Curricular Unit Form

POLITÉCNICO DE PORTALEGRE

POLITÉCNICO DE PORTALEGRE
Escola Superior Agrária de Elvas

Updated On	2024/02/07
Curricular Year / Period	2023/24 / S2
Course	Agronomy
Curricular Unit	Plant Nutrition and Soil Fertility
Language(s) of Instruction	Português

ECTS/tempo de trabalho (horas)

ECTS	Total	Horas de contacto semestral								
		T	TP	PL	S	TC	E	O	OT	EC
6	160		64	32						

T - Theoretical; TP - Theoretical and practical; LP - Laboratory Practice; S - Seminar; TG - Tutorial guidance; FW - Fieldwork; T - Training; ; EC - Clinical teaching; O* - Other hours typified as Clinical Training under the Directive 77/453/EEC of June 27, adapted by Directive 2005/36/EC.

Teacher in charge (GDPR consent) [complete name, email]	José Manuel Rato Nunes / ratonunes@ipportalegre.pt
Prerequisites [Curricular Units that must precede and specific entry competences]	They do not exist, although the knowledge obtained in Pedology is important for a better understanding of this discipline.
Learning outcomes [Description of the overall and specific objectives] [Knowledge, skills and competences to be developed by students]	At the end of this course students will have the necessary knowledge to understand the mechanisms of plant nutrition. They will also learn which nutrients are essential to plant life, their relative importance and how they behave in the soil. They should be able to classify fertilizer materials and have a thorough knowledge of the preferred conditions for their use. The influence of the use of these substances on the physicochemical characteristics of the soil should also be known. It is the objective of this course that students have contact with the main techniques to determine soil fertility. In this context, it is particularly important to highlight the knowledge that the students should acquire regarding the chemical analysis of the soil. 1. Identify plant nutrients, be aware of their relative importance, know the main aspects of their behavior in the soil, understand their functions in plant development; 2. Critically evaluate the main environmental impacts of fertilizer use and minimize them; 3. Collect soil samples and plant material for analysis; 4. Plan environmentally and agronomically balanced fertilization schemes for the different crop / soil binomials; 5. Assess which fertilizer application technique should be adopted in each case; 6. Know, evaluate, understand and use new fertilizer materials available in agriculture; 7. Collect and record information or data in the library, laboratory or field, and summarize it using the most appropriate qualitative and/or quantitative techniques; 8. Use the Internet critically and as a means of communication and source of information; 9. Know how to listen, appreciate and evaluate the point of view of others; 10. Acquire the ability to publicly present a set of R&D ideas or results; 11. Acquire the ability to produce a clear and succinct activity report, demonstrating the performed study and the main results obtained; 12. Have the ability to plan and coordinate practical work as well as the teams responsible for its implementation.
Sustainable Developemnt Goals	
Syllabus	1. Plant nutrition 1.1 Primary macronutrients 1.2 Secondary macronutrients 1.3 Micro-nutrients 1.4 Beneficial elements 1.5 Other possibly beneficial elements 1.6 Toxic elements 1.7 Interaction between elements 2. Soil Fertility

	2.1 Soil chemical analysis 2.1.1 Collection of soil samples 2.1.2 Analysis of soil samples 2.1.3 Interpretation of soil analysis results and fertilization recommendation 2.2 Plant chemical analysis 2.2.1 Collection of plant samples 2.2.2 Preparation and analysis of plant samples 2.2.3 Interpretation of Fertilization Results and Recommendations 3. Fertilization, 3.1 Fertilizers, 3.1.1 Fertilizers general characteristics 3.1.2 Nitrogen fertilizers 3.1.3 Phosphate fertilizers 3.1.4 Potassium fertilizers 3.1.5 Other compound fertilizers 3.1.6 Special fertilizers 3.1.7 Liquid fertilizers 3.1.8 Organic and organomineral fertilizers 3.2 Amendments 3.2.1 Organic amendments 3.2.2 Mineral amendments 4. Environmental Impacts of Fertilization 4.1 Main sources of contamination 4.1.1 Nutrients and sediments 4.1.2 Pathogenic organisms 4.1.3 Trace Elements 4.1.4 Organic compounds 4.2 Soil Remediation 4.2.1 Inorganic Contaminants 4.2.2 Organic Contaminants
Teaching methodologies (including assessment) [Specify the types of assessment and the weights and evaluation criteria]	**1 - Teaching methodologies** Theoretical and theoretical-practical classes with explanation of concepts with discussion and with exercises, presentation and analysis of practical cases. **2 - Period assessment** Two theoretical assessment tests are carried out. The value obtained weights 70% of the final average, the remaining 30% are attributed to the monographic work. Minimum score in frequencies: 8.5 Minimum grade at work: 9.5. Exam: 70% of the final grade **3 - Examination assessement** Exam: 70% of the final grade. There are no parts. It is not possible to deliver the monographic work on this date.
Bibliography	**1 - Main Bibliography** Michael, J. S. 2005. Soils: An Introduction (6th Edition); Edward, P. 2008. Soil Science and Management Edward Plaster; Costa, J. B. 1995. Caracterização e constituição do solo. Fundação Calouste Gulbenkian Eds., Lisboa. Porta, J., López-Acevedo, M. & Roquero, C. 1994. Edafologia para la agricultura y el medio ambiente. Ediciones Mundi-Prensa (Eds)., Madrid. Santos, J. Q. 2012. Fertilização e Ambiente. Eds.. Europa-América, Lisboa. Santos, J. Q. 2012. Fertilização. Fundamentos da Utilização de Adubos e Correctivos Eds.. Europa-América, Lisboa. Foth, H. 1990. Fundamentals of Soil Science, eighth edition. John Wiley & Sons. (Eds.), New York.

Miller, R. & Donahue, R. 1995. Soils in Our Environment, seventh edition.. Prentice Hal Eds. l.

Sparks, D. L. 1986. Soil physical chemistry. CRC Press Eds. New York, EUA.

Sparks, D. L. 1995. Environmental soil chemistry. Academic Press Inc. Eds. New York, EUA.

Neal, E., Cary, J. G., Aga, R. & William, F .2008. Soil Science Simplified
Food and Agriculture Organization (FAO). 2009. Base referencial mundial del recurso suelo. Informes sobre recursos mundiales de suelos. FAO, Roma.

Varennes, A. 2003. Produtividade dos Solos e Ambiente. Escolar Editora, Lisboa.

2 - Complementary Bibliography

Aragüésa, V. Urdanozb, M. Çetinc, C. Kirdac, H. Dagharid, W. Ltifid, M. Lahloue, A. Douaikf. 2011. Soil salinity related to physical soil characteristics and irrigation management in four Mediterranean irrigation districts Agricultural Water Management 96(2): 959966;
Ayers, R. & Westcot, D. 1985. Water quality for agriculture. Irrigation and Drainage FAO Paper 29, revised. Roma. 97 p.
Food and Agriculture Organization (FAO). 1994. Efecto del água sobre el rendimiento de los cultivos. Relatório 33 de los estudios FAO sobre riego y drenage, FAO, Rome.
Feio, M. 1991. Clima e agricultura. Menistério da Agricultura, Pescas e Alimentação Eds. Lisboa, Portugal. p.266 Soils,
S. W. Buol. 2007.Soils, Land, and Life
Garrison Sposito. 2008. The Chemistry of Soils

Special Situations

[Students with special status]

1 - Period assessment - Students with special status

2 - Examination assessement - Students with special status