

AGRICULTURAL CHEMISTRY

MODULE	CONTENT	YEAR	TERM	CREDITS	TYPE
Complementary formation	Agricultural Chemistry	2nd, 3rd	1st,	6	Optative
LECTURER(S)			Postal address, telephone nº, e-mail address		
<ul style="list-style-type: none"> • Gabriel Delgado Calvo-Flores • Eduardo Ortega Bernaldo de Quirós • Jesús Párraga Martínez • Juan Manuel Martín García 			Dpto. Pedology and Agricultural Chemistry, first floor, Faculty of Pharmacy. Offices: 181, 184, 185 and 186. E-mail: gdelgado@ugr.es , eortega@ugr.es , jparraga@ugr.es , jmmartingarcia@ugr.es ,		
DEGREE WITHIN WHICH THE SUBJECT IS TAUGHT					
Degree in Science and Food Technology					
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). <u>Particular abilities:</u> -Know the models of food production, composition and physical, physico-chemical and chemical properties to					



determine its nutritional value and functionality.

-Know, understand and apply the classical methodology and new technological processes aimed to improve the production and processing of food.

-Analyze biological, chemical and physical hazards in the food chain in order to protect public health.

-Develop protocols for environmental management and quality control in food industry.

-Know and set nutritional guidelines and design food to encourage consumption and healthy eating.

-Inform, train and advise legal, scientific and technical, to the public administration, the food industry and consumers, to design strategies of intervention and training in the field of science and technology of foods

-Put into practice the principles and methodologies that define the professional profile of scientist and technologist of food, showing in an integrated way the acquisition of skills and competencies that contemplates the degree.

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

THEORETICAL ISSUES:

Lesson 1. The Agricultural Chemistry and the Agricultural soil

Lesson 2. Components of the agricultural soils

Lesson 3. The natural fertility of agricultural soils



Lesson 4. The artificial substrates for the crop

Lesson 5. The Quality of the agricultural soil

Lesson 6. Degradation of agricultural soils

Lesson 7. Correction and improvement of agricultural soils

Lesson 8. The Essential Elements in the soil-plant-foods system: General Information

Lesson 9. The essential elements in the soil-plant-foods system: macronutrients

Lesson 10. The essential elements in the soil-plant-foods system: micronutrients

Lesson 11. Fertilization: Laws of the Fertilization, Inorganic Fertilization

Lesson 12. Organic fertilizers

Lesson 13. Biofortification

Lesson 14. The pesticides

Lesson 15. Agricultural models

Lesson 16. Soils, foods and human health

PRACTICE ISSUES:

Seminarios

- Los suelos y la alimentación bajo la perspectiva de un cambio climático
- El futuro de la humanidad frente a la escasez de suelos y agua para la agricultura
- Los conceptos de seguridad alimentaria en el marco de una agricultura sostenible
La Vega de Granada: agricultura y alimentos a lo largo de la Historia

Field practices

-Description and sampling of the topsoil of agricultural soils for laboratory practices

Laboratory practices

- Preparation of samples of arable layer and layer of roots of agricultural soils for analysis in the laboratory
- Determination of soil bulk density
- Determination of available potassium in the soils
- Determination of available phosphorous in the soils
- Determination of the active lime in soils
- Determination of assimilable heavy metals and micronutrients

Seminaries

- Soils and food under the perspective of climate change
- The future of humanity under the perspective of a shortage of land and water for agriculture
- The concepts of food security within the framework of a sustainable agriculture



READING

FUNDAMENTAL 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. 2003. *Química Agrícola*. Mundi-Prensa.
- Porta J., López-Acevedo M., Roquero C. 2003. *Edafología para la Agricultura y el Medio Ambiente*. 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.
- 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.
- Brady N.C. 2010. *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., Iacadena J.R., Montoliu L., Fresno A., Barahona E., Torralba F., Gracia D. 2001. *Aspectos Científicos, Jurídicos y Éticos de los Transgénicos*. Univ. Pont. de Comillas
- 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/>

