

Course Content

Title: Refining Processes Fundamentals

Potential PDH: 16

Code: BTT027

Description:

This course will present an overview of a modern petroleum refinery, including the feedstock properties, product slate and the processes used to convert crude oil and intermediate streams into desirable products. Basic hydrocarbon chemistry, crude oil properties and fuel product quality will be discussed. Material and energy balances of the various processes will be addressed along with their impact on the overall operability and economic performance of the refinery. Refining processes will be presented, covering equipment, operating conditions, feedstock, catalyst, yields, and the relationship between key parameters, unit performance and product output and properties. Additionally, future operations, including anticipated changes in crude oil and product slates will be discussed.

Outline:

Module 1

- Process Chemistry and Unit Operations
- Understanding Boiling Point Curves and Crude Oil Properties
- The Refinery Flowsheet
- Modeling Operations within a Refinery
- Types of Refinery Products

Module 2

- Feedstocks and Material Balance
- Energy Balance
- Front End Crude Oil Processing
- Reaction Processes Within a Refinery
- Heavy Oil Processing
- Additional Processes for Liquid Fuel Production

Module 3

- Product Specifications
- Pollution Control Within the Refinery
- Future Refinery Operations
- Worldwide Picture of Refinery Operations in the 21st Century
- Refinery Flowsheet in Future Refinery Operations Worldwide

Instructor:

Professor Gennaro “Jerry” Maffia (USA), MBA, PhD has 20 years of industrial experience at ABB Lummus Co., Air Products & Chemicals Co., and ARCO Chemical Co. Then after two decades as full professor and department chairman at Widener University, Dr. Maffia joined Manhattan College as full professor of chemical engineering. During his time in academia, he has maintained an active consulting practice with assignments on 6 continents. As an R&D manager and researcher, he developed new manufacturing processes including biomolecule production & separation, and propylene production technologies. Dr. Maffia was responsible for the design and start-up of major petrochemical plants

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throughout the Middle East, North America, Europe and Asia. His client list includes: Petrosar, Sarnia, Ontario; PEMEX, La Cangreherra, Mexico; Gulf Oil, Cedar Bayou, Texas; CONOCO / Monsanto, Chocolate Bayou, Texas; ARCO Chemical, 11 propylene oxide plants around the world; and VERAX, Inc., Lebanon, NH. He also worked on EDC plants in Greece and other locations in the Middle East. Dr. Maffia was also part of the team that designed ethylene plants in Fife (UK), Saudi Arabia, Korea, Australia, Qatar, Abadan and Basra. Dr. Jerry Maffia has more than 35 years of process simulation experience including Aspen, ProVision, Hysys, Fluent, and CFD2000. Dr. Maffia participated in, consulted on, and/or managed the design, development, and evaluation of new processes for the production of olefins from natural gas and from gas oil, dimerization of olefins, metathesis of ethylene and butylene to propylene, production and use of epoxides, ethers, alcohols, and styrene, utilization of collagen for cell culture, bioseparations and environmental processes. Dr. Maffia graduated from Manhattan College (New York) with his Bachelors and Masters in Chemical Engineering. He also holds an MBA (Economics) from New York University, and his PhD in Engineering (Chemical) from Dartmouth College. He is a member of the American Chemical Society, American Institute of Chemical Engineers, American Association of University Professors, Tau Beta Pi, Phi Kappa Phi, Phi Beta Delta (International Scholars), Materials Research Society, American Association of Engineering Educators, Delaware Valley Science Council, Junior Achievement of the Delaware Valley, Chemical Consultants Forum, and the Catalysis Club of Philadelphia.