Code: 1470 **Pesticides and Environment**
Degree: 2nd cycle – Agriculture; Food Science and Engineering
Stream: Agriculture - Plant Protection; Food Science and Engineering – Food Safety and Quality
Curricular Year: 2nd **Semester Course: 1st**
Credits: 6 ECTS **Compulsory** (Agriculture)
Language: Portuguese/English **Optional** (Food Science and Engineering)
Responsible: Maria José Antão Pais de Almeida Cerejeira
Other lecture(s): António Maria Marques Mexia and Elisabete Tavares Lacerda de Figueiredo Oliveira
Web Site: http://www.isa.utl.pt/home/node/3821

1. Contact hours:
Lectures 42 **Praticals/Laboratory** 28 **Others** 14 **Total** 84

2. Objectives:

It is intended with this discipline that students acquire knowledge on the diverse toxicological and ecotoxicological aspects of pesticides in the perspective of a sustainable use of these products for the Man and Environment and prevention of its main food and environmental risks.
Development of abilities in the area of the environment management of these products, particularly in agricultural and non-agricultural ecosystems.

3. Programme:

Physical-chemical, biological and toxicological characterisation of pesticides. Biological efficacy. Resistance and its prevention. Pesticide toxicity. Pathways: cutaneous, oral and inhalation. Acute, subchronic and chronic toxicity studies and other. Pesticides and human health. Pesticide application. Operator and consumer safety. Quality and food safety. Maximum residue levels permitted in food products. Traceability.
Ecotoxicology: Fundamental concepts. Environmental exposure vs toxic effects. Behaviour and fate of the pesticides on the environment (air, water, soil, sediment and biota). Factors affecting environmental contamination. Pesticide properties, soil properties, site conditions, management practices. Toxic effects on biota. Criteria and ecotoxicological classification to birds, aquatic organisms, bees, worms and other beneficial organisms. Biodiversity protection. Biological assays in toxicity testing.
Environmental modelling, laboratory and field methodologies. Integrated approach on environmental Hazard and Risk assessment.
Practical application in agro-environmental systems: horticultural, fruit, vine and grass-plot production and in sensitive areas. Selection and application of pesticides based on biological efficacy and risk management to the user, consumer and environment. Decision Support Systems. Risk maps.
Legislative framing on the domains of nature and biodiversity, environment and health, and natural resources and waste management. Objectives and action measures on the scope of the sustainable use of pesticides.
Seminaries
Integrated strategies of Plant Protection on management risk of pesticides.
Study visits: 2 Field visits**;** 1 Visit to Portuguese Environment Agency

4. Bibliography:

Main Bibliography

Kuhr, R.J. & Motoyama, N. (1998) – *Pesticides and the Future. Minimizing Chronic Exposure of Humans and the Environment*. IOS Press, 332p.
Schüürmann, G. & Markert, B. (1998) - *Ecotoxicology, Ecological Fundamentals, Chemical Exposure and Biological Effects*. John Wiley & Sons, Environmental Sciences and Tecnology, 900p.
Ragsdale, N. N. & Seiber, J.N. (1999) – *Pesticides: managing risks and optimizing benefits*. ACS Symposium Series, 734. American Chemical Society, Washington, DC, 286p.
Mackay, D. (1991) – *Multimedia Environmental Fate Models: The fugacity Approach*, Lewis Publications, CRCPress, Boca Raton, FL., 257p.

Other Bibliography

Bacci, E. (1994) - *Ecotoxicology of Organic Contaminants*, Lewis Publishers, Boca Raton, 165p.
Pimentel, D. (1997) – *Techniques for Reducing Pesticide Use. Economic and environmental benefits*. John Wiley & Sons, 444p.
Mackay, D., Shiu, W. & Ma, K (1997) – Illustrated handbook of Physical-chemical properties and environmental fate. Pesticide Chemicals Vol 5. Lewis Publishers, Boca Raton, New York, 812p.
Tomlin, C.D.S. (2006) - The pesticide manual, 14th Edition, BCPC, 1349p.
Copping, L.G. (2004) – The manual of biocontrol agents,3rs Edition, BCPC, 702p.

5. Assessment:

Continuous student evaluation through individual and team works, laboratory experimental tasks and seminars. There is still the possibility of final examination if the students do not get the minimum mark in the continuous assessment.

6. Estimated Workload: 168 Hours

7. Last Update: 19/7/2010