SUBJECT GUIDE Academic year 2019-2020

AGRICULTURAL CHEMISTRY

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
Complementary formation	Agricultural Chemistry	2nd, 3rd			

LECTURER(S)	Postal address, telephone nº, e-mail address
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DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT	
Degree in Science and Technology of Food	

PREREQUISITES and/or RECOMMENDATIONS (if necessary)

Have completed the basic subjects of the degree

BRIEF ACCOUNT OF THE SUBJECT PROGRAMME (ACCORDING TO THE DEGREE ¿??)

-The agricultural soil: morphology, constituents, natural fertility, soil quality/soil health. Artificial soils.
-Degradation, correction and improvement of agricultural soils.
-The essential elements: macro and micronutrients.
-Fertilization: inorganic and organic. Biofortification.
-Pesticides.
-Agricultural models.
-Soils, food and human health.

GENERAL AND PARTICULAR ABILITIES

The Agricultural Chemistry ensures the acquisition of all general abilities, included in the agreement of the Commission Andalusian Commission for the Degree in Food Science and Technology (30122009) and in the Degree Project (pages 11 and 12).

Basic Abilities: CB1, CB2, CB3, CB4, CB5,

Transversal abilities: CT1, CT2, CT3

General abilities: CG1, CG2, CG3, CG4, CG5, CG6, CG7, CG8, CG9, CG10, CG11, CG12, CG13, CG14

Specific abilities: CE1, CE2, CE6, CE7, CE11, CE12, CE13, CE14

OBJECTIVES (EXPRESSED IN TERMS OF EXPECTED RESULTS OF THE TEACHING PROGRAMME)

We intend that at the end of the matter the student has acquired knowledge and skills on the following aspects:

- The agricultural soil: its morphology, components, properties, natural fertility, and quality.
- Artificial soils, both solids and liquids (hydroponic).
- Degradation, correction and improvement of agricultural soils.
- Essential elements: macro and micronutrients and their status in the soil-plant system.
- Inorganic and Organic fertilization and food Biofortification.
- Pesticides: their advantages and risks.
- Agricultural models and its possible relationship with the quality of food and sustainability.
- The relationships between soil, food and human health.
- Sampling of agricultural soils.
- Analysis of nutrients in the soil and different types of fertilizers
- Calculations of corrections and improvements of agricultural soils

These knowledge contribute to the education of the student in the three basic pillars of nutrition:

1. The preparation and preservation of food
2. The quality and food safety
3. The binomial nutrition-health

DETAILED SUBJECT SYLLABUS

Topic 1. Agricultural Chemistry and Agricultural Soil
Topic 2. Constituents of agricultural land
Topic 3. Bases of the natural fertility of agricultural soils
Topic 4. Artificial substrates for cultivation
Topic 5. Agricultural land quality
Topic 6. Degradation of agricultural soils
Topic 7. Correction and improvement of agricultural soils
Topic 8. The essential elements in the soil-plant-food system: macronutrients and micronutrients
Topic 9. Fertilization: Subscriber's laws
Topic 10. Inorganic and organic fertilizers
Topic 11. Biofortification
Topic 12. Pesticides
Topic 13. Agricultural models
Topic 14. Soils, food and human health

Field practices:
• Description and sampling of the arable layer of agricultural soils for laboratory practices

Laboratory practices
• Preparation of samples of arable layer and root layer of agricultural soils for analysis in the laboratory
• Determination of the apparent density of the soil
• Determination of organic matter in soils
• Determination of total nitrogen in soils

• Determination of pH and electrical conductivity in soils
• Determination of phosphorus and potassium assimilable in soils
• Determination of equivalent calcium carbonate in soils

Seminars
• Soils and food under the perspective of climate change
• The future of humanity in the face of a shortage of land and water for agriculture
• The concepts of food security within the framework of sustainable agriculture
• La Vega de Granada: agriculture and food throughout history

READING

- Auld S.J.M., Ker D.R.E. 2007. *Practical Agricultural Chemistry*. Biotech Books.
- Brevik E.C., Burgess L.C. 2013. *Soils and Human Health*. CRS Press.
- Bohn H., Myers R.A., O'Connor G. 2002. *Soil Chemistry*. Wiley and Sons.
- Castañón G. 2000. *Ingeniería del Riego. Utilización Racional del Agua*. Paraninfo.
- Gómez Brindis J.G. 2011. *Herbicidas Agrícolas: Formulaciones, Usos, Dosis y Aplicaciones*. Trillas.
- Gostincar I Turon J., Yuste Pérez P. 1999. *Handbook of Agriculture*. Marcel Dekker.
- Hood T.M., Jones J.B. 1997. *Soil and Plant Analysis in Sustainable Agriculture and Environment.* Marcel Dekker.
- Labrador Moreno J. 1996. *La Materia Orgánica en los Agrosistemas*. Mundi-Prensa.
- Lal R., Hansen D., Uphoff N., Slack S. 2003. *Food Security and Environment Quality in the Developing World*. Lewis Publishers.
- Loomis R.S. 2002. Ecología de Cultivos. *Productividad y Manejo en Sistemas Agrarios*. Mundi-Prensa.
- Knowles F. 2007. *A Practical Course in Agricultural Chemistry*. Read Books.
- Martín de Santa Olalla F., López Fuster P., Calera A. 2005. *Agua y Agronomía*. Mundi-Prensa.
- Moreno Casco J., Moral Herrero R. 2008. *Compostaje*. Mundi-Prensa.
- Navarro G. y Navarro S. 2013. *Química Agrícola, Química del Suelo y de los Nutrientes Esenciales para las Plantas*. Mundi-Prensa.
- Sposito B.G. 2008. *The Chemistry of Soils*. Oxford University Press.
- Urbano Terrón P. 2000. *Aplicaciones Fitotécnicas*. Mundi-Prensa.
- Urbano Terrón P. 2001. *Tratado de Fitotecnia General*. Mundi-Prensa.
- Urbano Terrón P. 2002. *Fitotecnia. Ingeniería de la Producción Vegetal*. Mundi-Prensa.
- Villalobos F.J. y Fererer E. 2017. Fitotecnia, Principios de Agronomía para una Agricultura Sostenible. Mundi-Prensa.
- Wild A. 1992. *Condiciones del Suelo y Desarrollo de las Plantas, Según Rusell*. Mundi-Prensa.
- Wild A. 2003. *Soils, Land and Food. Managing the Land During the Twenty-First Century*. Cambridge.
- Yagüe González J.I., Yagüe Martínez de Tejada A. 2011. *Guía Práctica de Productos Fitosanitarios* 2011. Mundi-Prensa/Paraninfo.
- Yin X., Yuan L. 2012. *Phytoremediation and Biofortification: Two Sides of One Coin*. Springer

Complementary reading:

- Adriano D.C. 2001. *Trace Elements in Terrestrial Environments. Biochemistry, Bioavailability and Risk of Metals*. Springer.
- Baird C. 2001. *Química Ambiental*. Reverté.
- Weil R.R. y Brady N.C., 2017. *Elements of the Nature and Properties of Soils*. Pearson AG.
- FAO. 2012. *El Estado de los Recursos de Tierras y Aguas del Mundo para la Alimentación y la*

Agricultura. La gestión de los Sistemas en Situación de Riesgo. Mundi-Prensa
- Fenoll C., González-Candelas F. 2010. *Transgénicos*. CSIC-Press
- Gafo J., lacadena J.R., Montoliu L., Fresno A., Barahona E., Torralba F., Gracia D. 2001. *Aspectos Científicos, Jurídicos y Éticos de los Transgénicos*. Univ. Pont. de Comilllas
- Morgan R.P.C. 1997. *Erosión y Conservación del Suelo*. Mundi-Prensa
- Plaster E.J. 2000. *La Ciencia del Suelo y su Manejo*. Paraninfo.
- Regnault-Roger C., Philogène B., Vincent Ch. 2004. *Biopesticidas de Origen Vegetal*. Mundi-Prensa.
- Sellinus O., Alloway B., Centeno J.A., Finkelman R.B., Fuge R., Lindh. U, Smedley P. 2007. *Essential of Medical Geology*. Elsevier Academic Press.

White R.E. 2006. *Principles and Practice of Soil Science. The Soil as a Natural Resource*. Blackwell Publishing.

RECOMMENDED INTERNET LINKS

British Society of Soil Science: http://www.soils.org.uk/pages/home
Food and Agriculture Organization of the United Nations: http://www.fao.org/home/en/
Journal of Agricultural and Food Chemistry: http://pubs.acs.org/journal/jafcau
Journal of the Science of Food and Agriculture: http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1097-0010
Soil Science and Plant Nutrition: http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1747-0765
Soil Science Society of America: https://www.soils.org/
Soil Use and Management: http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1475-2743
United States Department of Agriculture (USDA): http://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/