



# THE CHEMICAL ENGINEERING MAJOR

## Refinery System Process Analysis and Testing using Agent Based Simulation

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## **Introduction**

The oil refining process is one of the most complex processes in today's industry, as it incorporates catalyst systems, complex reactor designs, sophisticated computer control hardware and software, and advanced safety and environmental controls. Due to the sheer size and complexity of the refineries, having an overview of the system as a whole is very difficult, and predicting the influence of different behavior of the pumps, machines, assets and personnel is almost impossible without the help of the adequate software tools. However, only the simulation and process modeling software that has the ability to incorporate and connect agent-based simulation, system dynamics simulation and discrete event simulation can analyze the behavior of a system as a whole based on the interaction of the agents.

In order to optimize these complex systems and their interactions approach to single point or single system optimizing cannot work as effectively as we hope, as the refinery has to be considered as a system, rather than connection of its parts. Here is where the multi-method simulation comes to play as we incorporate all the refinery systems into one and be able to have the outputs from the system, as well as its components, rather than just having an output from one of the components.

## **Training Objectives**

### **What are the Goals?**

By attending this BTS training course, delegates will be able to make a substantial, positive impact on the Refinery Process Optimization best practices within their organization, more specifically:

- Acquire the knowledge to consider the refinery as a system, not a sum off its parts
- Incorporate optimizing models into a simulation package
- Create and run simulations of complex systems
- Harness the possibilities of testing change options in virtual environment
- Learn how to perform Multi-method modeling and apply it to refinery process

# Target Audience

## Who is this Training For?

This BTS training course is designed for all professionals working in the field of data analysis, oil and gas exploration, geology and reservoir modelling, process improvement, refinery.

This training course is suitable to a wide range of professionals but will greatly benefit:

- Process engineers
- Refinery schedulers
- Planners, and managers
- Data Scientists
- Data Analysts
- Petroleum engineers
- Refinery Plant Engineers
- Consultants in Data Science, Optimization and Petroleum Engineering

## Daily Agenda

### Topics to be covered:

Amongst a wide range of valuable topics, the following will be prioritised:

- Mathematical Programming in Refining Industry
- Characterization, Physical and Thermodynamic Properties of Oil Fractions
- Artificial-Neural-Network-Based Modelling for Oil Refining Process,
- Planning Under Uncertainty for a Single Refinery
- Refinery and Petrochemical Synergy Benefits
- Concepts and methods of selecting feedstocks and product slates
- Incorporating the fluid dynamics into the process optimization
- Planning for work stoppages, interruptions and recoveries
- Simulation of an upstream and midstream process as a whole
- IoT and refinery process optimization