



INTELLIGENT SOLUTIONS, INC. PRESENTS:

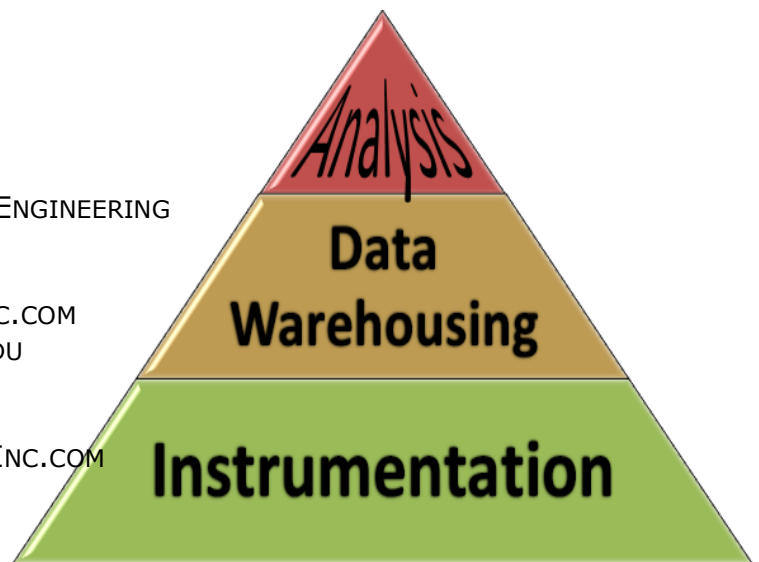
ISI's Short Course Series; AI&DM in the Exploration & Production Industry

COURSE TITLE:

SMART ANALYSIS AND SMART MODELING FOR THE SMART FIELDS.

INSTRUCTOR:

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INTENDED AUDIENCE:

ASSET MANAGERS, RESERVOIR AND PRODUCTION ENGINEERS. GEOLOGISTS, PETRO-PHYSICIST, AND GEO-PHYSICISTS. THIS COURSE IS BENEFICIAL FOR THOSE WHO ARE INVOLVED IN DATA ANALYSIS, MODELING AND DECISION MAKING OF SMART FIELDS.

COURSE DESCRIPTION:

THIS IS A COMPREHENSIVE COURSE DESIGNED FOR PETROLEUM PROFESSIONALS FOCUSING ON SMART FIELD TECHNOLOGY USING THE LATEST TECHNIQUES AND ALGORITHMS FOR INTEGRATION OF ARTIFICIAL INTELLIGENCE AND DATA MINING WITH PRODUCTION AND RESERVOIR ENGINEERING.

THIS SHORT COURSE IS DIVIDED INTO TWO PARTS. THE FIRST PART OF THE SHORT COURSE IS DEDICATED TO THE FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE AND DATA MINING. THIS PART OF THE COURSE WILL PROVIDE THE THEORETICAL BACKGROUND FOR ITS MOST USED COMPONENTS SUCH AS ARTIFICIAL NEURAL NETWORKS, EVOLUTIONARY COMPUTING, AND FUZZY LOGIC. THE SHORT COURSE WILL THEN PROVIDE SOME INSIGHT ON THE TYPE OF PROBLEMS THAT CAN BE SOLVED USING THE ARTIFICIAL INTELLIGENCE AND DATA MINING TECHNIQUES AND THE TYPES OF PROBLEMS THAT ARE NOT SUITED FOR AI&DM. THE SECOND PART OF THE SHORT COURSE IS DEVOTED TO ACTUAL APPLICATION OF THESE ANALYTICAL TOOLS AND TECHNIQUES IN SMART FIELDS. THESE APPLICATIONS WILL COVER AREAS SUCH AS:

- ✚ REAL-TIME DATA PREPARATION FOR ANALYSIS
- ✚ WELL-CENTRIC REAL-TIME ANALYSIS
- ✚ REAL-TIME RESERVOIR ANALYSIS
- ✚ REAL-TIME RESERVOIR MANAGEMENT

ARTIFICIAL INTELLIGENCE IS A COLLECTION OF SEVERAL ANALYTICAL TOOLS THAT ATTEMPTS TO MIMIC LIFE. THESE TOOLS (INCLUDE BUT ARE NOT LIMITED TO, ARTIFICIAL NEURAL NETWORKS, EVOLUTIONARY COMPUTING, AND FUZZY LOGIC) ARE BEING USED IN MANY COMMERCIAL PRODUCTS. THEY ARE AN INTEGRATED PART OF MANY NEW CARS SUCH AS HONDA AND MITSUBISHI. THEY ARE USED TO PROVIDE SMOOTH RIDES IN SUBWAY SYSTEMS AND PREVENT FRAUD IN USE OF CREDIT CARDS. THEY ARE EXTENSIVELY USED IN THE FINANCIAL MARKET TO PREDICT CHAOTIC STOCK MARKET BEHAVIOR, OR OPTIMIZE FINANCIAL PORTFOLIOS. THEIR APPLICATION IN OIL AND GAS INDUSTRY IS FAIRLY NEW. A HANDFUL OF RESEARCHERS AND PRACTITIONERS HAVE CONCENTRATED THEIR EFFORTS ON PROVIDING INTELLIGENT TOOLS FOR THE PETROLEUM INDUSTRY. ARTIFICIAL INTELLIGENCE TOOLS HAVE BEEN USED TO OPTIMIZE HYDRAULIC FRACTURE DESIGNS, CHARACTERIZE OIL AND GAS RESERVOIRS, OPTIMIZE DRILLING OPERATIONS, INTERPRET WELL LOGS, GENERATE VIRTUAL MAGNETIC RESONANCE LOGS, OPTIMIZE NEW WELL PLACEMENT, SELECT CANDIDATE WELLS FOR TREATMENTS AND PREDICT POST FRACTURE DELIVERABILITY.

A DETAIL OUTLINE OF THE COURSE MATERIAL FOLLOWS.

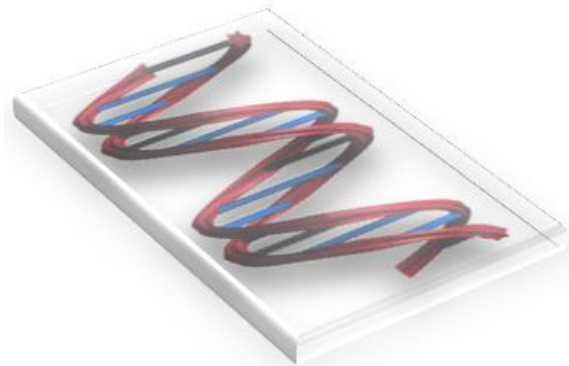
Course Outline:

➤ **Part One: Virtual intelligence; an over view**

- Introduction
- State-of-the-art

➤ **Part Two: Artificial Neural Networks**

- General Overview
- Biological Background
- Learning algorithms
 - Supervised
 - Backpropagation Networks
 - Conjugate Gradient Networks
 - Radial Basis Function Networks
 - Auto Associative Networks
 - Unsupervised (Self Organizing Maps)
 - Kohonen networks
 - Reinforced
- Transfer Functions
- Training, Testing and Verification data sets
- Training a Network
- Dos and Don'ts of Neural Network Practices



Part Three: Evolutionary Computing

- General Overview
- Biological Background
- Genetic Algorithms
 - An Optimization Solution
 - Initial Population
 - Fitness Function
 - Genetic Operation
 - Convergence
- Digital and Analog Coding of the Population

➤ **Part Four: Fuzzy Logic**

- General Overview
- Fuzzy Set Theory
 - Fuzzy Sets
 - Fuzzy Membership Function
- Fuzzy Decision Support Systems
 - Fuzzy Rules
 - Fuzzy Inference Engines
 - Defuzzifications
- Fuzzy Pattern Recognition
 - Fuzzy C-mean Clustering

➤ **Part Five: Hybrid Intelligent Systems**

- General Overview
- Integrating Neural Networks, Genetic Algorithms and Fuzzy Logic

- **Part Six: Field Applications**
 - *Real-Time Data Preparation for Analysis*
 - Cleansing the real-time data streams.
 - Summarization & abstraction of the real-time data streams.
 - Identification and management of outliers.
 - Identification and management of noise.
 - *Well-Centric Real-Time Analysis*
 - Real-time well monitoring.
 - Real-time well test detection and analysis for proactive intervention.
 - Real-time, adaptive well performance modeling and forecasting.
 - *Real-Time Reservoir Analysis*
 - Real-time analysis of depletion mechanism.
 - Real-time analysis of multiple well communications.
 - Real-time analysis of fluid movement in the reservoir.
 - *Real-Time Reservoir Management*
 - Surrogate Reservoir Modeling (SRM).
 - Top-Down, Intelligent Reservoir Modeling (TDM).

- **Part Seven: Getting Familiarity with Software Implementations**
 - **INTELLIGENT DATA EVALUATION & ANALYSIS FOR THE SMART FIELDS, IMPULSE™**
 - **Data Preparation**
 - Getting to know your data
 - Frequency Distribution
 - Conventional Regression Analysis
 - Dealing with Missing Data
 - Dealing with Outliers
 - Advance Statistical Analysis
 - **Key Performance Indicators**
 - Ranking the Performance Indicators
 - Behavior of the Performance Indicator

- **Cluster Analysis**
 - Conventional K-Mean Clustering
 - Fuzzy C-Mean Clustering
 - Automatic Cluster Analysis

- **Neural Network Model Building**
 - Data partitioning
 - Intelligent Data Partitioning
 - Cluster Analysis-Based Partitioning
 - Random Partitioning
 - Pre-Determined Partitioning

 - Neural Model Architecture
 - Number of Layers
 - Number of Neurons
 - Activation Functions
 - Learning Rates
 - Momentum

 - Training Algorithms
 - Back Propagation
 - Generalized Regression
 - Recurrent
 - Radial Basis Functions
 - Self-Organizing Maps

 - Training Process
 - Avoiding Overtraining
 - Real-time Monitoring of the Training Process

 - Neural Model Analysis
 - Parameters Inter-Dependency
 - Tables
 - Functions
 - Neural Models
 - Sensitivity Analysis
 - Single Parameter Analysis
 - Combinatorial Analysis
 - Monte Carlo Simulation
 - General Model Behavior

 - Neural Model Application
 - Import New Data
 - Apply Neural Model