

28907 - Chemistry II

Syllabus Information

Academic Year: 2022/23

Subject: 28907 - Chemistry II

Faculty / School: 201 - Escuela Politécnica Superior

Degree: 583 - Degree in Rural and Agri-Food Engineering

ECTS: 6.0

Year: 1

Semester: Second semester

Subject Type: Basic Education

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. The learning methods and strategies designed for the "Chemistry II" course include lectures (classes regarding the subject theory contents), a teamwork project (this activity involves bibliographic search and group work tutorials), lab sessions and problem-solving classes and seminars.

4.2. Learning tasks

The course will address the following topics:

1. Lectures (25 h). The lectures are designed to provide the students with basic knowledge about organic chemistry, ion balanced exchange, soil colloidal systems structure and chemistry, fertilizers and pesticides. The main objectives of each lesson will be highlighted and an interactive environment will be created for the discussion of theory contents.
2. Problem-solving sessions and seminars (10 h). The goal of this activity is the understanding reinforcement of several subject contents and a better knowledge of critical aspects of the course.
3. Lab sessions (15 h). The goal of this activity is to provide the students with basic skills in chemical laboratory work. The practicals contents involve organic chemistry and agricultural chemistry experiments. The students should self-study the protocols and instructions for planned experiments before going to the lab.
4. Project (10 h). This activity will be carried out in groups. The students will undertake a bibliographic search on a topic beyond the subject contents, elaborate a written report and make an oral exposition. The tutor will give the students regular feedback on progress. The project requires the students to construct logical reasoning to communicate efficiently.

Whenever possible, the contents and project topics of learning activities 1 and 4 will be related to the Sustainable Development Goals and targets listed in section 1.1.

4.3. Syllabus

The course will address the following topics:

- **TOPIC 1: FORMULATION AND NOMENCLATURE OF ORGANIC CHEMISTRY.** Saturated and unsaturated hydrocarbons. Halides. Alcohols. Ethers. Amines. Nitriles. Nitro compounds. Aldehydes. Ketones. Carboxylic acids and their salts. Esters. Anhydrides. Acid halides. Amides.
- **TOPIC 2: INTRODUCTION TO ORGANIC CHEMISTRY.** Carbon and its compounds. Classification of organic compounds. Isomers and stereochemistry. Reactions in organic chemistry.
- **TOPIC 3: ION EXCHANGE EQUILIBRIA.** Natural and synthetic materials and the exchange of ions. ion exchange equilibria. Application of ion-exchange resins. Ion exchange in soils.
- **TOPIC 4: COLLOIDS.** Generalizations. Colloidal systems of the soil.
- **TOPIC 5: THE PLANT, THE SOIL AND FERTILIZERS.** Types of nutrients.
- **TOPIC 6: NITROGEN.** Nitrogen. Nitrogenous fertilizers.
- **TOPIC 7: PHOSPHOROUS.** Generalizations. Phosphated fertilizers.
- **TOPIC 8: POTASSIUM.** Generalizations. Potassium fertilizers.
- **TOPIC 9: SECONDARY MACRONUTRIENTS AND MICRONUTRIENTS FERTILIZERS**
- **TOPIC 10: PESTICIDES.** Definition. Classification. Historical development. The pesticide industry. Need for the use of pesticides. Properties of pesticides. Distribution in the soils. Degradation. Toxicity.

The contents of Lessons 5-10 contribute in a certain way to the knowledge, understanding and awareness of the Sustainable Development Goals and targets listed in section 1.1.

Practice Sessions

1. Identification of functional groups.
2. Organic synthesis of an attractant (I)
3. Organic synthesis of an attractant (II)
4. Ion exchange resins.
5. Saponification.
6. Determination of organic matter in soils.
7. Ammonium nitrate determination in fertilisers

4.4. Course planning and calendar

Activity / Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Face-to-face activities																
Lectures	2	2	2	2	1	2	2	2	2		2	2	2	2		
Problem-solving sessions	2	2		2	2	2	2								2	
Laboratory sessions			2					2	2		2	2	2	3		
Project (Assignment)	1					1	1		1				1			
Assessment					1										1	
non-face-to-face activities																
Autonomous work	2	3	4	3	3	2	2	2	3	8	3	4	4	2	3	8
Group work	1	1		1	1	1	1	3	1		1	1		1	2	
TOTAL	8	8	8	8	8	8	8	9	9	8	8	9	9	8	8	8

4.5. Bibliography and recommended resources

- BB** Cabildo Miranda, M. D. P. (2008). Química orgánica. UNED - Universidad Nacional de Educación a Distancia. . ISBN: 9788436263053, 9788436255287
- BB** Navarro Blaya, Simón. Química agrícola : el suelo y los elementos químicos esenciales para la vida vegetal / Simón Navarro Blaya, Ginés Navarro García. Madrid [etc.] : Mundi-Prensa, 2000
- BB** Navarro García, Ginés. Fertilizantes : química y acción / Ginés Navarro García, Simón Navarro García. Madrid : Mundi-Prensa, D.L. 2014
- BB** Química agrícola. II, Plaguicidas y fitoreguladores / E. Primo Yúfera, J.M. Carrasco Dorrién. 1ª ed., 2ª reimp. Madrid : Alhambra, 1986
- BB** Quiñoá Cabana, Emilio. Nomenclatura y representación de los compuestos orgánicos : una guía de estudio y autoevaluación / Emilio Quiñoá Cabana, Ricardo Riguera Vega. 2ª ed. Madrid [etc.] : McGraw-Hill, D.L. 2005
- BC**
- BB** Cabildo Miranda, M. D. P. (2008). Química orgánica. UNED - Universidad Nacional de Educación a Distancia. . ISBN: 9788436263053, 9788436255287
- BB** Navarro Blaya, Simón. Química agrícola : el suelo y los elementos químicos esenciales para la vida vegetal / Simón Navarro Blaya, Ginés Navarro García. Madrid [etc.] : Mundi-Prensa, 2000
- BB** Navarro García, Ginés. Fertilizantes : química y acción / Ginés Navarro García, Simón Navarro García. Madrid : Mundi-Prensa, D.L. 2014
- BB** Química agrícola. II, Plaguicidas y fitoreguladores / E. Primo Yúfera, J.M. Carrasco Dorrién. 1ª ed., 2ª reimp. Madrid : Alhambra, 1986
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- BC** Bohn, Hinrich L. Química del suelo / Hinrich L. Bohn, Brian L. McNeal, George A. O'Connor ; versión en español, Mario Sánchez Orozco ; revisión técnica, Rubén Guajardo Viera. 1ª ed. México : Limusa, 1993
- BC** Cela, Rafael. Técnicas de separación en química analítica / Rafael Cela, Rosa Antonio Lorenzo, María del Carmen Casais Madrid : Síntesis, 2002
- BC** Domènech, Xavier. Química ambiental de sistemas terrestres / Xavier Domènech, José Peral. Barcelona [etc.] : Reverté, 2006
- BC** Hellwinkel, D. (2012). Systematic Nomenclature of Organic Chemistry: A Directory to Comprehension and Application of its Basic Principles. Berlin: Springer [english friendly]
- BC** Kolay, A.K. (2007). Manures and fertilizers. New Delhi: Atlantic Publishers & Distributors [english friendly]
- BC** Laboratorio de química : Generalidades y aspectos básicos / Carmen Fernández González ... [et al.]. Cáceres : Universidad de Extremadura. Servicio de Publicaciones, 2009
- BC** McMurry, J. (2011). Organic Chemistry. Cengage Learning [english friendly]
- BC** Singh, D.K. (2012). Pesticide Chemistry and Toxicology. New Delhi: Bentham Science Publishers [english friendly]
- BC** Tan, Kim H. Principles of soil chemistry / Kim H. Tan. 3rd ed., rev. and expanded. New York [etc.] : Marcel Dekker, cop. 1998 [english friendly]

The updated recommended bibliography can be consulted in:
<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28907>