Universidad Zaragoza

Year : 2020/21

28956 - Agricultural chemical analysis

Syllabus Information

Academic Year: 2020/21
Subject: 28956 - Agricultural chemical analysis
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 583 - Degree in Rural and Agri-Food Engineering
437 - Degree in Rural and Agri-Food Engineering
ECTS: 6.0
Year: 4
Semester: Second semester
Subject Type: Optional
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

Since the subject is theoretical/practical, the proposed methodology includes classroom lectures complemented by sessions of laboratory practices, where the student will apply the basic knowledge about the main tools of chemical analysis applied to agricultural samples. The lectures are reinforced with solving sessions of various types of numerical problems or exercises.

For better monitoring of the learning process, they will be presented to the student a series of questionnaires or exercises throughout the semester and will encourage the student to use the tutorial hours.

In support, it is posted on the Web (Moodle platform) Basic reference materials as the course syllabus, class presentations of theoretical issues, scripts complementary practices or different material.

4.2.Learning tasks

The course includes the following learning tasks:

- 1- Lectures (20 hours) that consist of lectures aimed at students to acquire theoretical knowledge and basic principles of Chemical Analysis. Classes will be held interactively with students, discussing with them the aspects that are more difficult or especially interesting for each topic. "Case studies" that allow students to consolidate the theoretical concepts and establish the applicability of chemical analysis in solving problems agrifood be presented.
- 2- Solving-problems sessions (10 hours) for the determination of chemical species in agrifood matrices (soil, water, plants, fertilizers, food) that will be inserted in the calendar as progress is made in the content of the subject to be

seeing in classes theoretical.

- 3- Laboratory practice (30 h). According to the academic calendar, 15 sessions of two hours each will be made. various practices on soil nutrient determination, water quality parameters, the composition of fertilizers, etc., that promote the consolidation of theoretical knowledge must be developed. To achieve the goals of the ODS, the following complementary activity is proposed. The practice script will provide an annex with a list of the most important chemical reagents to be used in the laboratory practices together with the link to download the safety data sheets of these reagents for the prevention of risks during their handling. In each of the practices, emphasis will be placed on the importance of handling each reagent correctly, its hazardousness (toxicity) to health and the environment, and therefore having basic knowledge of how to manage the waste generated in the teaching laboratory (for example: differentiating between reagents that can be poured directly down the drain from those that require collection in carafes, minimising the amount of reagents to be used).
- 4- Tutorials. Attendance at tutorials to clarify any doubts of more individualized students is recommended. In them, the teacher can do a better closer monitoring of student work orientating with the most appropriate methods.

4.3.Syllabus

The course will address the following topics:

Theory Program

- 1. Introduction to chemical analysis. Classification of analytical methods.
- 2. Stages in chemical analysis.
- 3. Sampling.
- 4. Chemical treatment of the samples
- 5. Calibration methods.
- 6. Volumetric analysis methods.
- 7. Instrumental analysis methods. Introduction. Classification.
- 8. Electro-analytical methods. Conductometric and potentiometric. Applications.
- 9. Spectroscopic methods.
- 10. Chromatographic methods. Applications.
- 11. Soil analysis.
- 12. Water analysis.
- 13. Fertilizer analysis.
- 14. Food analysis.

Practical Programme

- 1. Water analysis. Determining different parameters related to water quality: pH, conductivity, alkalinity, chlorides, hardness, sulfates.
- 2. Soil analysis. Nutrient measurements: Organic matter, nitrates, Cu.
- 3. Organic (compost) and inorganic fertilizer analysis. Measuring phosphates, K, Mg.
- 4. Food analysis. Measuring: Protein content in cereals, fat in milk, acidity in wine, caffeine in drinks.
- 5. Analysis of different plant matter.

4.4.Course planning and calendar

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	1
Activity																			
Theoretical classes	2	2	1	1	2	1	1	1	2		1	1	1	2	1	2			
Problems			1	1		1	1	1			1	1	1	1	1				
Laboratory classes	2	2	2	2	2	2	2	2	2		2	2	2	2	2	2			
Technical visits																			

Tutorial																				
Evaluation																				4
Independent learning																				
Individual work	3	4	4	4	4	4	4	4	4	8	4	4	4	4	4	4	8	8	4	
Group work																				
TOTAL	5	8	8	8	8	8	8	8	8	8	8	8	8	9	8	8	8	8	8	

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Activity																	
Theorety	2	2	1	1	1	2	2		2	2	2	1	1	2	2	2	
Problems			1	1	1							1	1				
Laboratory classes	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	
Group work																	
Visits																	
Tutorial																	
Evaluation							1									1	
Independent learning																	
Independent learning	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	8
Group work																	
TOTAL	8	8	8	8	8	8	9	4	8	8	8	8	8	8	8	9	8

4.5.Bibliography and recommended resources

BB Faithfull, Nigel T.. Métodos [de] análisis químico agrícola : manual práctico / Nigel T. Faithfull ; traducción de Ana Cristina Ferrando Navarro ; revisión de Miguel Ángel Usón Finkenzeller . Zaragoza : Acribia, 2005

BB Harris, Daniel C.. Análisis químico cuantitativo / Daniel C. Harris . 3ª ed. Barcelona [etc.] : Reverté, cop. 2007

BB Hernández Hernández, Lucas. Introducción al análisis instrumental / Lucas Hernández Hernández y Claudio González Pérez . Barcelona : Ariel, 2002

BC Aceites y grasas / PANREAC . Barcelona [etc.] : Montplet & Esteban, 1983

BC Aguas / PANREAC . Barcelona [etc.] : Montplet & Esteban, 1983

BC Carne y productos cárnicos / PANREAC . Barcelona [etc.] : Montplet & Esteban, 1983

BC Cereales, derivados y cerveza / PANREAC . [s.l.] : Montplet & Esteban, 1983

BC Hamilton, Leicester F.. Cálculos de química analítica / Leicester F. Hamilton, Stephen G. Simpson, David W. Ellis ; traducción Luis Rodríguez Terán ; revisión técnica José Luis Morales . 2ª ed. México [etc.] : McGraw-Hill, imp.1990

BC Jackson, M.L.. Análisis químico de suelos / M.L. Jackson ; traducido del inglés americano por José Beltrán Martínez . [4a. ed.] Barcelona : Omega, 1982

BC Leche y productos lácteos / PANREAC . Barcelona [etc.] : Montplet & Esteban, 1983

BC Métodos normalizados : para el análisis de aguas potables y residuales / preparado y publicado conjuntamente por American Public Health Association, American Water Works Association, Water Pollution control Federation ; directora de edición Mary Ann H. Franson . Madrid : Díaz de Santos, D.L. 1992

BC Métodos oficiales de análisis / [publicados por el] Ministerio de Agricultura, Pesca y Alimentación, Dirección General de Política Alimentaria . Madrid : Secretaría General Técnica, Ministerio de Agricultura, Pesca y Alimentación, 1993-1994

BC Pearson, David. Técnicas de laboratorio para el análisis de alimentos / David Pearson ; traducido del inglés por C. Romero, J. L. Miranda y J. L. Suso . [1a ed.],3a reimpr. Zaragoza : Acribia, D.L. 1997

BC Primo Yufera, Eduardo. Química agrícola. I, Suelos y fertilizantes / E. Primo Yúfera, J.M. Carrasco Dorrién . 1a ed., reimpr. Madrid : Alhambra, 1987

BC Productos derivados de la uva y similares / PANREAC . [s.l.] : Montplet & Esteban, 1983

BC Rubinson, Judith F.. Química analítica contemporánea / Judith F. Rubinson, Kenneth A. Rubinson ; Traducción, Ma Teresa Aguilar Ortega ; Revisión técnica, Josefina de Gyves Marciniack . 1a ed. México [etc.] : Pearson Educación : Prentice Hall Hispanoamericana, 2000

BC Rubinson, Kenneth A.. Análisis instrumental / Kenneth A. Rubinson, Judith F. Rubinson . 1a. ed. en español Madrid : Pearson Educación, cop. 2001

BC Skoog, Douglas A.. Fundamentos de química analítica / Douglas A. Skoog, Donald M. West, F. James Holler . 4a. ed. Barcelona [etc.] : Reverté, D.L. 1996-1997

BC Skoog, Douglas A.. Química analítica / Douglas A. Skoog...[et al.] ; traducción María del Carmen Ramírez Medeles ; revisión técnica Luz Beatriz Santos Aquino . 7a. ed. México [etc.] : McGraw-Hill, cop. 2000

The updated recommended bibliography can be consulted in:
http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28956