

## 30800 - General chemistry

### Información del Plan Docente

Academic Year	2016/17
Academic center	105 - Facultad de Veterinaria
Degree	568 - Degree in Food Science and Technology
ECTS	6.0
Course	1
Period	First semester
Subject Type	Basic Education
Module	---

### 1. Basic info

#### 1.1. Recommendations to take this course

#### 1.2. Activities and key dates for the course

### 2. Initiation

#### 2.1. Learning outcomes that define the subject

#### 2.2. Introduction

### 3. Context and competences

#### 3.1. Goals

#### 3.2. Context and meaning of the subject in the degree

#### 3.3. Competences

#### 3.4. Importance of learning outcomes

### 4. Evaluation

### 5. Activities and resources

#### 5.1. General methodological presentation

The learning process designed for this subject has been based upon ...

The 6 ECTS credits will be broken down into participatory tasks, as follows:

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40 hours of lectures or classes in the classroom. All the students will attend simultaneously. The course contents will be followed in an orderly and chronological way. Students will participate with questions, if they deem it appropriate, as well as with the realization of self-assessment exercises proposed by the lecturer. There are some subjects, which are an integral part of the program, that will not be presented in these lectures, but should be studied by the student.

6 hours of problem solving, also performed in the classroom, which will be divided into two groups. In these classes those problems previously proposed to the students will be resolved, particularly those in which the students found specific difficulties. The work in this activity will be fully participatory and interactive.

14 hours of practical laboratory work, distributed in 7 sessions of 2 hours each. During these classes, every student will execute experimental procedures completely, including material preparation, its calculations and the interpretation of results. Such experimental procedures will be provided to the student, together with some questions that he/she must prepare and resolve prior to the realization of the practice. After the practical class, students should present another questionnaire to the lecturer.

20 hours of Supervised work. It consists of the oral presentation of a work prepared and supervised by the teacher. It will be performed in groups of three students. Two sessions for student supervision of about half an hour each are set, and then the oral presentation will be carried out in the laboratory for fifteen minutes, approximately. Finally, a round of questions about the presentation is done, and a final supervised session to collect results and conclusions.

All the material needed to complete the course is provided by the lecturers and will be available in the Reprographics Service of the Faculty, and online in the ADD.

### 5.2.Learning activities

#### Part 1. Principles of Chemistry. Fundamentals of Organic Chemistry

- Lectures: 40 hours
- Seminars: 6 hours
- Individual work: 91 hours

#### Part 2. Practical classes. Supervised work

- Practical classes: 14 hours
- Supervised work: 20 hours
- Individual work: 27 hours

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### 5.3.Program

The program offered to the students to help them to achieve the expected results comprises the following activities

1 Principles of Chemistry. Fundamentals of Organic Chemistry

Descriptors:

1. The properties of matter. The scope of Chemistry. The scientific method. Properties of matter. Classification of matter. Measurement of the properties of matter. SI units. Density. Percentage composition and its use in solving problems. Uncertainty in measurement science. Significant figures.

2. Water its significance in the field of Science and Food Technology. Composition. Functional significance of the properties. General solvent. Thermal conductivity. Latent heat of vaporization. Surface tension. Dielectric constant. Weak electrolytes. Water content in food. Water activity. Phase changes in Food. Drinking and mineral water. Nutritional properties. Activity. Content of permissible substances. Toxic Substances. Quality control.

3. The chemical reactions. The chemical reactions and chemical equation. The chemical equation and stoichiometry. Chemical reactions in solution. Limiting reactant.

4. Solutions and their properties. Types of solutions. Terminology. Classification. Expression of concentrations and interconversion. Concept of chemical equivalent. Normality. Colligative properties of solutions. Varying the vapor pressure. Increased boiling point. Freezing-point depression. Dissemination through the membrane. Osmosis and osmotic pressure. Isotonic, hypotonic and hypertonic solutions. Endosmosis and exosmosis. Electrolyte solutions. Conductivity. Strong electrolytes. Activity. Ionic strength. Weak electrolytes. Degree of dissociation. Vant'Hoff factor. Osmole and osmolality. Colligative properties of electrolytes. Colloidal solutions. properties

5. Chemical kinetics. The speed of a chemical reaction. Measures of reaction speed. Dependence of the reaction rate with concentration. Rate equation. Reaction order. Dependence of the reaction rate with temperature. Reaction mechanisms.

6. Chemical equilibrium. Principles of chemical equilibrium. Acid-base balance. Solubility and complex ion balance.

7. Electrochemistry. Electrolysis and Faraday's laws. Batteries. Electrode potentials and their measurement. Normal hydrogen electrode. Reference electrodes. Relationship between the electrode potentials and concentration: Nerst equation.

8. General principles of Organic Chemistry. Classes formulas. Bonding in carbon compounds. Types of carbon atoms. Homologous series and functional groups. Reactivity of carbon compounds. Nucleophilic and electrophilic reagents. Reaction mechanisms. Types of organic reactions.

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9. Importance, formulation, nomenclature, use and reactivity of organic compounds. Aliphatic and aromatic. Alcohols, phenols and ethers. Aldehydes and ketones. Carboxylic acids and their derivatives. Amines. Heterocyclic. Isomers, stereoisomers. Lipids. Carbohydrates. Amino acids and proteins.

### Part 2. Practical classes. Supervised work

descriptors:

Practice 1. Knowledge and use of laboratory equipment. Rules, health and safety in laboratory work. Audiovisual support.

Practice 2. Using balances and pH-meters. Basic laboratory operations. Using material and basic equipment.

Practice 3. Preparation of solutions I. Solid-liquid. Expressions of concentration and interconversion. Using laboratory balances.

Practice 4. Preparation of solutions II. Liquid-liquid. Expressions of concentration and interconversion. Using laboratory pipettes.

Practice 5. Preparation of solutions III. Preparation of solutions for analytical purposes. Dilutions.

Practice 6. Preparation of regulatory mixtures. Calculation and measurement of pH.

Handling meter.

Practice 7. Preparation of buffers. Calculation and measurement of the buffer capacity. Applications of interest. Using the pH-meter.

### 5.4.Planning and scheduling

All the information concerning the timetable and classroom for every activity programmed is detailed in the website of the Faculty of Veterinary (link: <http://veterinaria.unizar.es/gradocta/>). This link will be updated at the beginning of each academic year.

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Activity	Classroom	Factor	Personal study	Total
Lectures	40	1,3	52	92
Seminars	6	1	6	12
Practical classes	14	0,5	7	21
Supervised activities			20	20
Examinations			5	5
<b>Total</b>	<b>60</b>		<b>90</b>	<b>150</b>

### 5.5. Bibliography and recommended resources

All class materials, problems to solve, procedure for practical classes, as well as some examples of basic calculations, questions that students must be resolved over the course, and forums to raise further questions are available at <https://moodle2.unizar.es/add/>, within the corresponding site of "Química General". Registered students can access this site using their NIA and password. This material will be made available also in the Reprographics Service of the Faculty.

In addition, the student can consult the following books.

<http://psfunizar7.unizar.es/br13/egAsignaturas.php?codigo=30800&Identificador=C70410>

#### Principles of Chemistry:

BROWN, LEMAY, BURSTEN: *Química. La Ciencia Central*, Ed. Pearson.

WHITTEN, K.W. y GAILEY, K.D.: *Química general*, Ed. Interamericana

EBBING, D.D.: *Química General*. Ed. McGraw-Hill.

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PETRUCCI, R.H. y HARWOOD, W.S.: *Química General. Principios y aplicaciones modernas* . Ed. Prentice-Hall.

AMERICAN CHEMICAL SOCIETY. *Química (Un proyecto de la ACS)*. Editorial Reverté

### **Problems of Chemistry:**

FERNANDEZ OCHOA A: y PEREZ ESCRIBANO C.

*Química Schaum*. Ed. McGraw-Hill.

VINAGRE, F. Y VÁZQUEZ DE MIGUEL, L.M.: *Fundamentos y problemas de Química* , Ed. Alianza Universitaria Textos (AUT).

SIENKO, M.J.: *Problemas de Química* , Ed. Reverté.

BERMEJO, F. y PAZ, M.: *Problemas de Química general y sus fundamentos teóricos* , Ed. Dossat.

### **Formulation of Organic Chemistry compounds:**

PETERSON, W.R.: *Formulación y nomenclatura de Química orgánica* , Ed. Eunibar.

### **Organic Chemistry :**

SCHMIDT: *Química biológica. Las bases químicas de la vida* , Ed. Interamericana.

McMURRAY, J.: *Química orgánica* . Grupo Editorial Iberoamericano.

MORRISON, R.T. y BOYD, R.N.: *Química Orgánica* . Ed. Fondo Educativo Interamericano.