

## SUBJECT TEACHING GUIDE

### G451 - Chemistry

#### Degree in Nautical Engineering and Maritime Transport

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Nautical Engineering and Maritime Transport			Type and Year	Core. Year 1
Faculty	School of Maritime Engineering				
Discipline	Subject Area: Chemistry Basic Training Module				
Course unit title and code	G451 - Chemistry				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. DE QUIMICA E INGENIERIA DE PROCESOS Y RECURSOS.				
Name of lecturer	ALBERTO COZ FERNANDEZ				
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Other lecturers	GEMA RUIZ GUTIERREZ CRISTINA RUEDA RUIZ				

3.1 LEARNING OUTCOMES
- To know how to solve general chemistry problems, organic and inorganic chemistry problems and their applications in engineering
- Characteristics of fluid flow, liquefied gas, lubricants and refrigeration to operate the main and auxiliary machine and the control systems
- Fires and chemical characteristics for the prevention and control on board
- Chemical characteristics of cargo for cargo operations in oil tankers, chemical and gas vessels
- Chemical characteristics for pollution prevention due to hydrocarbons, chemical products and/or liquefied gases
- Characteristics of chemical loads and risks

#### 4. OBJECTIVES

Basic chemistry for Maritime Engineering, Marine Engineering and Nautical Engineering.

- Chemical behaviour, chemical reactions in water and calculus.
- Physico-chemical behaviour of gases, liquids and their properties. Physico-chemical operations.
- Inorganic formulation and general information about organic compounds.
- Fuels and lubricants. Chemistry in fire behaviour

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	Part I: INTRODUCTION TO CHEMICAL ENGINEERING. Elements, compounds, symbols, formulation and stoichiometry. Introduction to organic chemistry and their compounds. Petroleum and hydrocarbons. Problems and practical case number 1 (computer room): general activities in a chemical laboratory, safety and simulation.
2	Part 2: PHYSICO-CHEMICAL PROPERTIES IN ENGINEERING States of aggregation. Gases, pressure, temperature, density, laws of gases, diffusion and mixing, inert gases, liquids, vapour pressure, properties, solids, state change, phases diagram, critical pressure and temperature, dew point, bubble point, Liquefied gas, solutions, heterogeneous mixing, specific substances, hydrates, polymers, solidification, high density, compatible and incompatible substances. Physico-chemical operations: distillation, extraction, crystallisation, polymerisation. Problems and practical case number 2 (laboratory): liquid-liquid extraction.
3	Part 3: WATER CHEMISTRY IN ENGINEERING Water: importance, classification, properties. Kinetic and chemical equilibrium. Acid-base equilibrium, precipitation, redox. Marine pollutant: general overview, effects of hydrocarbons and other chemical compounds in water. Problems and practical cases number 3 (computer room) and 4 (laboratory): temperature in equilibrium, water analysis. Homework
4	Part 4: FUELS AND LUBRICANTS Hazardous properties: toxic, harmful, corrosive, irritant, flammable, explosive, oxidiser, reactive. Heat in chemical reactions (Fire fuels type A, B, C, D and F), exothermic reactions, combustion, fire, fuels and lubricants properties, electrostatic charge. Problems and practical case number 5: physico-chemical properties of hydrocarbons - density. Final exams

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Homework	Work	No	No	20,00
Laboratory work	Laboratory evaluation	No	No	20,00
Continuous evaluation or exams	Written exam	No	Yes	60,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>Students have 3 options:</p> <ol style="list-style-type: none"> <li>1. Continuous evaluation: tests and exams during classes (60%), group work (20%) and laboratory practices (20%). To take advantage of this continuous evaluation, they must attend 80% of the classes. There will be no midterms, only small tests and questions and tasks for people who take part in the continuous evaluation.</li> <li>2. Ordinary and extraordinary exams, and practices, without work. For students who do not attend at least 80% of the classes or do not want to take advantage of this continuous assessment modality. The mark will consist of the exam (80%) and laboratory and computer practices (20%).</li> <li>3. For part-time students see the evaluation criteria box for part-time students.</li> </ol> <p>Important: even if students do not take part in continuous assessment, it is essential that they attend class because it is where guidelines will be given, problems and practices will be solved and more emphasis will be placed on skills.</p>				
<b>Observations for part-time students</b>				
<p>For students who are part-time, the exam in the ordinary and extraordinary calls (theory and problems and practices) can count 100% of the note, unless they have also presented the work and have done the practices laboratory, in which case the corresponding percentage will be applied. If they want to do the homework, they have to attend 80% of theory classes.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
<b>BASIC</b>
Baber, J. A.; Ibarz, J. Química general moderna. Ed. Marín, S.A.
Brown, T.; LeMay, Jr.; Bursten, B. Química La ciencia central. Editorial Prentice Hall Hispanoamericana SA.
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Ibarz, J. Problemas de Química General" Ed. Marín S.A.
López, J.A. Problemas de química: cuestiones y ejercicios. Ed. Prentice Hall.
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Orozco, C.; González, M <sup>a</sup> N.; Pérez, A. Problemas resueltos de química aplicada. Ed. Paraninfo
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Petrucci, B.; Harwood, C.; Herring, R.H. Química General. Ed. Prentice Hall.
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