

SUBJECT TEACHING GUIDE

G602 - Petrochemical Refining

Degree in Energy Resources Engineering

Academic year 2023-2024

| 1. IDENTIFYING DATA | | | | | |
|----------------------------------|--|------------------|--------------------|------------------|--------------------|
| Degree | Degree in Energy Resources Engineering | | | Type and Year | Compulsory. Year 4 |
| Faculty | School of Mines and Energy Engineering | | | | |
| Discipline | Subject Area: Technology of Mineral and Energy Resources Module: Training in Energy Resources, Fuels and Explosives | | | | |
| Course unit title and code | G602 - Petrochemical Refining | | | | |
| Number of ECTS credits allocated | 6 | Term | Semester based (1) | | |
| Web | | | | | |
| Language of instruction | Spanish | English Friendly | Yes | Mode of delivery | Face-to-face |

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|------------------|---|--|--|--|--|
| Department | DPTO. INGENIERIAS QUIMICA Y BIOMOLECULAR | | | | |
| Name of lecturer | MARIA MARGALLO BLANCO | | | | |
| E-mail | maria.margallo@uncan.es | | | | |
| Office | E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. SEMINARIO S2062 (S2062) | | | | |
| Other lecturers | JAVIER PINEDO ALONSO | | | | |

3.1 LEARNING OUTCOMES

- Understanding the refinery engineering topics from basic concepts and unit operations, covering some separation technologies (distillation of crudes to refinery fractions), and conversion processes (catalytic reforming and isomerization, alkylation, hydroconversion, fluid catalytic cracking).

4. OBJECTIVES

The objectives of the subject are:

(2) learning the inlet and outlet streams in a refinery scheme, the characterization of the crude oils, and the main refined products;

(1) learning the processes operated in the petroleum refining: separation technologies (distillation of crudes to refinery fractions), and conversion processes (catalytic reforming and isomerization, alkylation, hydroconversion, fluid catalytic cracking);

(3) environment aspects to be considered in the petroleum refining.

6. COURSE ORGANIZATION

| CONTENTS | |
|----------|---|
| 1 | Part I. Chemical processes and unit operations. Some applications of unit operations. Distillation. Mass and enthalpy balances. Equilibrium L-V. Efficiency in separation processes. Diffusion. |
| 2 | Part II. Petroleum refining and petrochemical plants. Introduction. Initial processing in petroleum refining. Petroleum refinery: operation units and catalytic processes. Chemical reactors. Petrochemical plants. Environmental and safety aspects. |
| 3 | Part III. Carbochemistry. Introduction. Processes of coal conversion. Chemical reactors. Environmental and safety aspects. |

7. ASSESSMENT METHODS AND CRITERIA

| Description | Type | Final Eval. | Reassessn | % |
|---|--------------|-------------|-----------|--------|
| Written reports of individual and group activities Minimum mark: 5,00 (scale 0-10). Date: during the semester after each activity is completed, attendance required for the evaluation. Contribution to the overall grading mark: 40%. | Work | No | Yes | 40,00 |
| Written exams of the subject Minimum mark: 5,00 (scale 0-10) Date: Halfway through the semester and in dates fixed by the School for the ordinary and extraordinary evaluation calls. Contribution to overall grading mark: 60 %. | Written exam | Yes | Yes | 60,00 |
| TOTAL | | | | 100,00 |
| Observations | | | | |
| The recovery will take place in the special period dedicated to the effect (extraordinary call) and in the same form of the tests of the ordinary evaluation. Those students who have not passed the part of Work activities, will be able to return the corrected reports before the date of the examination calls in order to be evaluated again. | | | | |
| Observations for part-time students | | | | |
| The evaluation of the subject can be adapted to the partial time students upon request. | | | | |

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

J. -P. Wauquier, El refinado del petróleo, volumen 1. Díaz de Santos, 2004.

J. -P. Wauquier, Petroleum refining, vols. 1-4. Technip, 1994.

J. H. Gary, G.E. Handwerk, Refino de petróleo: tecnología y economía. Reverté, 1980. Reimpresión 2003.

R.A. Dubois, Introducción a la refinación de petróleo, Eudeba, 2006.

J. G. Speight, The chemistry and technology of petroleum. CRC Press, Taylor & Francis Group, 2007.

J. G. Speight, The chemistry and technology of coal. CRC Press, Taylor & Francis Group, 2013.

J. G. Speight, The refinery of the future, Elsevier, 2011.

M. A. Fahim, T. A. Alsahhaf, A. Elkilani, Fundamentals of petroleum refining. Recurso electrónico. Elsevier, 2010.

A. K. Coker, Petroleum refining. Design and Applications Handbook, John Wiley & Sons, 2018.