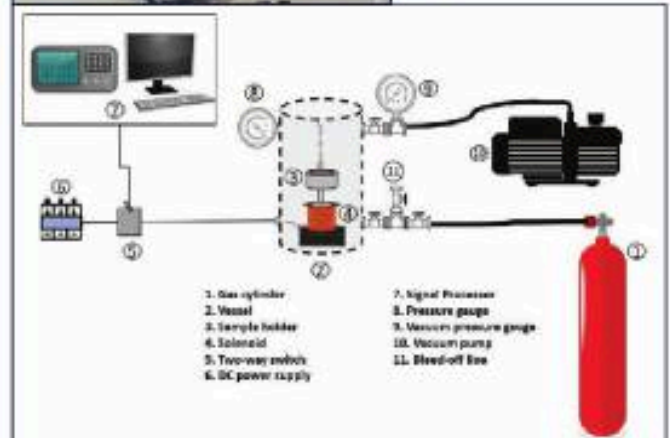
Prof. Sorensen with his wife and son at Epcot.

## Awards and Recognition

- The Enger Teaching award went to Dr. Bill Eustes in fall 2020 and Dr. Mansur Ermila in spring 2021.
- The Mines Alumni Board of Directors gives out awards every fall, and in fall 2020 several PE alumni were recognized. More details about the awards and recipients are at <https://weare.mines.edu/s/840/19/interior.aspx?sid=840&gid=1&pgid=465>.
- Outstanding Alumnus Award: Barry Thomas '91. This award recognizes an alumnus/na who has contributed meritorious service on behalf of Mines.
- Academic Support Award: William Fleckenstein '86, ME '88, PhD '00. This award is given each year to a member of the Mines community who goes above and beyond to support the rigor of a Mines education.
- Young Alumna of the Year Award: Jordan Hopper '14. This award is presented to a recent graduate whose accomplishments have reflected favorably on the school and are actively involved in their alumni community.
- M Club Leader of the Year: Alyse Keller '15. This award recognizes alumni who are M Club Leaders in their area and go the extra mile to support Mines and their fellow Oregidgers.



MS student Mohammad Airlangga in Dr. Xiaolong Yin's group recently measured the total gas stored in a nanosilicate material called MCM-41. Left is the pressure vessel used to make measurements and below is the experiment schematic.



## Research Tidbits

- A new research grant for 2021, entitled "Simulation test of fracture initiation and propagation", was funded by CNPC-USA. It will be led by Drs. Yu-Shu Wu and Phil Winterfeld on further development and enhancement of hydraulic fracture simulator.
- Drs. Yu-Shu Wu and Phil Winterfeld developed a new theory on multicomponent diffusion model, representing a breakthrough in theoretical study of mass transport in porous media, and published in the *SPE Journal*.
- Dr. Fleckenstein leads a multi-disciplinary team who was awarded a \$4.8 million DOE grant to develop tools for harvesting geothermal energy. The Utah FORGE project will be based on some existing patents (see below).
- Years of work have paid off and this year two patents were awarded. The first was developed by Drs. Fleckenstein and Eustes on a Method and apparatus to rotate subsurface wellbore casing (<https://patents.justia.com/patent/10961791>). On the second Dr. Fleckenstein led a team which was Downhole tractor for use in a wellbore (<https://patents.justia.com/patent/10927625>).
- Dr. Yilin Fan received a grant from the American Chemical Society Petroleum Research Fund in 2020. The research is about "Experimental Investigation of Droplet Size Distribution in Water-in-Oil Emulsion in Air and Emulsion Multiphase Horizontal Pipe Flow."
- Dr. Winterfeld is finishing project entitled "Laboratory and modeling studies of cryogenic fracturing/cooling processes around boreholes with liquid nitrogen." Newcrest Mining's Lihir gold mine, in Papua, New Guinea, is in a seismically active area and the ground is hot due to this activity. Part of the gold mining process is to drill boreholes and place explosives into them for detonation. The hot ground causes thermal degradation of the explosives, and we are studying minimizing this degradation by injecting liquid nitrogen into the boreholes in order to cool them.
- Dr. Winterfeld is working on project entitled: "Software Upgrade and Algorithm Research on Three-Dimensional Hydraulic Fracturing Propagation Model" for China National Petroleum Corporation where we will upgrade Frac-CSM, the three-dimensional fracturing simulator, and optimize the numerical algorithm for fracture propagation modeling including improving the speed of the simulator by increasing the code efficiency, improving the linear equation solution speed, parallelizing the code with either MPI and OPEN-MP, and improving the fracture mechanics formulation by implementing the three-dimensional Displacement Discontinuity Method for fracture width and induced stress calculations.
- Dr. Kazemi had four students defend and graduate over the summer. Their thesis topics span a wide variety of subjects—experiments involving low-cost ketones to enhance oil recovery (Etaf Alghunaim), analytical evaluation of a shale reservoir performance in the DJ Basin (Balnur Mindygaliyeva and Nurbol Bekbossinov), and testing a practical matrix refinement computer code for use in low-permeability fractured reservoirs (Sarah Alruwayi). Research for his current advisees involved laboratory experiments to compare performance of synthetic low-permeability cores vs. reservoir cores (Asm Kamruzzaman), geologic and engineering assessment of Permian Basin reservoirs (Ozan Uzun), numerical and engineering assessment of a gas-condensate region in Eagle Ford (Kaveh Amini), and experimental measurement of relative permeability in fractured carbonate reservoirs (Daulet Gaziz).

## Other News

- Dr. Miskimins was the first guest for Mines' new podcast "The Conveyor". Check out her 10-minute podcast about the state of the industry (<https://bit.ly/3Cu92Nj>) and keep an eye on The Conveyor to see what else gets featured.
- For the TOPENERGY alliance (Mines, UTexas & Penn State) Jim Crompton revised their program on Environmental Stewardship and is developing a new section on the Digital Oilfield. Dr. Linda Battalora is now the Mines rep for TOPCORP.



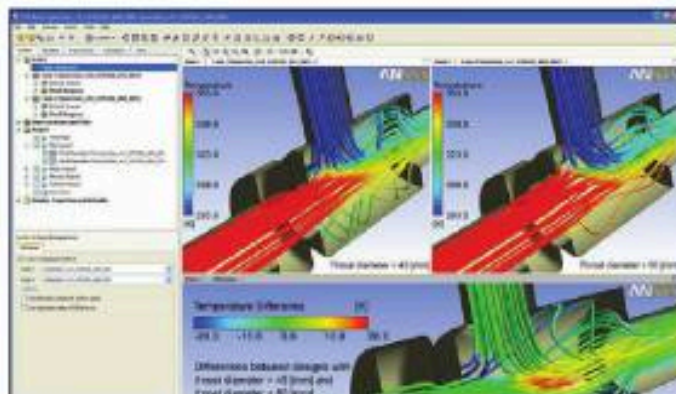
It probably surprises nobody that Jennifer got a new puppy during the pandemic – his name is Aidan. Here he is in her lap with his sisters Kensi and Zoey.

## PAPERS & PRESENTATIONS

Names highlighted in red are our students, faculty, research associates and post-docs.

### Presentations

- Prof. **Jim Crompton** has spoken at a lot of conferences, webinars, lecture series and class guest lectures over the past year, including Eminent Lecture Series, SPE Gulf Coast Society, a western India PE student group, OspreyData, and classes at University of Portsmouth and NU. He also completed a two-part webinar for Surtek on challenges of data visualization and explainable AI.
- **Dr. Zerpa** was chair of the Session on Wetting, Interfaces, and Membranes of Gas Hydrates at the Twenty First Symposium on Thermophysical Properties, June 20-23, 2021.
- **Dr. Fleckenstein** presented on "Finite Element Analysis of Casing Deformation" at SPE Virtual Summit: Casing Deformation During Fracturing of Unconventional Wells, on 16-18 February 2021.
- **Philip H. Winterfeld** and **Yu-Shu Wu** presented "Multi-stage hydraulic fracturing simulation with fluid and heat flow, and geomechanical effects" at the AIChE 2020 Virtual Annual Meeting.
- PhD student **Berk Coskuner** presented his work, "Effects of Molecular Level Forces on the Diffusivity Characteristics of Hydrocarbons in Shale Reservoirs" at the UrTec meeting in Houston, July 2021.
- **Santiago Rocha** MS '21 and **Luis Zerpa** will present "Evaluation of closed-loop geothermal heat extraction concepts using reservoir simulation" at the 2021 Geothermal Rising Conference at San Diego, California, 3-6 October, 2021.
- **Wang, Shihao, Yu-Shu Wu**, and X. Wen, "Unified Reservoir and Seismic Simulation with Explicit Representation of Fractures and Faults," SPE-203979, to be presented at SPE Reservoir Simulation Conference, 4 - 6 Oct 2021 Galveston Island Convention Center Galveston, Texas, USA
- **Similoluwa Oduwole, Luis Zerpa**, Mathias Pohl, Jyoti Behura, and Manika Prasad will present "Reservoir analysis of a CO2 sequestration site: Experiment-guided field scale modeling" at the 2021 International Meeting for Applied Geoscience & Energy, 26 September - 1 October, Denver, CO.
- **Yu, Xiangyu**, Cong Wang, X. Yan, **Shihao Wang**, Lei Wang, **Phil Winterfeld**, and **Yu-Shu Wu**, "A 3D Coupled Thermal-Hydraulic-Mechanical (THM) Model Using EDFM and XFEM for Hydraulic-Fracture-Dominated Geothermal Reservoirs," SPE-203983, to be presented at SPE Reservoir Simulation Conference, 4 - 6 Oct 2021 Galveston Island Convention Center Galveston, Texas, USA
- **Wu, Dawei**, Yuan Di, and **Yu-Shu Wu**, "Theoretical and Numerical Investigation of Supersonic Multiphase Gas Injection," SPE-203911, to be presented at SPE Reservoir Simulation Conference, 4 - 6 Oct 2021 Galveston Island Convention Center Galveston, Texas, USA
- **Tian, Ye, Chi Zhang**, Zhengdong Lei, **Xiaolong Yin, Hossein Kazemi**, and **Yu-Shu Wu**, "An Improved Diffusion Model for Fractured Tight Reservoirs," SPE-204010, to be presented at SPE Reservoir Simulation Conference, 4 - 6 Oct 2021 Galveston Island Convention Center Galveston, Texas, USA
- **Daniel Croce** PhD '20 and **Luis Zerpa** will present "Mechanistic model for the design and operation of an intermittent gas lift system for liquid loaded horizontal gas wells" at 2021 SPE ATCE at Dubai, United Arab Emirates, 21-23 September, 2021. SPE-205962-MS



This is one of the many visuals Jim Crompton used in his presentations over the past year.

## Publications

- **Jim Crompton** published a book titled *Digital Canterbury Tales*.
- **Chiang Cheng Siew '21** worked as a research scholar for Payne Institute. Her research paper on the topic of "Influence of Carbon Capture and Storage in the Future of Oil and Gas in Brazil" was published in The Payne Institute Commentary Series for the Payne Institute for Public Policy. <https://bit.ly/2Wa5i9x>.
- A recently published paper in *Energy & Fuels* on work by **Dr. Zerpa's** group on the modeling of gas hydrate formation in oil and gas pipelines, and providing guidelines to manage offshore pipelines, titled "Changing the Hydrate Management Guidelines: From Benchtop Experiments to CSMHyK Field Simulations". <https://pubs.acs.org/articlesonrequest/AOR-Y5GERIFIGT2RWTIXEMWB>
- **Tian, Ye, Chi Zhang, Zhengdong Lei, Xiaolong Yin, Hossein Kazemi, and Yu-Shu Wu**, "An Improved Multicomponent Diffusion Model for Compositional Simulation of Fractured Unconventional Reservoirs," *SPE Journal*, 2021
- **Wang, Shihao, Yuan Di, Phillip H. Winterfeld, Jun Li, Xianmin Zhou, Bowen Yao, and Yu-Shu Wu**, "Understanding the Multiphysical Processes in CO<sub>2</sub>-EOR Operations: A Numerical Study Using a General Simulation Framework," Vol. 26, *SPE Journal*, pp.918-939, 2021
- **Zhao, Xinrui, Ridha Al-Abdrabalnabi, Yu-Shu Wu, and Xianmin Zhou**, "Evaluations of the feasibility of oil storage in depleted petroleum reservoirs through experimental and modeling studies," *Fuel*, 294, 2021
- **Wu, Yuanqing, Jisheng Kou, Shuyu Sun, and Yu-Shu Wu**, "Thermodynamically consistent Darcy-Brinkman-Forchheimer framework in matrix acidization," *Oil & Gas Science and Technology-Rev. IFP Energies Nouvelles*, 76, 8, 2021
- **Tang, Huiying, Boning Zhang, Sha Liu, Hangyu Li, Da Huo, and Yu-Shu Wu**, "A novel decline curve regression procedure for analyzing shale gas production," *Journal of Natural Gas Science & Engineering*, 81, 2021
- **Tian, Ye, Chi Zhang, Zhengdong Lei, Xiaolong Yin, Hossein Kazemi, and Yu-Shu Wu**, "An Improved Multicomponent Diffusion Model for Compositional Simulation of Fractured Unconventional Reservoirs," *SPE Journal*, 2021
- Prof. **Jim Crompton's** piece, "When the Rules Get Ahead of the Data, There Is Nowhere To Hide" was published in *JPT* and *DSDE Journals*.
- An article featuring the moon drilling research **Deep Joshi, Dr. Alfred Eustes, Dr. Christopher Dreyer and Dr. Jamal Rostami** have been working on was published in *JPT*. <https://bit.ly/3s72j73>
- **Deep Joshi's** research on drilling on the moon was presented at SPE/IADC International Drilling Conference. A detailed write-up was published in *Drilling Contractor*. <https://bit.ly/3s30J4t>

## PETROLEUM DATA ANALYTICS GRADUATE CERTIFICATE

The new graduate level online Petroleum Data Analytics Certificate program has officially launched! The first year has gone well and we have even had our first graduates.

The program is focused on the practicing engineer with field level operations. The Petroleum Data Analytics Certificate provides an opportunity to receive a valuable Mines Certificate that fills the gap between a graduate degree and an industry short course. Plus, you earn graduate level credit hours. It is taught by industry-renowned Mines faculty with vast experience in the technical areas and in the digital oilfield. The Petroleum Engineering Department has worked with the Computer Science and Applied Math faculty to offer this practically oriented four three-credit hour course certificate program. In collaboration with the Trefny Engineering Education Center at Mines, the certificate is fully on-line with a global reach. This graduate level certificate will be extremely valuable for the individual and for any company that wants an in-depth education for staff and management at an exceptional value without having to come back to campus. Don't miss this amazing opportunity!

If you want to get involved, learn more at: <https://online.mines.edu/pda/>

### REQUIRED COURSES:

- DSCI403 Introduction to Data Science
- MATH530 Statistical Methods
- PEGN551 Petroleum Data Analytics – Fundamentals
- PEGN552 Petroleum Data Analytics – Applications



## Achievements & Competitions

- Gustavo Barraza was a NSF-REU Intern (The National Science Foundation funds a number of Research Experiences for Undergraduate students through its REU sites program. An REU site consists of a group of ten undergraduates who work in the research programs of the host institution.) His host institution was the Center for Environmentally Beneficial Catalysis-The University of Kansas (CEBC-KU). Gustavo's research project was on Catalysis of Alkene Epoxidation. Gustavo is working with his mentor to finish the research and write up their results with a projected publication in the next year.
- Some of the many external scholarships our student received include the SPE Dallas Section Scholarships (Nikhil Goud Kadirisani and Marie Christina Adjiman), SPE Denver Scholarships (Andrew Menzies, Chiang Cheng Siew, Edgar Juarez, George Roose, Jourdan Link, Niels Snow, Nikhil Kadirisani, Peter Kvokotov, Philip Dennar, William Jordan and Brou Marie Adjuman) and WY-SPE Chapter Scholarship (Gustavo Barraza).



May 2021 graduates Christina Adjiman, Chiang Cheng Siew, George Roose, Niels Snow and Clayton Kocot. Image credit: Chiang Cheng Siew



Masters student Nicole Bourdon worked on an emissions reduction project with Cimarex Energy in the Permian Basin.

The Mines Undergraduate Research Scholars had two PE students in the May 2021 cohort: Chiang Cheng Siew and Brou Marie Christina Adjiman. Siew was a URS for the last two years and received an honorable mention in the spring 2020 UG Research Symposium for her work on "Investigation of Reservoir Rock Properties Measurement Methods for Sandstone and Shale Samples". In the academic year of 2020-2021, Siew worked as a research fellow for the Economics and Business Department under the Mines Undergraduate Research Fellowship (MURF) on the topics of "Prescribing Optimal Decisions for Retailers using Retail Analytics" and the "Retail Analytics Analysis on the Influence of COVID-19 Social Distancing Guidelines in Stores" with her mentor Dr. Tulay Flamand. Christina worked with the mining department for her research regarding sustainability.

**SHELL INDUSTRY ACADEMIA EVENT 2021**  
SAT, FEBRUARY 27 | CLOSING & AWARDS CEREMONY

**Organizing Team**

|   |  |  |  |   |  |
|---|--|--|--|---|--|
| <br>Dorina Marjan<br>High Lecturer in<br>Reservoir Engineering in<br>Tanks SPE | <br>Patrick Chaudhry<br>Masters Student in<br>Petroleum Engineering in<br>Tanks SPE | <br>Matthew Beckendorf<br>Senior PE in Petroleum<br>Engineering at Chevron<br>CDM-SPE | <br>Nick Bryan<br>Senior PE in<br>Petroleum Engineering at<br>Chevron SPE | <br>Luis Carlos Hernandez<br>PE in Geology in<br>Reservoir Engineering at<br>Chevron SPE | <br>Matthew Cole<br>Senior PE in<br>Reservoir Engineering at<br>Shell SPE |
|---|--|--|--|---|--|

The Mines SPE team won second place at the Shell Case Study Challenge. The Mines SPE team members for this competition were Nicholas Bryan, William Benson, Ethan Anderson, Niels Snow, and Matthew Beckendorf.



Breakthrough! A team of grad students drilled and cored 112 ft from one drift to another at the Edgar Mine. The 3-inch bore hole will be used as part of a fiber optic casing flow-loop. Pictured left to right are Arif Aydar, Prof. Tim Sorensen, Esad Kaya, Kurt McKenna, and Daulet Galiyev. The bit is just visible over Kurt's left shoulder.



## Graduation Awards

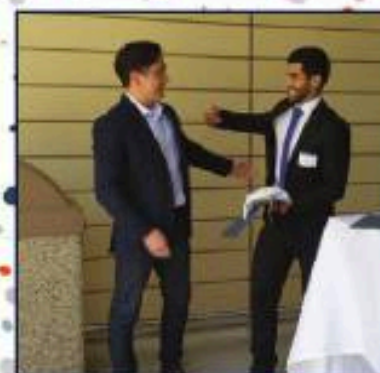
### December 2020

- Outstanding Graduating Senior: Ford Edwards
- Outstanding Graduating Masters: Bianca Levy Sgrio Geranutto
- Outstanding Graduating PhD: Rong Lu

### May 2021

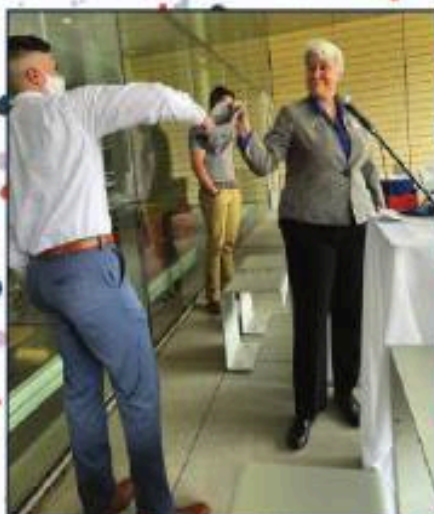
- Outstanding Graduating Senior: Leonardo Ruelas
- Outstanding Graduating Masters: Santiago Rocha
- Outstanding Graduating PhD: Deep Joshi
- Doug Tippie Award: Gunnar Merrick
- Wright Ethics Award: Chiang Cheng Siew

Unfortunately we did not get screenshots from the virtual fall receptions of the award recipients. All of the pictures below are from the spring graduation receptions.



Dr. Miskimins handed out the Wright Ethics Award to Cheng Chiang Siew (above left) and the Outstanding Graduating Senior Award to Leonardo Ruelas (above right) before having Leo help draw the name (below left) of the Tippie Award recipient, Gunnar Merrick (below right).

Dr. Luis Zerpa got to award the Outstanding Graduating Students awards to Master's recipient Santiago Rocha (above) and PhD recipient Deep Joshi (below) in his capacity as head of the Graduate Program Committee.





On 11/8/2020, two petroleum engineers—graduate students Sydney Tomblin and Katie Kowalchick—set out to tackle intense drilling operations on Petroleum Peak, located in the Sawatch mountain range in CO. The surface hole went well and the formation was soft. As they drilled deeper, they ran into some operational issues and broke the bit off from the drill string. Additionally, the water supply was beginning to freeze so operations were postponed for the season. These are great learnings we can take with us moving forward. Overall, it was a successful exploration drilling operation.

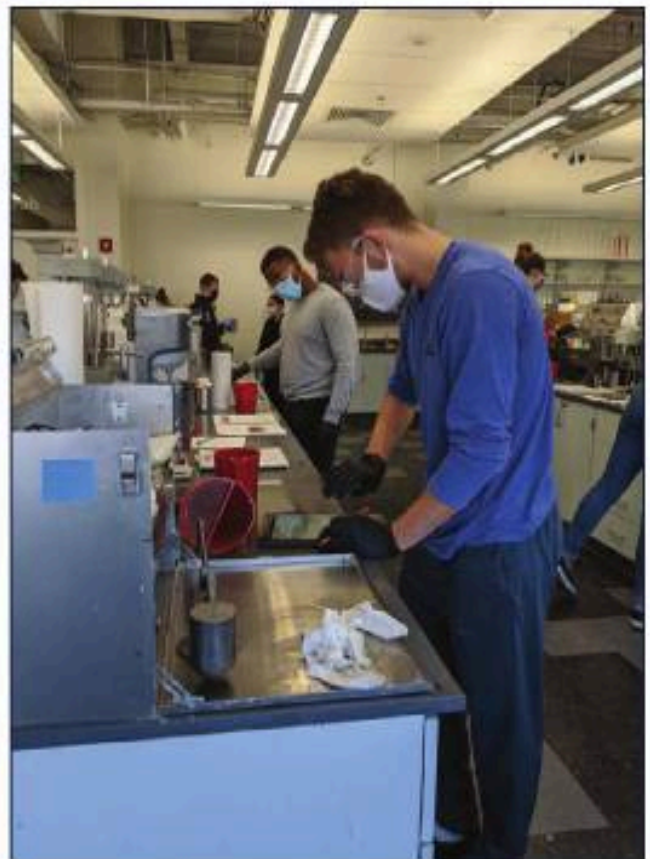
Image credit to Katie Kowalchick.

## PANDEMIC PRECAUTIONS

Mines had a comprehensive pandemic plan in place and students, faculty and staff followed those guidelines so Mines was one of the schools that never had to shut down during this past academic year. Campus had to be creative in finding additional classroom spaces as we adhered to social distancing guidelines and most of the existing classrooms got Live Capture systems so students could participate remotely. Teaching while wearing a mask was a challenge for both our faculty and the students, but we were able to push through and still have an effective school year.

Handling the labs under pandemic restrictions was especially difficult. We staggered lab stations to maximize how many people could be in the room while maintaining the required distancing and added additional lab sections. Masks, fogging goggles and other complications had to be overcome, but the hands-on experience was worth all the hassle.

Some of these precautions will still be in place for this academic year and some have gone away, but no matter what the circumstances we will continue to do everything we can to continue to give the best learning experience possible to our students.



Students from the drilling course practicing social distancing during one of the mud labs.

## SPECIAL PROGRAMS

### Chevron Short Course Series

We had to adapt and have all of the short courses as webinars this year. They included:

- *Data Analytics*, presented by Naser Erwmi, Nobel Energy
- *Hydraulic Fracturing*, presented by Pravin Patel, NexTier, Completion Solution
- *Real-time Fracture Diagnostic Tool - FracBeat*, Presented by Sattor Khakimov, Terra-Laboratories
- *Cementing Technologies and Applications*, Presented by Ahmed Mansour, Field Engineer II, from BJ services
- *Frac Design*, Presented by Premier Oilfield Group reps
- *StimPlan Hydraulic Fracturing Software*, presented by Carla De Paulo and Dante Guerra, NSI Technologies

Around 40 students, mostly seniors with a few juniors and grad students, participated in the series this year. Upon completion of the short course the students received a certificate of completion as well as additional skills, knowledge, and training to put on their resume.

Students were excited for the opportunity to learn skills that were immediately useful in classes and internships.

We are always looking for interesting and useful instructors and courses, so please contact Mark Miller if you would like to participate or share an opportunity for a course students would benefit from.

A big thanks to **Chevron** for their continued support.

### Distinguished Seminar Series

We have an unusual year with no seminars in the fall and going fully virtual in the spring. We also changed the time to every other Monday at 4 pm. The new time worked really well and we look forward to seeing how it works when we're in person again this fall.

We are still looking for speakers for this coming spring 2022. We are especially interested in speakers who can address future opportunities (research opportunities in new techniques, future of the field, etc.), specialized technical topics or related topics such as artificial intelligence or banking and its involvement in O&G.

Please contact the department at (303) 273-3740 or [petroleum@mines.edu](mailto:petroleum@mines.edu) with speaker referrals or to volunteer to speak on these or related topics.

#### PRESENTERS IN SPRING 2021

- Jan 15: Ahmed Amer, Newpark Fluids Systems - *New R&D Trends to address Lost Circulation*
- Feb 8: Dr. Hariprasad Janakiram, Chevron - *Current trends in Flow Assurance: from R&D to Applications*
- Feb 22: Dr. Roland Horne, Stanford - *Big Data and Machine Learning in Reservoir Analysis*
- Mar 8: Dr. Ding Zhu, Texas A&M University - *Using Downhole Fiberoptic Sensing Technology to Monitor, Control and Improve Well Performance*
- Mar 22: Dr. Jingjun (Zi) Zhang, ConocoPhillips - *Mitigating Production Degradation Due to Frac Hits in Unconventional Reservoirs*
- Apr 5: Kyle Haustveit, Devon Energy - *Making Decisions Using Completions Diagnostics Tools in Unconventional Reservoirs*
- Apr 10: Dr. Abbas Firoozabadi, Rice University - *Molecular Structure, Functional Molecules, Molecule Simulations and Classical Thermodynamics in Relation to Efficient Hydrocarbon Energy Production and Stewardship of the Environment*

## SUPPORTING PE STUDENTS

Scholarships provide much needed financial assistance to students pursuing studies in the Department of Petroleum Engineering, especially to those who demonstrate a passion for learning and applying new knowledge in support of the science and engineering community.

Donations can be made to any of the petroleum engineering scholarships found on our website. You can support our students by making a gift, in any amount.

Go Online: [weare.mines.edu/supportpe](http://weare.mines.edu/supportpe)

Mail a Check or Visit Us:

Starzer Welcome Center  
1812 Illinois St  
Golden, CO 80401

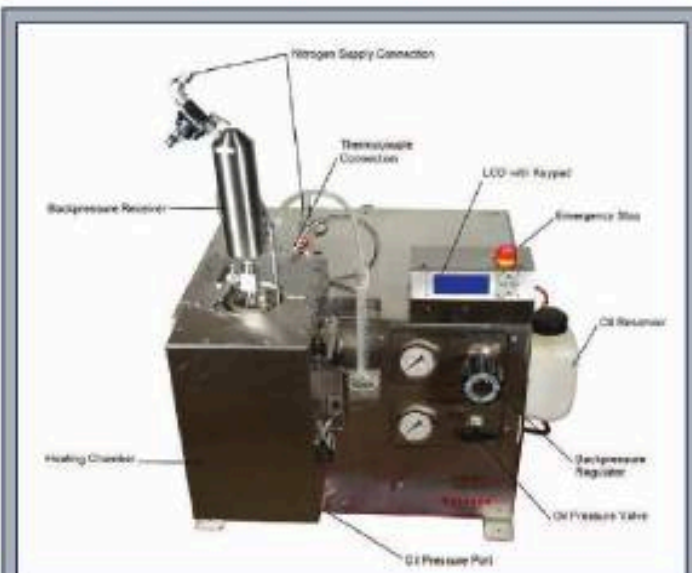
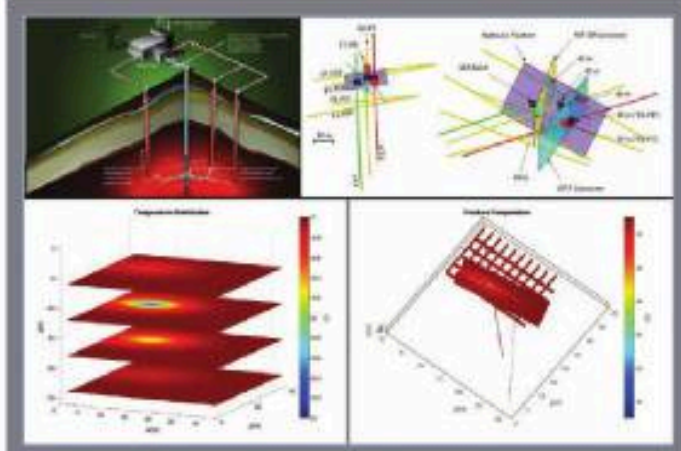


# SOCIAL MEDIA RESEARCH FEATURES

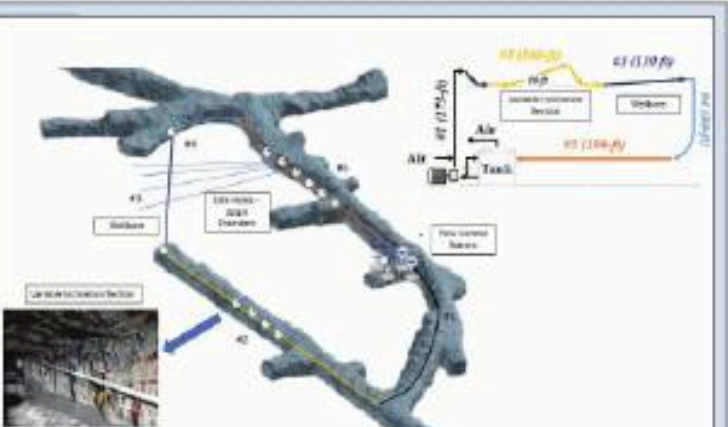
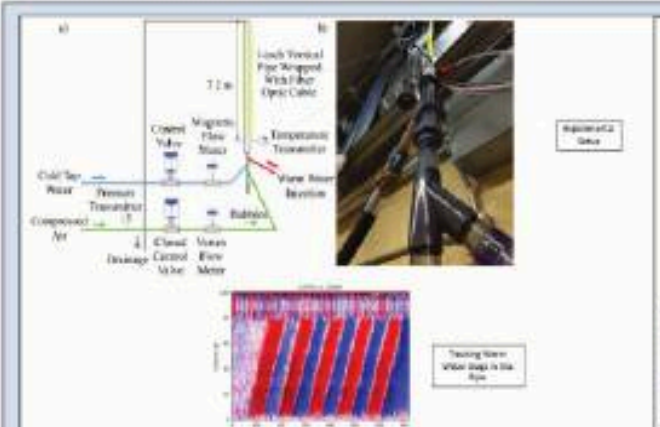
We started a new feature this year on the department Facebook page. Every Friday during the school year a new #ResearchFeature post about some of the research being done in the department went live. Check out these snippets and photos from many of the posts from the past academic year, then make sure to follow us on Facebook to see this year's features.

Thanks to student office worker Kallyn Regidor for contacting faculty and students and writing the posts!

Graduate student Xiangyu Yu, worked with Professor Yu-Shu Wu on an E&S Collab project with geological, geophysical and engineering exploration and monitored tools that directly operated on a geothermal reservoir in South Dakota. Those tools were used to stimulate hydraulic fractures into which cold water could be injected for heat production. Below shows the model produced from the exploration data and the temperature distribution results of our simulation when we consider a natural fracture network.



This features PhD student Ola Akrad and her research on Particulate Diversion Experimental Studies under the FAST consortium. Particulate diversion method works by pumping diverting particles into the wellbore where they block the path of least resistance and create a barrier. Pictured above is the APRA equipment used and below are the diverters.



Ph.D. students Cagan Kuzun and Aleks Titov are working on the Fiber Optics Research Program. Their research consists of on-campus experimentation as well as research at the Edgar Mine. Fiber Optics Research Program is a multidisciplinary collaboration between P.E. and Geophysics research groups (FAST and RCP) and professors Dr. Jennifer Miskimins, Dr. Ali Tura, Dr. Ge Jin, Dr. Yilin Fan. The program's research focuses on subsurface distributed fiber optics sensing methods via field data analysis, modeling, and experimentation. The picture above left depicts the flow loop experimentation in Alderson Hall. In which, the fiber, through DFS and DAS interrogation, is used to characterize the multiphase flow and heat transfer within the pipe. The second picture belongs to the larger flow loop currently being constructed in Mines's Edgar Mine.

Deep Joshi Phd '21 did some really impressive research alongside Professor Dr. Bill Eustes III and faculty in the Mining Department regarding drilling on the Moon and Mars, mostly funded by NASA's Early Stage Innovation grant.

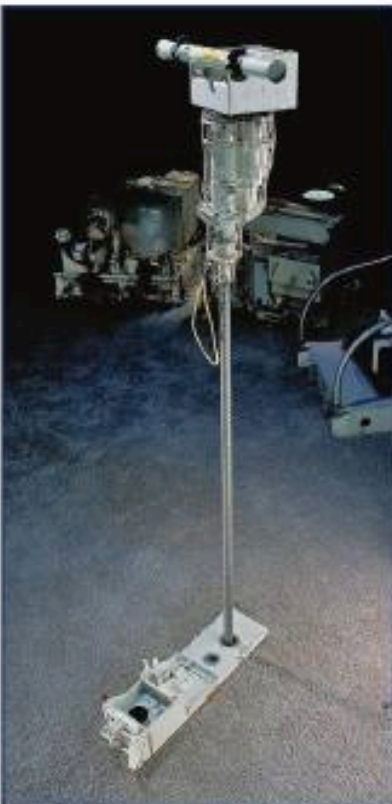


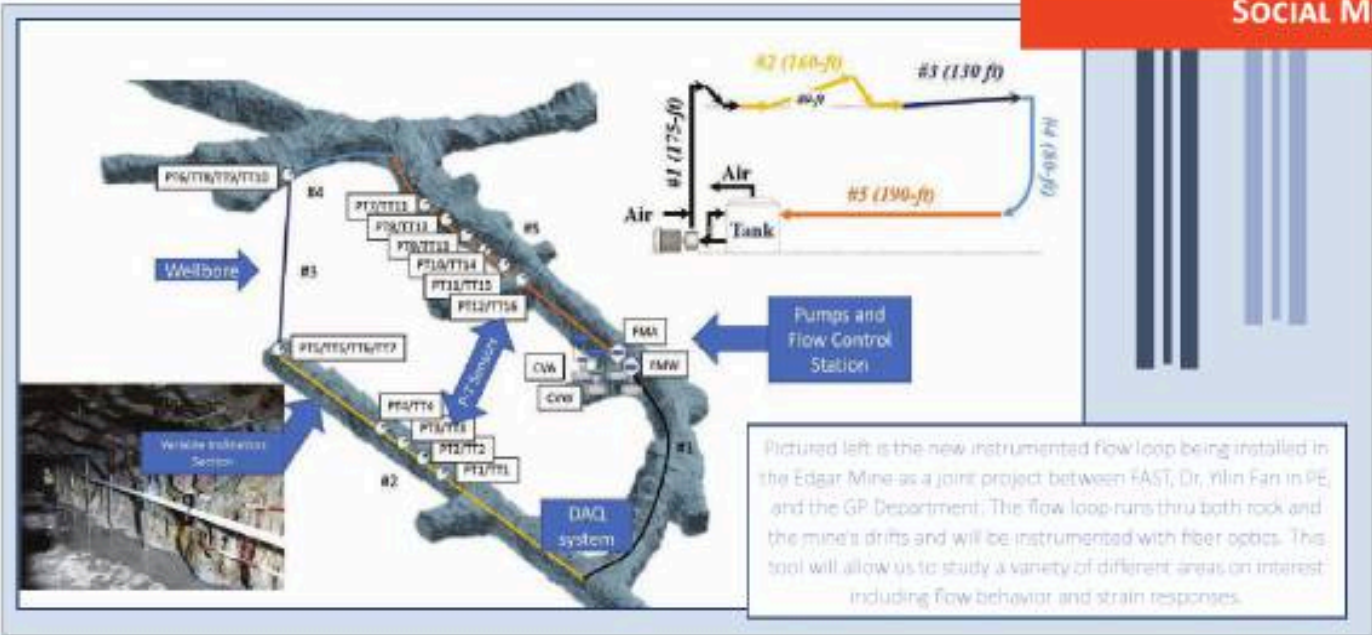
Drilling system fabricated by Deep Joshi and Dr. Bill Eustes to replicate drilling into analog and cryogenic lunar soil simulant. Images to left, above and below.



Below is the Luna-27 lander designed by ESA and ROSCOSMOS to detect and characterize lunar volatiles will be launched in 2025. The lander contains a 1-m class ProSEED drill. We also see in the next picture below is the Apollo Lunar Surface Drill (ALSD) used for Apollo 15, 16, and 17 to drill on the Moon and acquire core samples.

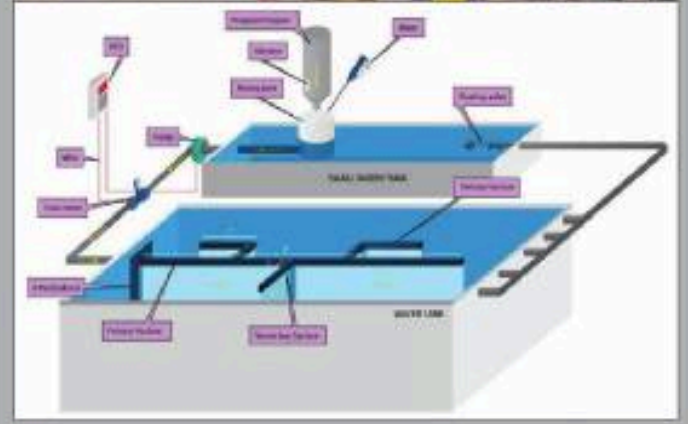
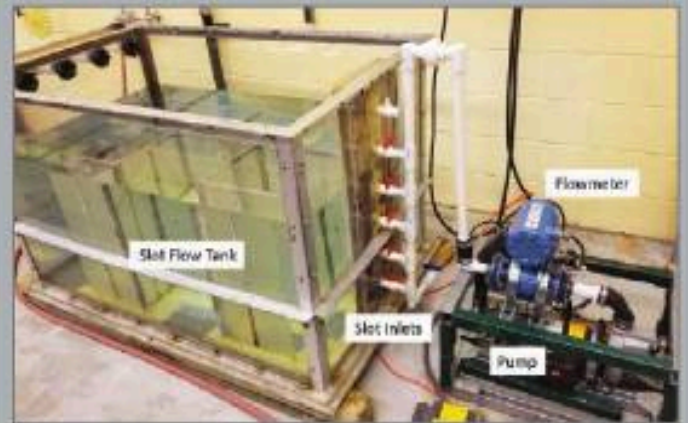
To the left is a representation of the machines that are and will be used to drill on the moon.



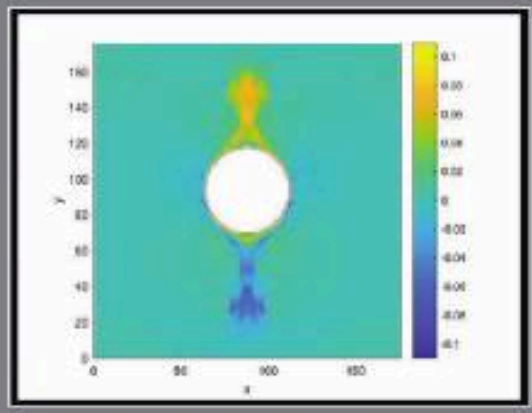
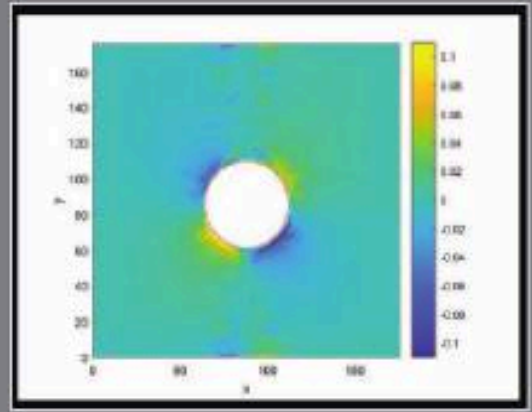


Pictured left is the new instrumented flow loop being installed in the Edgar Mine as a joint project between FAST, Dr. Yilin Fan in PE, and the GP Department. The flow loop runs thru both rock and the mine's drifts and will be instrumented with fiber optics. This tool will allow us to study a variety of different areas of interest including flow behavior and strain responses.

The Proppant Transport in Complex Fracture Systems project is led by PhD student Ashwi Bahri under FAST consortium director Dr. Jennifer Miskimins. Pictured below are the apparatus and schematics of the project. The experimental apparatus for this research was designed at Mines to understand proppant transport in a complex fracture network. The experimental apparatus consists of fracture slots, a mixing tank, a mixer, flow lines, a flow meter, and a slurry pump. This apparatus has one primary fracture, three secondary fractures, and two tertiary fractures. Sieve analysis equipment was used to analyze the collected proppants from inside the slots.



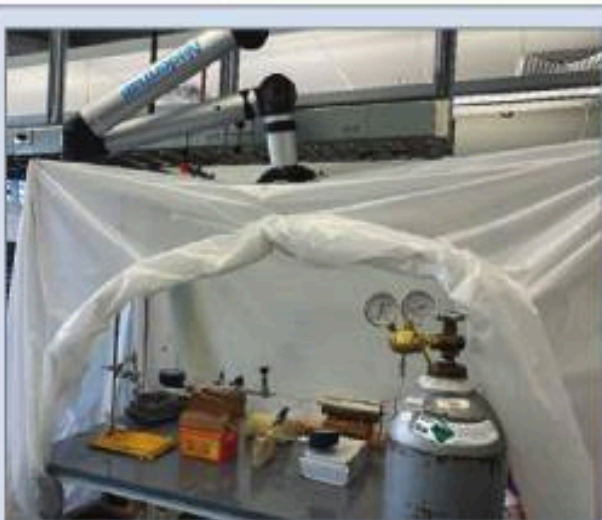
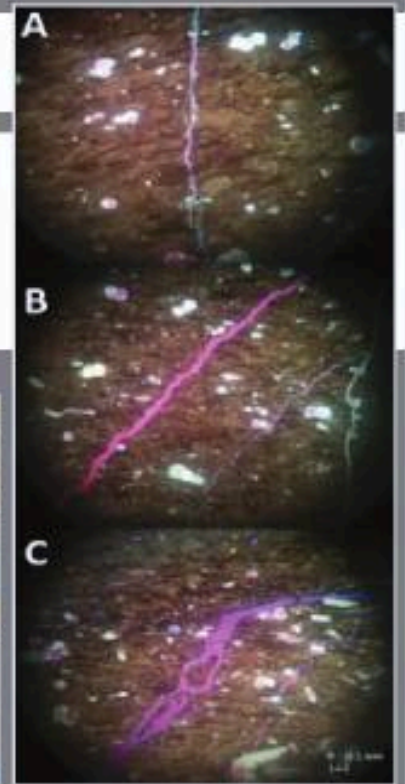
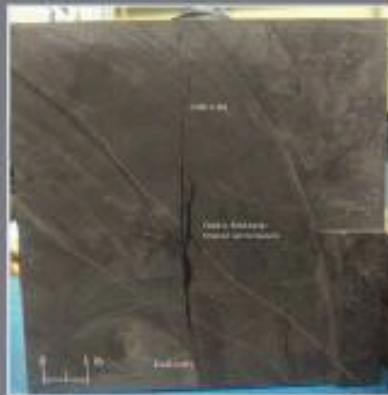
Studies on multiphase fluid dynamics and fluid properties are led by Associate Professor Xiaolong Yin's research group. Pictured below are animations of distributions of x- and y-velocities around an oscillating sphere. "Virtual Mass of an Oscillating Sphere" – a research conducted by undergraduate student Niels Snow advised by Prof. Xiaolong Yin – will be presented at the online AIChE Annual Meeting in a special session held in honor of Prof. Christine Hrenya in her contributions to particle flows.



## RESEARCH FEATURES, CONTINUED

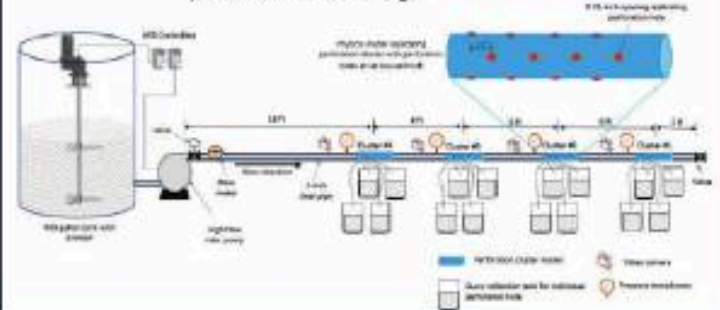
Doctorate student Juan Carlos Camata works with Dr. Miskimins under the FAST consortium. His research includes laboratory experiments focusing on fracture mechanics for tight sandstone and mud rock (shale) environments, specifically diving into fracture tip mechanisms.

Pictured below left is Mines True Triaxial Test Unit (TTU) located at Alderson Hall's High Bay lab. The picture below center provides a clear interpretation for tip mechanisms, in terms of P2S and dilation. The main crack is seen opening in the direction of the net pressure but as it progresses towards the fracture tip, its width decreases until disappearing at the crack tip. The image to the right to that shows three views of the main crack progression, where a thinner main crack is seen at the beginning of fracture development, but as it progresses, its width becomes larger and thinner bifurcated cracks are seen departing the main crack.



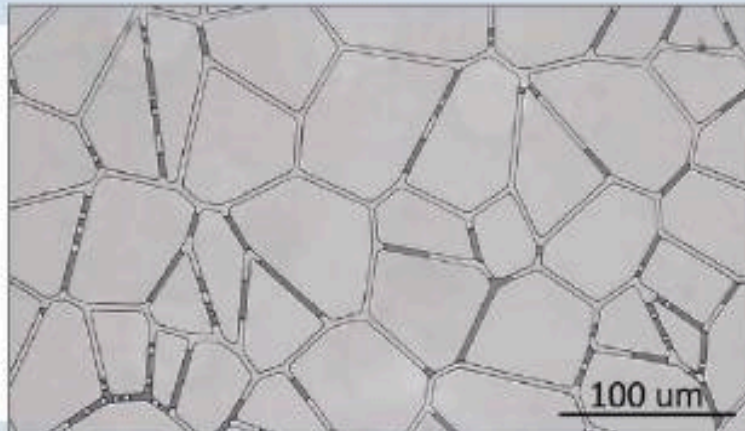
Ph.D. student Berk Coskuner's research is regarding the reduction of ferric ions. His project is under the supervision of Dr. Yin and Dr. Ozkan under the UREP consortium. Pictured is a negative pressure chamber which contains the experimental setup as well as CO<sub>2</sub> detectors as represented by the image. During the CO<sub>2</sub> injection period of the experiment, the plastic curtain is closed to maintain the negative pressure environment, so that any possible CO<sub>2</sub> leakage will be diverted away from the laboratory.

**Lab setup diagram for proppant placement along a horizontal pipe with modular perforation cluster design**



The Proppant Transport and Distribution Among Perforation Clusters in Horizontal Wellbores project is led by PHD Graduate Faraj Ahmad. Pictured above is the experimental apparatus and set up of the project. The objectives of the project were to investigate the parameters that have a significant effect on proppant distribution in the wellbore and among perforation clusters for a single fracturing stage using slickwater fluids and to investigate the change in the perforation orientation on proppant placement in multiple clusters.

## SOCIAL MEDIA RESEARCH FEATURES, CONTINUED



PhD student Shaken Kenzibekhanov works in the Multiphase Fluid Dynamics and Fluid Properties consortium led by Dr. Yin. Their research involves fluids in microfluidic chips. Pictured for left is a microscope as well as what the microfluidic experiment looks like under it. Their group uses microfluidics to visualize and conduct fundamental research on fluid flow through porous media.

PhD student Kirtland McKenna's does his research alongside Dr. Bill Eustes using the Apache Drill. The Apache rig is an industrial coring rig used in the mining industry. The PE department is using it for education and research. Their research is to use artificial intelligence to characterize geomechanics directly from drilling data. We have outfitted the drill rig with sensors and have a custom built measurements while drilling tool to measure high frequency drilling dynamics.

Pictured below is the Apache rig being used to drill a 123 ft horizontal wellbore from one mine drift to another. This was for a closed flowloop research project. You can see the drill pipe and hole opener coming out of the mountain next to PhD student Kirt McKenna



Research Assistant Professor Tedesse Teklu's research includes experimental and modeling study of: (1) EOR/AOR of sandstone, carbonate, and shale reservoirs using variable fluids such as seawater, low salinity water, surfactant, CO<sub>2</sub> and combination of these fluids; (2) Matrix and fracture permeability, geomechanics, hydraulic fracturing, and CO<sub>2</sub> storage characteristics of sandstone, carbonate, and shale formations. These experimental studies are performed under high pressure and high temperature (HPHT) conditions. The photos below shows the HPHT coreflood and imbibition experimental setup used in Dr. Teklu's research work.



# STUDENT ORGANIZATIONS

*THE STUDENT ORGANIZATIONS HAD A HARD YEAR WITH THE STRICT LIMITATIONS ON GATHERINGS, BUT THEY PERSEVERED AND STILL PROVIDED OPPORTUNITIES FOR STUDENTS TO NETWORK AND LEARN.*

## American Association of Drilling Engineers (AADE)

The American Association of Drilling Engineers student chapter at the Colorado School of Mines had a very successful 2020-2021 school year. Our organization was able to host several lectures and events despite the manifold headwinds incident to COVID. We welcomed, through the power of the internet, such figures as David Ramsden-Wood of the Hot Take of the Day podcast; John Turley, author of several books detailing the Deepwater Horizon disaster; and Dr. Leen Weijers, VP Engineering at Liberty Oilfield Services. AADE was fortunate to host several executives from Nickel Road Operating to outline their entrepreneurial journey. Nickel Road then generously invited our members to tour one of their drilling rigs in the DJ basin. AADE was fortunate to partner with the other petroleum clubs to host Mr. John Cristmann, CEO of Apache, and Mr. David Lawler, CEO of BPx. The Fall 2021 AADE officer team looks forward to an excellent upcoming semester and plans to host many more engaging lectures and activities.



Above are AADE members at the Nickel Road rig tour while to the left is the Nickel Road Operating Lunch and Learn.

## American Rock Mechanics Association (ARMA)

The American Rock Mechanics Association (ARMA) student chapter had an eventful year, despite many challenges associated with the pandemic. In-person event COVID restrictions required the board members to become inventive! We held nearly 10 events this year, most of which were academic lectures given by faculty from other universities and industry members whose work focuses on rock mechanics. The lectures contained an array of applications including petroleum, tunneling, experimental rock mechanics, and others. ARMA held all events in a hybrid format, with guest lecturers presenting via Zoom and some students attending via Zoom, as well. However, most of our student attendees were able to come in person to view the presentation in a socially distant format. An important part of Mines' student organization culture is providing food during lunchtime meetings, so the ARMA board felt it was important to keep up this tradition. Despite the COVID restrictions in place this year, ARMA was able to offer our student attendees free takeaway lunches following each presentation. Additionally, a social picnic event was held outside at the beginning of the year for networking at a distance!



A technical lecture in rock mechanics given on zoom for the ARMA Student Chapter. Students were able to view it remotely or in-person.

## Society of Petroleum Engineers (SPE)

The past academic year has posed its challenges for SPE, especially in terms of holding events virtually, however our officer team was dedicated to working towards a great academic year and handled well these challenging times to make sure SPE continues to grow and engage the community through events. There were numerous events and new programs which were held and executed during the past academic year including successfully expanding outreach to other SPE chapters and organizations, holding more than 10 lunch & learns, virtual mock interviews, golf tournament, clay shoot tournament, volunteering events, skills seminars and launching a new mentorship program.



CSM SPE Clay Shoot Tournament on April 30th which was sponsored by Liberty Oilfield Services and Chevron.

In the beginning of the fall semester, in collaboration with IHS Markit, Harmony Enterprise Virtual Workshop was completed in a virtual setting which included training videos, live sessions with the instructors, and a Certificate of Completion. One of our biggest events was the Joint Session with Denver SPE which was held on April 21st virtually and the keynote speaker was the 2018 SPE President Darcy W. Spady. It was a successful event where every attendee (students, professionals, and professors) was very engaged.

The newly implemented mentorship program helps students in developing mentoring relationships. As the pandemic resulted most of students missing out on in-person internship mentoring and internships entirely, the program acted as an addition during these unprecedented times to ensure students still feel connected to the industry.

The SPE Point System was introduced recently which is in place to assign point values to members to incentivize them to participate in various chapter and Denver section events. SPE was also very excited to be awarded the Student Excellence Chapter Award for 2021 by Society of Petroleum Engineers International. The award is in recognition of our student chapter's programs in industry engagement, operations and planning, community involvement, professional development, and innovation. SPE seeks to continue offering more benefits to its members. If you have any interest in putting on workshops, giving lunch & learn lectures or supporting SPE in any other way, please reach out to [csmspe@gmail.com](mailto:csmspe@gmail.com). Thank you for the support!



SPE Lunch & Learn with Schlumberger on February 24th.

Figuring out how to have Field Session 1 while working under pandemic restrictions was challenging, but happily we pulled it off! Everyone got to sleep in their own beds at night and we did day trips all around Colorado while following all of the campus pandemic protocols. We loaded everyone into nine mini-vans every day to go to our sites. The group consisted of 52 students from the US, Saudi Arabia, Kazakhstan, South Korea and Kuwait, faculty (Drs. Linda Battalora, Xiaolong Yin, Mark Miller, and Yilin Fan), staff (Rachel McDonald, Nellie Link, and Joe Chen) and teaching assistants (Gamma Firdaus, Gunnar Merrick and Jennifer DiCarlo). Some students from Saudi Arabia came off planes only days before field session began!

The first day we were on campus and started off with a presentation on "Environmental and Social Governance and Corporate Social Responsibility" by David Van der Vieren of **Western Midstream**, DJ Basin Regulatory Group. That was followed by a virtual **AERA Energy** panel session from Mines alumni about working in the oil and gas industry after graduation from Mines. Participating alums were George Hunsacker PE '85, Matt Erbes PE '13, Molly Fantasky ME '17, Linda Mohammad PE '07 and '09, and Nicole Kennedy PE '14. In the afternoon we headed over for an **OXY Production** field tour where we learned about OXY's tankless site design. Our host, Telbe Storbeck, OXY Stakeholder Relations Advisor, and OXY tour guides did a great job leading our students while working around thunderstorms.

Day two started off with a visit to one of **PDC's** drilling rigs. Alum David Lillo, PE '87, Senior Vice President Operations, organized the visit, and we toured the rig led by PDC Energy employees and rig contractor employees. They were waiting for a part so students were able to get a close look at the control booth and other parts of the rig that would have been off-limits if the rig was in use. We then headed over to a **Crestone Peak Resources (CPR)** hydraulic fracturing site for a very muddy visit, thanks to afternoon thunderstorms. Mark Balderston, PE '83, Completions Superintendent, organized this tour. Our tour guides were CPR employees and Liberty Oilfield Services employees, including Matt Pullos PE '13, District Engineer, Liberty Oilfield Services.

Day three was a simple day as we broke into two groups and took turns visiting the **EVRAZ Steel Mill** in Pueblo where students learned how seamless pipes are made. It was fascinating, loud and hot, but we learned a lot from our host and guide Mines alum Ryan Willis MME '18, Quality Manager, Seamless Mill.



Top picture is of the whole group at PDC's drilling rig. Center picture is of some of the students at the Evraz Steel Mill. Below is one of the groups of students being led around the PDC rig.



Day four we also split into two groups and visited different sites then swapped locations. We visited a **CPR** production site that was organized by Mark Balderston and guided by CPR employees. At this site, students also learned about fishing tools. The second location was **Western Midstream's Latham Gas Plant**. David Van Der Vieren, DJ Basin Regulatory Group, and other Western Midstream employees took us around the plant to see how associated gas from the nearby oil wells is collectively processed. We were given a very thorough walkthrough of the plant, starting from compressors, dehydration, to acid gas stripping and cryogenic towers. The fact that the plant only needs a handful of people to operate is really amazing to us.

On the last day, we toured a **CPR** drilling rig. It was interesting to see the similarities and differences between the two drilling rigs we were fortunate to visit this year. After that we had a group lunch and headed back to campus.

We are very grateful to all of our hosts for their time and interest in our Field Session 1. We know the large group and the pandemic protocols were not easy to work with this year. To our dearest alums: We greatly appreciate your commitment and support to the PE Department and our students!

Below left students are listening to Mark Balderston and reps from Well Whisper. Below we got a look at capped well heads.



## FIELD SESSION 316 BY ELIO DEAN



A common sight during field session II was students listening to instructor Wes Buchanan going over what they were going to do and learn that day.

You can also see our new storage shed to the left of the red and blue trailer. This much-needed storage was paid for from donations to the PE Field Supplementary Fund.

Field Session II is back in person, although reduced capacity. This year we had approximately 80 PE students go through the coming of age-old ritual of camping in Massadona and learning about the different petroleum systems in the Piceance and Uinta Basins. Due to COVID there were changes in the delivery of the course but all the geologic outcrop locations were visited. The main change was breaking the course into two sections with each spending one week camping and one week on campus for lectures.

During the week on campus both sections were overlapping, and presenters from Chevron, Koda, Caerus, and PLS graciously shared their knowledge and experience on their respective assets.

**Chervon** presenters Cliff Cuffey and Rose Mizell covered the Weber formation geology and engineering complexity of the Rangely oil field. Although the oil field has been producing for more than 90 years, Chevron showed that there is a lot of life left in the asset.

From **Koda**, Rob Zaback and Ken Babcock presented their companies work on the Green River formation, showing how geoscientist and reservoir engineers work together to characterize challenging lacustrine conventional assets. The Green River is notorious for its waxy crude, and vertical heterogeneity from alternating sandstone, limestone, shale zones. Identifying opportunities in mature assets was a key message shared.



Mike Leibovitz and Andrea Passman joined from **Caerus**. Andrea is the COO at Caerus and a Mines alum who recalled some memories of camping in Massadona when Ramona led the field session. Mike did a fabulous job presenting the companies efforts in developing the Mesa Verde in the Piceance basin and highlighted the importance of geologic understanding in those efforts.

Matt Stratton and Kevin Stratton from **Production Logging Services (PLS)** drove out to Golden from Vernal, bringing tools, items and industry experts for show and tell. PLS arranged for Nathan Wisler, from the EPA to present regulatory topics on wellbore classification, and Jim Smolen taught on wellbore testing methods.

Although the students only spent one-week camping, they did earn a two weeks Massadona merit badge as the camp grounds and cabins had been untouched since 2019. There was only one shriek in the middle of the night due to critters in the cabins.

One of the most notable marks of this year's field session were the demographics between the two sections. Section A was in line with historic averages where the majority of students were from the USA with several international students. These students had a great attitude and worked hard as they completed every assignment. Section B was a new experience dominated by students from Saudi Arabia making up approximately 75% of the class and USA students could be counted on a single hand. Expecting the Middle Eastern students to experience wild west culture shock from Massadona, it was the faculty that was shocked as volleyball nets were sets up, music, and fun was introduced. The festive environment was contagious as all students were included in the fun and it was positive reminder of how diverse and inclusive the oil industry can be. It was the faculty and TAs job to remind the students this was not supposed to be an enjoyable experience, but sure enough we too were caught in the first Massadona Students vs. Professors/TAs volleyball invitational. Although the students barely won the volleyball games, it was TA Berk Coskuner who won the push up contest.

Left students from section B are enjoying the volleyball net they brought, while below students take a break while taking notes.



This year's field session was a true success primarily due to the efforts of the Professor Wes Buchanan, Lead Geoscience TAs Dessy Sarpardina, Cankut Kondakci, and all the excellent geoscience TAs. The geoscience team has done a remarkable job on the technical content of the field session, and in supporting the student's geoscience understanding. A special thank you to Denise Winn-Bower and all the PE TAs for their help, too.



Above is everyone from section A while below is section B.



# MINES PE DEPARTMENT 100 YEAR ANNIVERSARY

We're celebrating the 100 year anniversary of the department. Check [petroleum.mines.edu/100](http://petroleum.mines.edu/100) to see what events we have scheduled and look for the logo to the right for featured events.

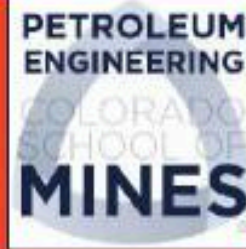
Also, follow the department on Facebook to see our weekly feature starting in January about the history of the department. We've already found lecture notes from the 1920s, letters from alumni and tons of photos. Will you be in one of the photos?

**Do you have photos or stories to share from your time at Mines? Send them to [petroleum@mines.edu](mailto:petroleum@mines.edu). We'd love to receive anything but are especially looking for pre-1970.**



Students during the PE 315 Field Session I in Europe 1989.

## SOCIAL MEDIA OPTIONS



Look for this logo to find the department's official social media accounts.

### NEW MINES PE LINKEDIN GROUP

We started a new group on LinkedIn called **Colorado School of Mines Petroleum Engineering Department**. Make sure to join if you haven't already to get the weekly research features and hear about events and opportunities for alumni.

### FOLLOW PE ON FACEBOOK

Follow us on Facebook for the fun stuff like event photos, historical pictures and student achievements. Search for [@minespe](#) to find us.

## #IDIGMINES GIVING DAY

The fourth annual #idigmimes Giving Day was structured differently this year, but departments and organizations across campus still competed to get the most donations in 24 hours. On the line were bragging rights and a share of the many bonus prizes offered. One of the bonuses this year was the first 10 donors from outside the US got to choose where a bonus would go, and several of them picked PE! Special thanks to our international support.

We want to have our numbers go up again! Please put February 3rd, 2022 on your calendar and be ready to participate so we can claim our spot on top! We want to celebrate 100 years in style.



### #IDIGMINES RESULTS FOR PETROLEUM ENGINEERING

Thanks to everyone for participating. We had the most donors yet and hope to see the numbers go up again next time!

|                     | FY18     | FY19     | FY20     | FY21     |
|---------------------|----------|----------|----------|----------|
| TOTAL GIFTS MADE    | 55       | 63       | 42       | 70       |
| TOTAL UNIQUE DONORS | 55       | 62       | 42       | 70       |
| DOLLARS RAISED      | \$12,810 | \$17,485 | \$12,217 | \$15,360 |
| BONUS FUNDS         | \$777    | \$850    | \$3,521  | \$1,990  |
| TOTAL DOLLARS       | \$13,587 | \$18,335 | \$15,822 | \$17,350 |