# Food Defence

***Text under revision. Not yet approved by academic staff.***

# Animal Parasites Module

## Prof. Rinaldo Nicoli Aldini

COURSE AIMS AND INTENDED LEARNING OUTCOMES

The aim of the course is to provide an overview of the problems relating to food-infesting animals, highlighting the importance of protecting against animal pests in order to maintain food quality and safety. The course will cover: a) the basics on pest categories, their harmfulness and the risks to food health and human health; b) in-depth studies of the biology and damage caused by orders, families, genera and species of animal pests of foodstuffs; c) learning the means and methods of prevention, monitoring and control of the various categories of pests in the field of integrated food protection in the food industries.

At the end of the course, students will: a) be aware of the possible negative implications of infestations for foodstuffs and their environments, both in terms of product loss, other damages and health and hygiene risks; b) be able to orient themselves in the identification of the main systematic categories of pests when faced with their specimens, traces and damages; c) possess up-to-date knowledge of the integrated protection methods for foodstuffs to counter the various types of infestation with the aim of favouring, where possible, alternative health-promoting methods over chemical antiparasitic substances; d) be able to independently draw from sources (professional courses, conferences, appropriate bibliographic material) to update and deepen their knowledge on individual topics; e) know how to communicate appropriately with sector operators, technicians and consumers on the problems in question.

COURSE CONTENT

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|  | ECTS |
| Importance of pest-related problems in foodstuffs. Harm caused by animal parasites (quantitative and qualitative damage) and health and hygiene risks. Ecological preferences, trophic niches, and the relationships between pests. Systematic groups of pests. | 0.5 |
| General characteristics of Arthropods. Insects: systematics, external morphology, anatomy (tegumental, muscular, nervous, circulatory, respiratory, digestive, excretory, secretory, and reproductive systems) and basic physiology. Communication and pheromones. Reproduction and post-embryonic development (ametabolic, heterometabolic and holometabolic, types of juvenile stages). | 1.0 |
| Morphology, biology, and harmfulness of pests: Tisanuri, Blattodei, Psocotteri, Lepidoptera. Coleoptera, Diptera, Hymenoptera. Mites: systematics (basics), morphology, biology and damage. Vertebrate pests: Birds and Murid Rodents, morphology, bio-ecology, ethology, harmfulness. Other pests of occasional interest (Molluscs, pest species in the field). | 1.5 |
| Food protection and integrated pest management in relation to the main types of foodstuffs and food industries. Prevention, inspection, monitoring of environments and foodstuffs. Types of traps. Entomological analysis of foods. Means and methods of control: mechanical, physical, biotechnical, and biological means; chemical means (insecticides, rodenticides) and risks to the environment and health. | 1.0 |
| Tutorials  General aspects of insect morphology. Observation and recognition of orders, families, genera, and species of animal pests infesting foodstuffs. Entomological analysis of foodstuffs. Filth-test execution. | 1.0 |

READING LIST

L. Suss - DP Locatelli, *I parassiti delle derrate,* Calderini Edagricole, 2001.

L. Suss - P. Guerra*Gli infestanti nelle industrie alimentari. La gestione sulle derrate e nell’industria. Riconoscimento, modalità di prevenzione, monitoraggio e lotta*, Avenue Media, Bologna 2021.

Suggested texts

G. Domenichini, *Protezione degli alimenti. Contaminazione biologica e sanità ambientale nell’industria alimentare,* Etaslibri, Milan, 1996.

WH Robinson, *Urban Entomology. Insect and Mite Pests in the Human Environment,* Chapman & Hall, Londra, 1996.

P. Trematerra - L. Suss, *Prontuario di entomologia merceologica e urbana con note morfologiche, biologiche e di gestione delle infestazioni,* Aracne editrice, Rome, 2007.

P. Trematerra, *Entomologia urbana applicata. Animali infestanti o molesti e loro gestione,* Aracne Editrice, Rome, 2016.

E. Tremblay, *Entomologia applicata,* vol. 1, Liguori Editore, Naples, 1990.

TEACHING METHOD

The 'Animal Parasites' module provides a total of 44 hours of teaching: 32 hours (4 ECTS) dedicated to frontal lectures and 12 hours (1 ECTS) dedicated to guided laboratory tutorials. The frontal lecture topics are presented with the help of presentations, both in Power Point and in paper files (also useful for exam preparation), which the lecturer provides to students in advance in order to facilitate their use during lectures. Teaching material is also made available through Blackboard. The tutorials in a laboratory equipped with biological microscopes, stereomicroscopes, and an extractor hood, allow both the practical observation of food insects, their juvenile stages, the damage they cause and the types of traps in use for monitoring and combatting it, as well as the direct learning of the filth-test, an analysis method for identifying solid impurities in food matrices.

ASSESSMENT METHOD AND CRITERIA

The assessment is in the form of a written exam, on paper, consisting of three parts that correspond to the three parts of the programme listed at the start. Each of the three parts of the exam consists of: a) closed-ended questions (12 in the case of the first and second parts, 9 in the case of the third part), with a choice between several options; b) short open-ended (free) questions (4 questions); c) long open-ended (free) question (1). The third part of the exam also includes the practical recognition, by stereomicroscope, of 3 of the food insects that were presented in the tutorials. The number and types of questions allow the probing of both the student's correct learning of notions and concepts as well as their presentation and logic skills, exploring a large part of the exam programme. The relevance and consistency of the responses and the appropriate use of specific terminology will contribute to the assessment. For correct answers, the following marks are awarded: 0.5 mark for each of the closed questions and for the recognition of each of the 3 insects; 0.75 mark maximum for each short open-ended question; 2 marks maximum for each long open-ended question. Any wrong answer receives a penalty mark of -0.25 for the closed questions and short open-ended questions, and a maximum of -1 for the long open-ended question. No mark is assigned to any question left unanswered. The maximum mark is 33/30 (11/30 for each part). The total duration of the written exam is 120 minutes (40 minutes for each section). A mark of 18/30 (with a minimum of 6/11 for each of the three sections) is required to pass the exam.

To facilitate students, 2 optional interim tests, lasting 40 minutes each, will be held during the course, covering the first and second part of the programme. The tests aim to assess the students' level of learning and their ability to answer specific questions on the subject matter. Should a student pass the test covering the first and/or second part of the programme, their mark may, at their discretion, be considered as part of the final exam. In this case the final exam will be limited to those parts of the programme they have not yet passed.

NOTES AND PREREQUISITES

To gain most from the course, students should possess an elementary knowledge of physics, general chemistry, and organic chemistry, acquired during their first year of the course. Elementary aspects of general biology and zoology are an important prerequisite (possessed by students to different degrees depending on the type of secondary school education received), and will be referred to by the lecturer during lessons in order to achieve a better understanding of certain parts of the subject matter; similar reference will be made to the basic aspects of microbiology, a subject that students will encounter in the second and third year of the course.

Information on office hours available on the teacher's personal page at http://docenti.unicatt.it/.

Plant Parasites Module

Prof. Marco Camardo Leggieri

COURSE AIMS AND INTENDED LEARNING OUTCOMES

The course aims to provide students with the appropriate knowledge for recognising the parasitic diseases and abiotic adversities that affect plant foodstuffs (whether intended for fresh consumption, preservation or transformation) and their post-harvest management, for the quantitative and qualitative protection of foodstuffs.

At the end of the course, students will be able to:

1. analyse the factors involved in quantitative and qualitative product reduction caused by biotic/abiotic alterations;
2. know the strategies for defending foodstuffs and identify the possible approaches for implementation using traditional or innovative means;
3. communicate, in specific terminology, the problems of foodstuff pathologies to supply chain operators, sector technicians and the non-expert public;
4. read up and update himself on study topics by consulting scientific and educational publications.

COURSE CONTENT

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| --- | --- |
|  | ECTS |
| Introduction to plant pathology. Respiration, maturation and life of vegetable products post-harvesting. | 1.0 |
| Host-pathogen interaction. Infection cycle and epidemiology of fungi. | 1.0 |
| Combative means and methods in post-harvesting. | 1.0 |
| Special part: main diseases of pome fruits, stone fruits, table grapes, strawberries and a few fruit and vegetable products. Notes on mycotoxigenic fungi. | 1.0 |
| Tutorials  Isolation, culture, and identification of fungal forms on foodstuffs. Introduction to the application of serological and molecular techniques. | 1.0 |

READING LIST

V. De Cicco-P. Bertolini-MG Salerno, Patologia post-raccolta dei prodotti vegetali, Piccin, 2009.

G. Colelli - P. Inglese, Gestione della qualità e conservazione dei prodotti ortofrutticoli, Edagricole, 2020.

A. Matta-R. Buonaurio-F. Favaron-A. Scala-F. Scala, Fondamenti di Patologia Vegetale, Patron, 2017.

G. Agrios, Plant Pathology, 5th edition, Academic Press, 2005.

TEACHING METHOD

The course foresees a total of 44 teaching hours. More specifically, 32 hours (4 credits) will be dedicated to frontal lectures and 12 hours (1 credit) to guided workshop-based tutorials. The frontal lecture topics will be addressed with the aid of PowerPoint presentations, and with case studies for the special part of the course. During the tutorials, the student will participate in workshop and seminar activities, intended for learning useful analytical methods for diagnosing diseases and identifying pathogens.

ASSESSMENT METHOD AND CRITERIA

The assessment will be based on a written test carried out on the Blackboard platform with the aim of evaluating the student's knowledge of the notions and verifying their understanding of the concepts learned.

The written exam covers the entire programme and consists of 27 questions, of which 25 are multiple-choice and 2 are open-ended. Closed-ended questions will aim to test the student's ability to interpret and solve a question, selecting the correct answer from the various options available. Open-ended questions will allow the student to briefly, critically and relevantly discuss what they have learned during the course.

Multiple-choice questions with correct answers will be awarded a mark of 1, those with wrong answers a penalty mark of -0.25.

Open-ended questions will be awarded a maximum mark of 3 for correct answers, while incorrect ones will be assigned a penalty mark of -0.75.

All questions left unanswered will be assigned a mark of 0. The maximum mark is 31/30, the minimum for passing the exam is 18/30.

The duration of the written exam is 40 minutes.

NOTES AND PREREQUISITES

Students signing up for the course are advised to have good basic knowledge of the fundamentals of general and organic chemistry, and of products of vegetable origin, subjects that are covered in the first-year courses.

Information on office hours available on the teacher's personal page at http://docenti.unicatt.it/.