Course Code	Course Title	ECTS Credits
OGEE-525	Petroleum Refining Processes	7.5
Prerequisites	**Department**	**Semester**
None	Engineering	Fall, Spring
Type of Course	**Field**	**Language of Instruction**
Elective	Oil, Gas and Energy Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
2nd Cycle	Dr Constantinos Hadjistassou	1st/2nd
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

The main objectives of the course are to:

- Introduce students to refining processes and refinery configurations;
- Familiarise attendees with refinery stocks and products;
- Detail the physical and thermal properties of petroleum fractions;
- Explain the processes of crude oil distillation and catalytic reforming;
- Help attendees understand thermal cracking and coking;
- Present the process of hydro-conversion and fluidised catalytic cracking;
- Elaborate on petroleum product blending and alkylation;
- Outline the process of hydrogen production as well as clean fuels;
- Explain the purpose of residue upgrading;
- Overview the safety record of refineries;
- Appreciate the environmental aspects of refining plants.

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Demonstrate knowledge of the chemical (engineering) aspects of petroleum refining;
2. Know the composition of crude oils and products;
3. Recognise the thermo-physical attributes of petroleum fractions;
4. Explain the processes of crude oil distillation and catalytic reforming;
5. Explain thoroughly coke formation and thermal cracking;
6. Identify hydro-conversion and fluidised catalytic cracking;
7. Explain the mechanics of product blending and alkylation;
8. Describe and provide information on clean fuels and residue upgrading;
9. Identify safety hazards in refineries;
10. Undertake basic refinery economic calculations;
11. Identify the types of wastes in refinery plants and waste management;

12. Familiarise with the environmental issues pertaining to refinery operations.

Course Contents:

- Overview of physical separation and chemical catalytic conversion processes;
- Composition of crude oils and petroleum products such as paraffins, gasoline, diesel fuel and characterisation of their physical properties;
- Basic input data, pseudo-components and determination of thermos-physical properties;
- Crude distillation, oil desalting, crude distillation material balance, catalytic reforming, reforming reactions, reaction kinetics and isomerisation;
- Visbreaking, delayed coking, and thermodynamics of coking;
- Hydro-treating, hydrocracking, fluidisation, thermodynamics of fluidised catalytic cracking;
- Product blending, flash point, vapour point, and alkylation processes;
- Upgrading options, non-catalytic and catalytic processes;
- Hazards in refinery plants, risk assessment and risk mitigation;
- Refining costs, refining margins, and economic analysis;
- Wastes, such as effluent water and gas waste, and waste management in refineries.

Learning Activities and Teaching Methods:

Lectures, Projects, Discussion.

Assessment Methods:

Homework, Project assignments, mid-term exam, final exam.

Required Textbooks / Reading:

Title	Author(s)	Publisher	Year	ISBN
Fundamentals of petroleum refining	Fahim, M. A., Alsahhaf, T. A., & Elkilani, A. S.	Elsevier	2010	978-0-444-52785-1

Recomended Textbooks / Reading:

Title	Author(s)	Publisher	Year	ISBN
Petroleum refining: technology and economics	Gary, J. H., Handwerk, G. E., & Kaiser, M. J.	CRC Press	2007	978-0-203-90792-4

Refining processes handbook	Parkash, S.	Elsevier	2003	978-0-750-67721-9