



→ → →
→ → →

Oil and Gas Well Construction and Production Technologies Certificate

PROGRAM SYLLABUS

Oil and Gas Well Construction and Production Technologies Certificate

This certificate program is for technical personnel working in research or technical labs, as well as within production doing drilling, well completion, and production departments both in design and field application phases of operations work.

1

APPLIED DRILLING
ENGINEERING

2

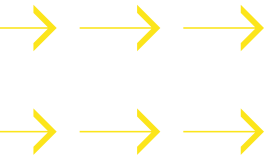
APPLIED WELL COMPLETION AND
SIMULATION TECHNOLOGIES

3

APPLIED PRODUCTION
ENGINEERING

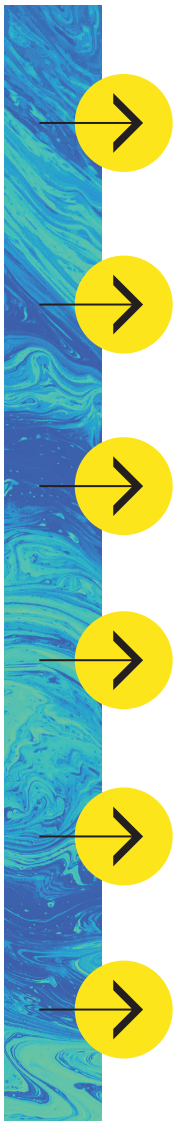


THE RESPECTFUL LAND USE SERIES



Certificate Outcomes

By completing this certificate, you will have the ability to:



Optimize drilling operational parameters (e.g. WOB, RPM, HSI) for minimum cost

Evaluate drilling performance using MSE concepts

Select optimum drill string and BHA composition required for deviation control and trouble free drilling

Design directional, horizontal, and multilateral well drilling systems

Optimize casing setting depth and casing composition for minimum cost well plan

Develop optimum cementing job design programs



Develop optimum tubing design, perforation design and sand control programs

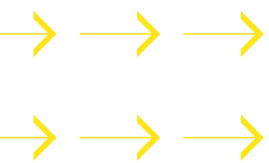
Develop optimum well stimulation programs, including acidizing and hydraulic fracturing operations

Conduct inflow performance and well deliverability analysis for vertical, horizontal and multilateral/multibranch wells

Perform production optimization using nodal analyses

Design artificial lift operations, including gas and pump-assisted lifts

Appreciate and respect land use in relation to treaty and/or land agreements with Indigenous nations.



Meet Your Instructors



Ergun Kuru PHD, PENG

Dr. Kuru is Professor and Director of Petroleum Engineering at the University of Alberta. He received his B.Sc. degree from Middle East Technical University, M.Sc. and Ph.D. degrees from Louisiana State University all in Petroleum Engineering. For more than 30 years, Dr. Kuru has been teaching courses and conducting research on drilling and well completion engineering related subjects. He has authored/co-authored more than 190 technical papers.

Dr. Kuru's current research area of interest includes: Development of Effective Hole Cleaning Strategies for Oil and Gas Well drilling Applications; Design and Development of Non-Damaging Fluids for Oil/Gas Well Drilling, Completion and Stimulation Applications; Understanding and Mitigating Leakage Pathways in Oil and Gas Well Cements. Dr. Kuru is a member of American Society of Mechanical Engineers (ASME) and the Society of Petroleum Engineers (SPE). Dr. Kuru served several SPE committees in the past including SPE ATCE Drilling Engineering Program Committee, SPE Global Training Committee, SPE Education and Accreditation Committee, Editorial Review Board member of SPE Drilling and Completion Journal and Associate Editor of SPE Journal of Canadian Petroleum Technology. He was also the Associate Editor of ASME Journal of Energy Resources Technology. He is currently serving as a member of SPE Journal of Petroleum Technology editorial board. Dr. Kuru is 2017 recipient of SPE Canada Region Distinguished Achievement Award for Petroleum Engineering Faculty and 2021 SPE Distinguished Member Award.

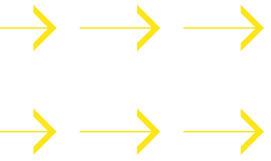


Huazhou Li PHD, PENG

Dr. Li is an Associate Professor in Petroleum Engineering at the University of Alberta. He holds a BSc degree and an MSc degree, both in Petroleum Engineering, from the China University of Petroleum (East China), and a PhD degree in Petroleum Systems Engineering from the University of Regina.

His research focuses on improving phase-behavior modeling of complex reservoir fluids and developing novel enhanced oil/gas recovery techniques. He has published one book entitled "Multiphase Equilibria of Complex Reservoir Fluids" and authored more than 100 peer-reviewed journal papers and SPE conference papers. He now serves as an associate editor for Geofluids.

He received the Regional Distinguished Achievement Award for Petroleum Engineering Faculty from the Society of Petroleum Engineers (SPE) in 2020, the Petro-Canada Young Innovator Award from the University of Alberta in 2018, and the Outstanding Technical Editor Award from SPE Journal in 2016, 2019, and 2021. He is a member of SPE and American Chemical Society (ACS).



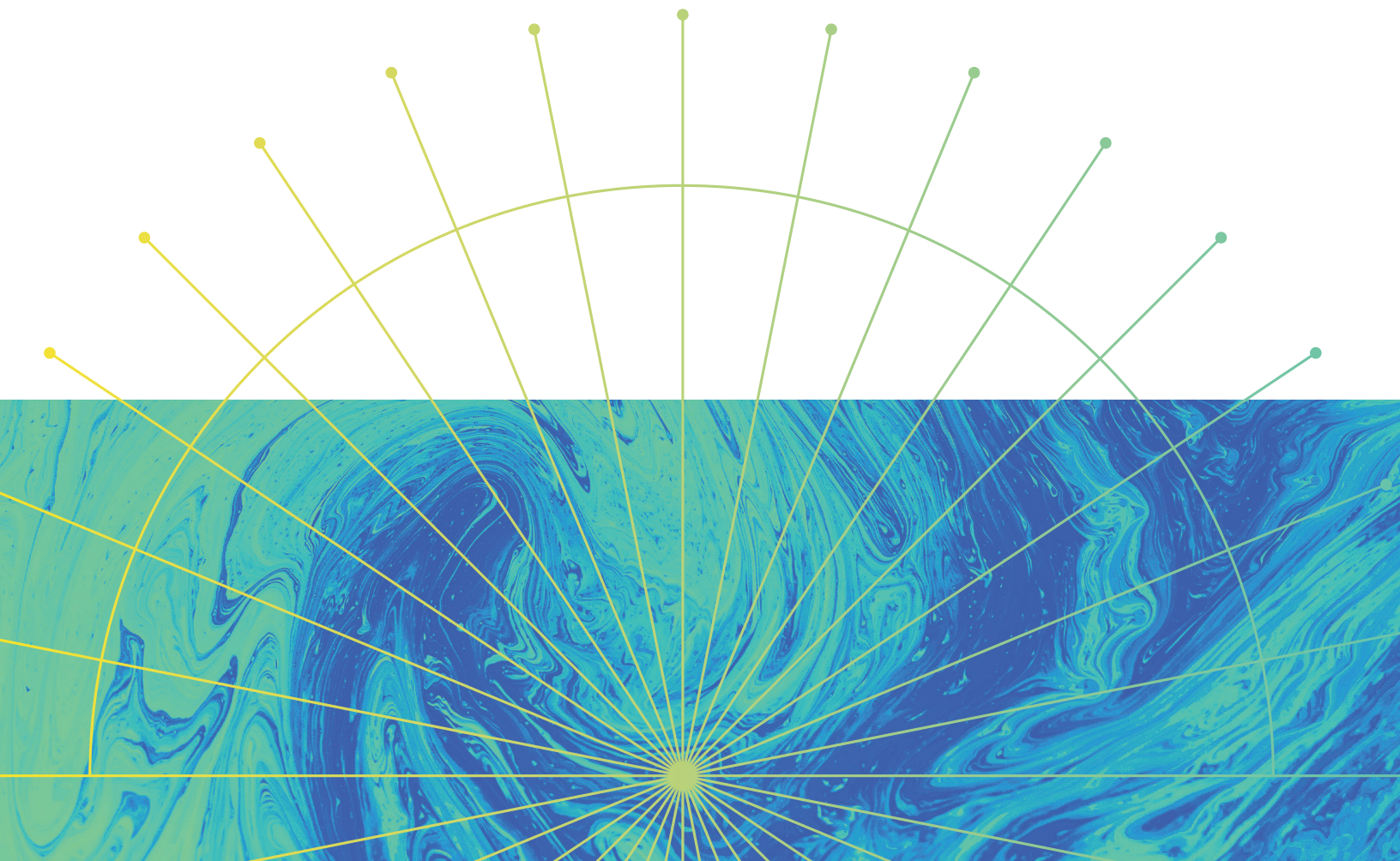
Meet Your Instructors



Jessica Vandenberghe MSc, PENG

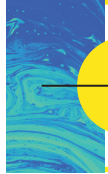
Jessica is an Industrial Professor - Indigenous Engineering and Assistant Dean (Community and Culture) with Engineering at Alberta where she oversees a wide portfolio that contributes to the development of well rounded and ethically minded engineering students who will ultimately help to build strong and vibrant communities within Canada.

She has worked in the oilsands, mining, regulatory, infrastructure, and consulting industries. She holds a B.Sc. in Chemical Engineering Computer Process Control Co-op and a M.Sc. in Chemical and Mining Engineering, both from the University of Alberta. Her career has taken her to communities large and small around the nation and she has sat on many Boards and Councils with stakeholders, such as federal, provincial and municipal governments, as a representative of First Nations, Metis Settlements and Metis Nations, as well as academic institutions and private industry. As a mother of two and an Indigenous female engineer, she is passionate about diversity, equity, and inclusion, along with Truth and Reconciliation.



1

Applied Drilling Engineering



Ergun Kuru PHD, PENG **Huazhou Li** PHD, PENG
MAR 2022 | FRIDAYS 4-6 PM | SATURDAYS 9 AM - 4 PM

The theory of optimization of various drilling operational parameters for minimum cost drilling operation (more specifically use of physics based data driven models, mechanical specific energy concept, technical limit of drilling rate concepts will be discussed). This course will also address the design concepts of drilling hydraulics and drillstring mechanics, as well as, the design concepts of drilling directional, long horizontal, and extended reach wells.

We will consider modern drilling technologies such as underbalanced drilling and managed pressure drilling.

Week 1 MARCH 4-5, 2022

Drilling performance analyses and cost control. Factors controlling drilling rate. Optimization of various drilling operational parameters for minimum cost drilling using physics-based data driven modeling. Evaluation of drilling performance using mechanical specific energy. Technical limit of drilling rate. Optimization of bit hydraulics, hole cleaning and cuttings transport.

Week 2 MARCH 11-12, 2022

Fundamentals of drill string design. Analysis of axial, torsional, and bending stresses acting on the drill string using maximum energy distortion theory. BHA Design. Deviation Control. Buckling Considerations.

Week 3 MARCH 18-19, 2022

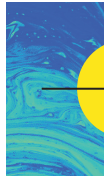
Fundamentals of directional well design. Planning the (2D and 3D) directional well trajectory. Determining the actual trajectory of a well after drilling. Planning the kick-off and trajectory change. Design concepts for drilling long horizontal and extended reach wells. Selection of rig location and types of horizontal wells.

Week 4 MARCH 25-26, 2022

Fundamentals of Underbalanced (UBD) and Managed Pressure (MPD) Drilling. Candidate Selection. Engineering Design Considerations. Performance evaluations.

2

Applied Well Completion and Simulation Technologies



Ergun Kuru PHD, PENG **Huazhou Li** PHD, PENG
MAY 2022 | FRIDAYS 4-6 PM | SATURDAYS 9 AM - 4 PM

This is a design course covering new developments in the area of well engineering. The course is designed for participants to develop an understanding of the basic principles of oil and gas well completion and stimulation engineering design, specifically: elements of a well completion design, well planning, casing design, cementing design, tubing design, perforating, sand control, and hydraulic fracturing.

Week 1 MAY 6-7, 2022

Factors influencing the well completion design. Decisions to be made in well completion design. Well completion types. Formation pressure and fracture resistance. Overburden Pressure. Causes of Abnormal Formation Pressure. Methods of Formation Pore Pressure Prediction. Methods of Formation Fracture Pressure Prediction. Leak-off Test.

Week 2 MAY 13-14, 2022

Selection of Casing Setting Depth. Kick Tolerance Calculation. Maximum Load Casing Design. Cementing design. Criteria for successful cementing operation. Properties of Cement Slurry. Cementing job design considerations. Cement job design examples.

Week 3 MAY 20-21, 2022

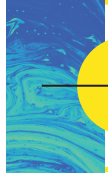
Tubing size selection. Tubing load design (selection of Unit Weight and Grade considering burst, collapse and axial load). Tubing elongation/shortening due to changes in pressures and temperatures. Requirements for successful perforating job. Perforator types. Calculations of perforation skin effect. Effect of partial penetration and limited entry on well productivity. Causes of sand production. Methods of sand control. Evaluation of gravel pack screen size. Evaluation of liner slot size. Selection of sand control method.

Week 4 MAY 27-28, 2022

Hydraulic fracturing theory. Guidelines for selection of fracture fluids. Proppant selection for fracture design. Design of hydraulic fracture treatment. Multistage fracturing technique for stimulating tight/shale reservoirs.

3

Applied Production Engineering



Huazhou Li PHD, PENG

SEPTEMBER 2022 | FRIDAYS 4-6 PM | SATURDAYS 9 AM - 4 PM

The purpose of the course is to introduce the fundamentals of the nodal analysis approach and its applications in modeling and optimization of the oil/gas production process. The course content includes how to obtain the inflow performance relationship, how to model the single-phase and multiphase flow in wells, how to model the single-phase and multiphase flow through restrictions, how to identify the weak components in the production system, how to improve/optimize the production system based on the nodal analysis results, and how to design artificial lift methods.

Week 1 SEPTEMBER 2-3, 2022

Overview of reservoir and fluid properties: Reservoir properties; Fluid properties. Inflow performance relationship: Well operation and reservoir flow stages; Single-phase oil flow; Skin factor; Single-phase gas flow.

Week 2 SEPTEMBER 9-10, 2022

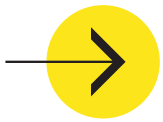
Inflow performance relationship: Multiphase flow; Multilayer inflow performance. Horizontal wells. Well performance: Single-phase oil flow in wells; Single-phase gas flow in wells.

Week 3 SEPTEMBER 16-17, 2022

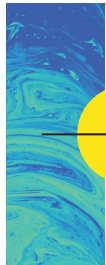
Well performance: Multiphase flow in wells; Tubing performance and intake curves. Flow through restrictions: Single-phase oil flow; Single-phase gas flow; Multiphase flow.

Week 4 SEPTEMBER 23-24, 2022

Nodal analyses and artificial lift: How to conduct nodal analysis; Application of nodal analysis in field development planning and field management; Artificial lift methods; Gas lift design.



The Respectful Land Use Series



Jessica Vandenberghe MSc, PEng

DATES: TBA

NOTE: This seminar series does not need to be repeated if you take more Petroleum Certificates in the future.

Participants will participate in three seminars on the importance of land use in all land development and resource exploitation, developing a foundational appreciation of, and respect for, land use in relation to treaty and/or land agreements with Indigenous nations.

Seminar 1 INTRODUCTION TO TRUTH AND RECONCILIATION

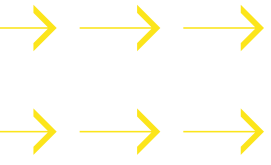
This one-hour seminar will be provided by a trained facilitator of Indigenous descent and will explore the history of Canada through the Indigenous lens of experiences and incidents that occurred, touching on the results and impacts of the Indian Act, Human Rights, and data that demonstrates that Indigenous people continue to be subject to oppressive policy, inherent racism, prejudice and stereotypes.

Seminar 2 UNDERSTANDING INDIGENOUS WORLDVIEW TOWARDS LAND SPIRIT AND MAKING THE CONNECTION TO INDIGENOUS COMMUNITIES AND LAND OWNERSHIP

This is a one-hour seminar, supplemented with reading, reflection and an assignment. It will guide participants towards understanding the differences between Settler and Indigenous perspectives towards land. It will also touch upon the governance laid out by the Indian Act around reserve lands, land ownership, and build an understanding of why reserves and Metis Settlements are different from municipalities and counties.

Seminar 3 HOW PROFESSIONAL ENGINEERS HAVE A RESPONSIBILITY TO ANSWER THE CALLS TO ACTION IN THEIR PROJECT WORK AND ETHICAL BEHAVIOUR

This one-hour seminar will be offered by a trained Indigenous Professional Engineer facilitator and discuss the Professional Engineer's ethical obligations and why equity, diversity, inclusion and decolonization are foundational to risk management, project management, decision making, and design work. Essential to meeting these ethical obligations is the deep understanding of Truth and Reconciliation and the Calls to Action in order to provide unbiased perspectives when part of project teams and engaging with ethnically diverse communities.



Certificate Details

Prerequisites:

A post-secondary degree or diploma in engineering, science or related field

Investment:

\$6000 + GST
Paid in three installments

Engineering at Alberta

We are one of the top five engineering schools in Canada, with more than 4,400 undergraduate students and 1,200 graduate students. Our Petroleum Engineering program ranks as one of the Top 10 Petroleum Engineering programs in the world.

Now we are offering new programs for the working professional. This is a place that uncovers the unknown. Where ideas take the stage and possibility runs the show. We train people to embrace curiosity, providing state-of-the-art facilities, award-winning faculty and support.

Enroll

[ONLINE UALBERTA.CA/ENGINEERING/PROGRAMS/
CERTIFICATES-IN-PETROLEUM-ENGINEERING](https://online.ualberta.ca/engineering/programs/certificates-in-petroleum-engineering)

[QUESTIONS? DR. ERGUN KURU - EKURU@UALBERTA.CA](mailto:DR. ERGUN KURU - EKURU@UALBERTA.CA)

**INTERESTED IN ARRANGING A CUSTOM IN-PERSON OR
VIRTUAL OFFERING FOR YOUR COMPANY?**

[GET IN TOUCH DR. ERGUN KURU - EKURU@UALBERTA.CA](mailto:DR. ERGUN KURU - EKURU@UALBERTA.CA)

