

MAGB107 Soil, water and ecological sciences for Agribusiness

ECTS Value: 5 ECTS
Self-Study Hours: 90

Contact Hours: 25
Assessment Hours: 10

Overall Objectives and Outcomes

This unit aims to provide the student with the good understanding of the soil, hydrological and agroecological sciences and the link to agricultural production methods and techniques. This unit will evaluate some to the key issues associated with the management of soil, water and agroecosystems together with the potential management options for agricultural productivity and sustainability.

By the end of this module, the learner will be able to:

Competences:

- a. describe the physical and chemical characteristics of soil;
- b. describe the flow of matter and energy in a soil ecosystem;
- c. describe how the soil's physical and biological characteristics affect its nutrient balance;
- d. identify techniques that can be applied to ensure soil and water conservation in an identified farming system;
- e. analyse the role of good agricultural in the prevention of water pollution;
- f. analyse how the population of an identified pest species changes across the crop growing season.

Knowledge:

- a. distinguish between different types of soil water;
- b. identify the key soil physical and chemical properties;
- c. describe the major soil processes;
- d. identify different point and non-point sources of water pollution and their impacts on the agricultural and natural environment;
- e. distinguish between different groundwater bodies within the Maltese Islands in terms of their geology, uses and quantitative and qualitative status;
- f. identify different species and varieties used in an agricultural setting;
- g. distinguish between species and functional biodiversity;
- h. define the term ecosystem services and give examples that are relevant to farming systems;

- i. analyse how agri-environment and climate measures can reconcile the production of food with conservation of natural resources under increasing production pressures.

Skills:

- a. analyse water and soil properties;
- b. identify management practices that may be used in a given site to improve the soil biological, physical and chemical properties;
- c. describe measures that may be applied to ensure water conservation in farming systems;
- d. describe measures that may be applied to prevent water pollution from agricultural systems;
- e. assess the contribution of agrobiodiversity to crop production through the delivery of agroecosystem services.

Assessment Methods

This module will be assessed through: Project-Based Assignment.

Suggested Readings

Core Reading List:

1. Martin, K. & Sauerborn, J. 2013. Agroecology. Springer, Dordrech.
2. Altieri, M. 1995. Agroecology: the science of sustainable agriculture. 2nd Edition. CRC Press.
3. Vandermeer, J.H. 2011. The ecology of agroecosystems. Jones and Bartlett Publishers. Boston.
4. Ashman, M., R., and G. Puri. 2002. Essential Soil Science. Blackwell Publishing.
5. Bardgett, R.D., 2005. The Biology of Soils. A Community and Ecosystem Approach. Oxford University Press.
6. FAO, 2000. Manual on integrated soil management and conservation practices. Food and Agriculture Organisation Land and Water Bulletin. [Online]. Available at: <http://www.fao.org/docrep/016/x4799e/x4799e.pdf>. [Accessed 19 03 2018].
7. FA), 2006. Malta: Water Resources Review. Food and Agriculture Organization of the United Nations. Rome. [Online]. Available at: <http://www.fao.org/docrep/009/a0994e/a0994e00.htm>. [Accessed 19 03 2018].

Supplementary Reading List:

1. Gliessman, S,R. 2014. Agroecology: the ecology of sustainable food systems. 3rd Edition. CRC Press.
2. Rowell, D. L. 1994. Soil Science Methods and Applications Prentice Hall.