

Refining and Petrochemicals - FINA 4373/7373– Spring 2022

Class Information

- Tuesdays 6:00pm-9:00pm : beginning January 18th 2022
- Location: MH 113 and online via Zoom

Instructor

Andrew Slaughter joined the University of Houston after a career in energy in Europe and North America. In the fall of 2020, he created and led the Energy Value Chain course at UH, repeated in fall 2021. In the spring of 2021, he designed and taught a new Refining and Petrochemicals course, and leads the second edition of this in 2022.

Andrew has held management positions at major oil companies and with leading consulting and advisory firms, as well as leading industry research programmes for the US government. Most recently Andrew was Executive Director of the Research Center for Energy and Industrials with Deloitte Services LLP, in Houston. He started his career at Chevron Oil in the UK.

Summary

The course is designed to introduce students to the fundamentals of petroleum refining, petrochemicals and their respective markets. It will discuss the US and global refining and petrochemical sectors and markets, and include consideration of broader issues affecting energy such as the economic environment, climate change and sustainability, and stakeholder issues.

Course Objectives

- Understand the current US and global refining and petrochemical market structure, including feedstocks, conversion steps and technologies, major products, investment drivers, operational optimization and underlying economic drivers
- Understand how and why refining and petrochemical sectors have evolved in the past, how and why they are likely to evolve in the future
- Understand the relationships between refining and petrochemicals and broader economic, policy, sustainability and societal trends
- Develop the ability to read, discuss, understand, analyse and present in written and verbal material issues affecting oil refining, refined products and petrochemicals

Course Approach

The course will include a variety of learning activities including lectures, classroom discussions, case studies and individual and team projects.

Materials

Textbook: No required textbook

Case Studies: *(subject to modification)*

“Dow Chemical Innovating for Sustainability”

“Valero and Tight Oil”

“Oil Refining in China”

“Reliance Industries: An Emerging Player in Global Petrochemicals and Energy”

“ChemChina”

These cases should be obtained using the following link: to be announced

Grading

Grades will be based on a combination of periodic in-class quizzes, an individual student paper, and a team presentation project (grades assigned approximately one-third for each component).

Class Topics (subject to modification)

Date	Topic	
January 18th	Introductions; Course overview and expectations; Introduction to critical refining and petrochemical concepts and data	
January 25th	Climate, carbon and sustainability considerations for refining and petrochemicals	
February 1st	Case Study – “Dow Chemical Innovating for Sustainability” – discussion and quiz Introduction to concepts of refining (1) – feedstocks and products	
February 8th	Introduction to concepts of refining (2) – refinery configurations and main processes	
February 15th	Case Study – “Valero and Tight Oil” – discussion and quiz Introduction to concepts of refining (3) -focus on main products Biofuels	
February 22nd	Introduction to Petrochemicals (1) – feedstocks and products	
March 1st	Case Study – “Oil Refining in China” – discussion and quiz Introduction to Petrochemicals (2) - processes	
March 8th	Introduction to Petrochemicals (3) – focus on main products	
March 22nd	Case Study – “Reliance Industries: An Emerging Player in Global Petrochemicals and Energy” – discussion and quiz Crude oil and refined products price dynamics Petrochemicals prices and margins	
March 29th	Emerging trends in refining and petrochemicals	
April 5th	Case Study – “ChemChina” – discussion and quiz Logistics and infrastructure; distribution channels and consumer choice	
April 12th	Class time available to finalise team project presentations	
April 19th	Group project presentations (1)	
April 26th	Group project presentation (2)	
Final exam	None	

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Project Assignments (subject to modification)

Projects	Topic	Description	Deliverable
Individual	Research paper on potential pathways to improve the sustainability performance of either refining or petrochemicals	Students will describe key aspects of the sustainability footprint of either refining or petrochemical operations and suggest the most effective ways to improve, supported by data and evidence	10-15 page white paper
Group	Products – from source to market	Student teams will select one major product of either refining or petrochemicals and describe the key drivers for feedstock choice, manufacturing and delivery to consumers, considering technologies, investments and economic drivers	10-15 minute presentation by each team, followed by group Q&A