

Announcing the 44th offering of

FLUID FLOW PROJECTS

“TWO-PHASE FLOW IN PIPES”



THE UNIVERSITY of
TULSA
*Continuing Education for
Science & Engineering*

Instructors

Dr. Cem Sarica

Dr. Eduardo Pereyra

UNIVERSITY OF TULSA
TUFFP RESEARCH SHORT COURSE

April 29 - May 3, 2019
TULSA, OKLAHOMA

ABOUT THE INSTRUCTORS

DR. CEM SARICA, F.H. “Mick” Merelli/Cimarex Energy Professor of Petroleum Engineering at The University of Tulsa (TU) holds a Ph.D. in Petroleum Engineering from TU. His current research interests are multiphase flow in pipes, oil and gas production, and flow assurance. He is currently serving as the director of TUFFP, Tulsa University Paraffin Deposition Projects (TUPDP) and Tulsa University Horizontal Well Artificial Lift Projects (TUHWALP). He is the recipient of the 2010 SPE International Production and Operations Award, recognized as a Distinguished Member of SPE in 2012. Cem received the SPE John Franklin Carll Award and SPE Cedric K. Feguson Certificate in 2015.

DR. EDUARDO PEREYRA, Assistant Professor of Petroleum Engineering and Associate Director of Fluid Flow and Horizontal Wells Artificial Lift Projects at The University of Tulsa. He also has worked as a research scientist intern at Chevron's advanced production technology / subsea technology unit focusing conventional separators performance. His research interests are multiphase flow systems and transport, flow assurance, and separation technologies. He received his Ph.D. and Master's degree in petroleum engineering from The University of Tulsa and two BS degrees (Mechanical and Systems Engineering) from The University of Los Andes, Merida Venezuela.

Multiphase flow of oil-gas-water is inevitable and presents unique challenges in operation for any production and transportation system, including horizontal wells drilled into unconventional plays. Off-shore activity emphasizes subsea completions with full wellstream flow in much longer flowlines than in other areas.

Therefore, an improved understanding of multiphase flow in wells, flowlines, and risers is of vital importance to engineers and industry professionals.

This 4 ½ day course is your opportunity to learn from leading University of Tulsa researchers and experts. The completed and current research projects covering the latest techniques for designing multiphase flow systems conducted at the Tulsa University Fluid Flow Project (TUFFP) will be explored in this course; with a focus on the fundamentals of two-phase flow in piping systems encountered in the production and transportation of oil & gas.

COURSE OUTLINE

PRINCIPLES OF TWO-PHASE FLOW

- Single-Phase Flow Review
 - Conservation laws
 - Mechanical energy balance equation
 - Heat balance equation
 - Evaluation of friction losses
- Two-Phase Flow Introduction
 - Definition of basic variables
 - Two-phase flow pressure gradient equation
 - Flow patterns
 - Computing algorithms

PVT PROPERTIES

- Mass Transfer Models
 - Black oil model
 - Compositional model
- Density of Oil, Water, Gas
- Viscosity of Oil, Water, Gas, Emulsions
- Surface Tension

FLOW IN WELLS

- Flow Pattern Prediction Modeling
- Pressure Loss and Holdup Prediction – Models and Correlations
- Evaluation of Pressure Loss Methods

FLOW IN PIPELINES

- Flow Pattern Prediction Modeling
- Pressure Loss and Holdup Prediction – Models and Correlations
- Evaluation of Methods
- Effects of Hilly Terrain
- Slug Flow Modeling

FLOW THROUGH RESTRICTIONS

- Basic Equations
- Critical vs. Subcritical Flow
- Critical Flow Correlations
- Subcritical Flow Correlations

UNIFIED MODELING

- Model Development
- Model Evaluation

FLOW ASSURANCE

- Wax Deposition
 - Deposition Modeling
 - Prevention and Remediation
- Severe Slugging
 - Phenomena
 - Mechanisms
 - Elimination Methods

This course features . . .

- An appropriate balance will be maintained between lectures and problem solving, and between theory and application.
- Problem-solving sessions are dispersed throughout the course to enhance the understanding of variables unique to two-phase flow.
- Information on the latest TUFFP studies.
- Computer algorithms are presented so that you will be able to develop your own programs upon completion of the course.
- You will receive the SPE monograph on "Multiphase Flow in Wells" and an extensive workshop manual.
- A tour of TU's North Campus Multiphase Flow and Flow Assurance Experimental Test Facilities (weather permitting).

This course is designed for . . .

Systems Engineers, Process Engineers, Operations Engineers, Facilities Engineers, Reservoir Engineers, Production Engineers, Petroleum Engineers, Flow Assurance Engineers, Technical Consultants, Chemical & Mechanical Engineers, and anyone who handles multiphase flow systems.

Participants should be familiar with basic fluid mechanics and properties; along with hydrocarbon systems vapor-liquid equilibrium and computer programming. No experience in two-phase flow is required for attendance.

"This course offers the attendee a unique opportunity to learn the fundamentals of multiphase flow technology from the industry experts who develop the technology."

— Technical Consultant, Marathon Oil

"I gained many useful tools and insights about multiphase flow from this course that will be beneficial to me in my job."

— Project Engineer, Baker Hughes, Inc.

"The course is very well organized and I now have a much deeper understanding of multiphase flow. The course clarifies the theories behind software interface."

— SGS Upstream Services

"An excellent short course on problem solving techniques to resolve your multiphase flow issues and understand the limits of the solutions."

— Process Engineer, Chevron

"This course definitely accelerated my understanding of fluid flow & flow assurance analysis. It was a great time investment."

— FA Engineer, ExxonMobil

"Essential for facilities and production engineers to understand flow in both vertical well bores and in horizontal pipelines."

— Infrastructure Facilities Engineer, WPX Energy

"Great insight into multiphase flow & its application. Probably the only course in the world that has oil & gas wells too."

— Tech Advisor Drilling, Saudi Aramco

"Highly recommend for petroleum engineers."

— Technology Researcher, YPF Technologia

WHAT IS TUFFP ?

The **Tulsa University Fluid Flow Projects (TUFFP)** is a cooperative industry-university research group supported by oil and gas production, service companies and government agencies. TUFFP conducts applied research on fluid flow problems encountered by the member firms.



FLUID FLOW PROJECTS

TUFFP SHORT COURSE
"TWO-PHASE FLOW IN PIPES"

Yes! Please enroll the following in the **April 29 - May 3, 2019**, Tulsa, Oklahoma offering of **FLUID FLOW PROJECTS: "TWO-PHASE FLOW IN PIPES" Short Course**

FIRST NAME	LAST NAME		
<input type="text"/>	<input type="text"/>		
JOB TITLE			
<input type="text"/>			
ORGANIZATION / COMPANY NAME			
<input type="text"/>			
ADDRESS			
<input type="text"/>			
CITY	STATE	ZIP	COUNTRY
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
PARTICIPANTS PHONE			
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PARTICIPANTS EMAIL			
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COURSE FEE SCHEDULE

Online Registration available at www.cese.utulsa.edu (credit card payments only)

Fees listed are per person and in net US Dollars

SELECT ONE:

TUFFP & TUPDP Member Company per person fees:

- \$2,395.00 ... BEST DEAL DISCOUNT** (available until February 22, 2019 for individuals or teams.)
- \$2,595.00 ... EARLY BIRD DISCOUNT** (available until March 22, 2019)
- \$2,595.00 ... TEAM DISCOUNT** (available after February 22, 2019)
- \$2,795.00 ... REGISTRATION FEE AFTER MARCH 22, 2019**

Non-Member Company per person fees:

- \$2,795.00 ... BEST DEAL DISCOUNT** (available until February 22, 2019 for individuals or teams.)
- \$3,295.00 ... EARLY BIRD DISCOUNT** (available until March 22, 2019)
- \$3,295.00 ... TEAM DISCOUNT** (available after February 22, 2019)
- \$3,595.00 ... REGISTRATION FEE AFTER MARCH 22, 2019**

PAYMENT OPTIONS

- Check** (Make payable to The University of Tulsa, CESE)
 - Credit Card** (Complete this registration form and return to the TU-CESE office. You will be contacted for payment information.)
- Online course registration is also available for credit cards payments at www.cese.utulsa.edu.

To enroll, complete and return the enrollment form to:

The University of Tulsa – CESE

800 S. Tucker Dr., Tulsa, OK 74104-3189

Fax: 918.631.2154

Phone: 918.631.3088

Email: cese@utulsa.edu

Online registration: cese.utulsa.edu

(credit cards only)

COURSE FEE

The seminar fee covers the cost of all sessions, handout materials, textbook, electronic workshop manual, guided tour of TU's experimental facilities, and daily refreshments. The fee is to be paid in net U.S. dollars.

MEMBER COMPANY DISCOUNT

Available to those companies enrolled in TUFFP (Tulsa University Fluid Flow Projects) and TUPDP (Tulsa University Paraffin Deposition Projects).

TEAM DISCOUNT

Group discounts are available to groups of two or more attending from the same company location.

BEST DEAL DISCOUNT!

Sign up before February 22, 2019 for the best deal.

NEEDING HOTEL RESERVATIONS?

You will be sent information about making reservations once you have registered for the course.

VENUE & TIMES

University of Tulsa, Henneke Building
1204 S. Harvard, Tulsa, Ok 74112

Monday – Thursday:

8:30 am - 5:00 pm

Friday:

8:30 am - 12:00 noon



The University of Tulsa

Continuing Education for Science & Engineering

Mailing Address: 800 S. Tucker Drive, Tulsa, OK 74104

Physical Address: 1204 S. Harvard, Tulsa, OK 74112

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