

**A Short Course for the  
Oil & Gas  
Industry Professionals**

# TOP-DOWN, INTELLIGENT RESERVOIR MODELING

## An Alternative to Numerical Reservoir Simulation & Modeling

*This Course is Designed for Engineers and scientists involved in reservoir modeling and reservoir management. It focuses on application of **Artificial Intelligence & Data Mining (AI&DM)**, in Reservoir Engineering, Simulation and Modeling.*

*Top-Down, Intelligent Reservoir Model (TDM) presents an alternative for modeling fluid flow in the hydrocarbon reservoirs. It starts with production & injection history and well logs to build the reservoir model. The model is refined by adding core, well test and seismic data. The trained and history matched model is validated with parts of historical data left out as blind test.*

### **Course Description:**

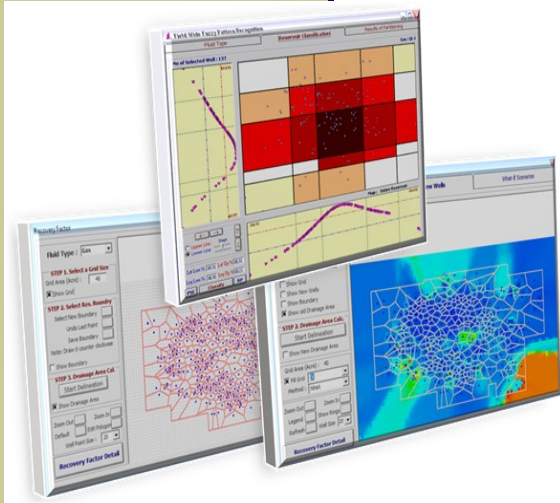
This course covers the fundamentals of artificial intelligence and data mining (AI&DM) and will provide the theoretical background for its most used components such as artificial neural networks, genetic optimization and fuzzy logic.

This course will provides a comprehensive overview of design, construction, training, history matching and validation of Top-Down, Intelligent Reservoir Models. The course will also cover the use of Top-Down Models in reservoir management analysis and planning of field development strategies.



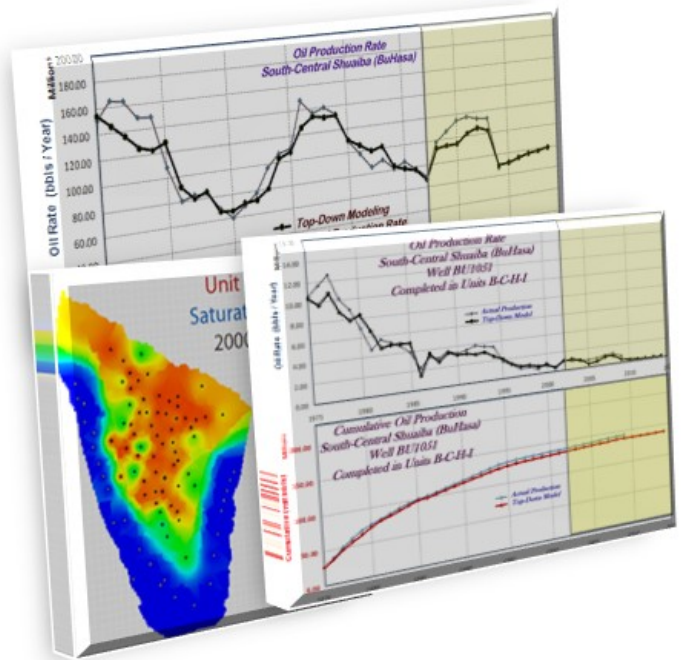
**INTELLIGENT SOLUTIONS, INC.**

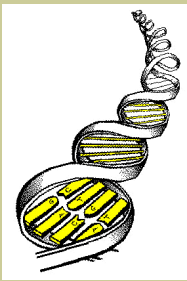




Intelligent Solutions, Inc. introduces a revolutionary and innovative alternative/complement to traditional numerical reservoir simulation and modeling. Top-Down, Intelligent Reservoir Model; may be defined as developing a calibrated (history Matched) model of the hydrocarbon producing reservoir that integrates multiple instance of field measured properties such as production and injection data, logs, cores ... into a cohesive predictive model of the field. Instead of using first principle physics to model the fluid flow in the porous media, Top-Down Modeling uses the pattern recognition capabilities of Artificial Intelligence and Data Mining (AI&DM) techniques to arrive at a consistent full field reservoir model with predictive capabilities.

**Top-Down Model:** Top-Down, Intelligent Reservoir Modeling approaches the reservoir simulation and modeling from an opposite angle. It attempts to build a realization of the reservoir starting with well production behavior (history). The production history is augmented by log, core, well test and seismic data in order to fine tune the Top-Down model and increase its accuracy. This innovative and novel approach to reservoir modeling can be used as an alternative (at a fraction of the cost) to traditional numerical reservoir simulation and modeling in cases where performing simulation is cost (and man-power) prohibitive. In cases where a numerical model exists, Top-Down Modeling should be considered a compliment to the conventional technique, to provide an independent look at the data coming from the reservoir/wells for optimum development strategy and recovery enhancement.





## Who Should Attend?

This course is designed for reservoir engineers, Reservoir Managers and geoscientists that are involved in all aspects of Reservoir Simulation and Modeling.

### *Every participant in the short course will receive:*

- A Course Manual including all the slides used during the presentation of the short course.
- An electronic copy of all the slides.
- Electronic copy of technical material as support for the topics covered in the short course. This technical material takes you beyond the summarized slides and help you review in detail all you have learned in the short course.
- In some cases a copy (full features with limited time license) of IImagine™ software applications will be provided (please ask about this option during the scheduling of the course). IImagine™ is the software application developed by ISI for Top-Down Modeling.

### Course Outline:

#### Part One:

Artificial Intelligence & Data Mining (AI&DM); Theoretical Background.

#### Part Two:

A Quick Review of Numerical Reservoir Simulation & Modeling.

#### Part Three:

Top-Down, Intelligent Reservoir Modeling (TDIRM);

Definition and specifications  
Development of Top-Down Modeling

Decline Curve Analysis  
Conventional Decline Curve Analysis  
ISI's Intelligent Decline Curve Analysis  
Type Curve Matching  
Single-Well Simulation & Modeling  
Single Well Volumetric Reserve Estimation  
Single Well Recovery Factor Estimation

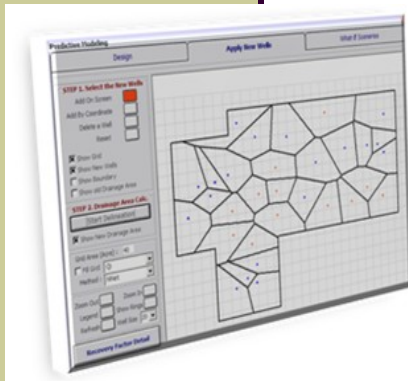
Training and History Matching Discrete, Single Well Predictive Modeling  
Incorporation of Analyzed Data  
Incorporation of Log Information  
Incorporation of Seismic Information (upon availability)

Field-wide Fuzzy Pattern Recognition  
Time-Successive, Complete, Full Field Modeling

Validation of the Top-Down Model  
Analysis in the Predictive Mode

#### Part Four:

Software Application.





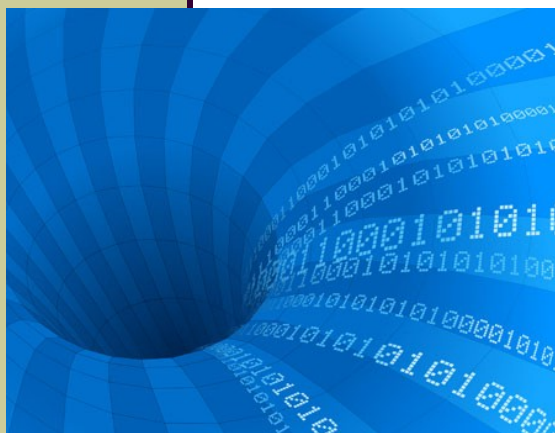
### ABOUT THE INSTRUCTOR

**Dr. Shahab D. Mohaghegh** is professor of Petroleum & Natural Gas Engineering at West Virginia University and founder and president of Intelligent Solutions, Inc., the leading company in providing the oil and gas industry with solutions based on artificial intelligence & data mining (AI & DM).

With more than 18 years of experience, Dr. Mohaghegh has been a pioneer in the application of "AI&DM" in petroleum industry, applying hybrid forms of neural networks, genetic optimization and fuzzy logic to smart wells, smart completions, and smart fields as well as to drilling, completion, well stimulation, surface facility optimization, formation evaluation, seismic inversion, reservoir characterization, reservoir simulation and reservoir management.

He has published more than 100 technical papers during his career and has been a technical editor/reviewer for various SPE journals as well as other petroleum-related publications such as Oil, Gas and Coal Technology, Journal of Petroleum Science and Engineering, Computers & Geosciences, Geophysics, and Energy & Fuels. His technical articles on the application of "AI&DM" in the oil and gas industry and their recent developments have appeared in the Distinguished Author Series of SPE's Journal of Petroleum Technology during September, October and November of 2000 as well as the April 2005. He is a SPE Distinguished Lecturer for 2007-2008. He is an associate editor of SPE Reservoir Evaluation and Engineering Journal 97-99, & 2007- present. He has also served as chair, Steering committee member and discussion leader in SPE forums and has served as a steering committee member in SPE Applied Technical Workshops. He has been a panelist in several international conference discussing topics related to "AI&DM" and smart fields. He has served in U.S. Secretary of Energy's Advisory Committee on Unconventional Resources Technology in two administrations.

Shahab D. Mohaghegh holds B.S. and M.S. degrees in Natural Gas Engineering from Texas A&I University and Ph.D. in Petroleum & Natural Gas Engineering from The Pennsylvania State University.



### FOR MORE INFORMATION PLEASE CONTACT:

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