

**COURSE DATA****Data Subject**

<b>Code</b>	34007
<b>Name</b>	Food Parasitology
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2022 - 2023

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. Period</b>
1103 - Degree in Food Science and Technology	Faculty of Pharmacy and Food Sciences	3 First term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1103 - Degree in Food Science and Technology	19 - Food parasitology	Obligatory

**Coordination**

<b>Name</b>	<b>Department</b>
FUENTES FERRER, MARIUS VICENT	358 - Pharmacy, Pharmaceutical Technology and Parasitology

**SUMMARY**

The course of Food Parasitology is a core subject in the third year of the Degree of Science and Food Technology, which is taught in the Faculty of Pharmacy, University of Valencia. In the current curriculum has 6 ECTS credits which are given on a quarterly basis.

The main objectives of the course are: 1) show the importance of food-borne parasites in general, and the most important food parasites (contaminating parasites, typical parasites of food and food-spoiling parasites) in particular; 2) to enable students to conduct sampling, diagnosis and identification of major parasites present in food; 3) to make known the sanitary measures for prevention and control of food-borne parasitic diseases.



Besides the food-borne transmission of parasites, the impact of the control and prevention of diseases aimed at reaching the Sustainable Development Goals (SDGs) of Agenda 2030 will also be reflected upon.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

To follow the course of Food Parasitology basic knowledge on biology and physiology imparted as a part of the basic module of this degree is required.

## OUTCOMES

### 1103 - Degree in Food Science and Technology

- Develop skills to undertake further study.
- Manage food safety.
- Poseer y comprender los conocimientos en el área de Ciencia y Tecnología de los Alimentos.
- Analyze and evaluate food safety risks.
- Know the basic concepts of parasitology.
- Know the specific concepts of food parasitology.
- Know and understand the different types of biological cycles related to foodborne parasites.
- Know the parasites specific of meat products, fish products and by-products.
- Master the techniques for sampling, diagnosing and identifying parasites in food.
- Conocer y manejar las fuentes de información básicas relacionadas con la Parasitología alimentaria.
- Be aware of the importance of foodborne parasitic diseases.
- Capacidad de trabajar en grupo.
- Habilidad para la exposición de temas y mejora de la exposición oral.
- Know the parasites causing water, fruit and vegetable contamination.
- Know food-spoiling parasites.

## LEARNING OUTCOMES



- Knowledge of basic parasitological concepts
- Knowledge of specific concepts of Food Parasitology
- Knowledge and understanding of the different types of biological cycles related to the transmission of food-borne parasites
- Accurate knowledge of parasites contaminating water, fruit and vegetables
- Accurate knowledge of parasites found in meat (products) and fish (products)
- Accurate knowledge of food-spoiling parasites
- Knowledge and understanding of the epidemiology of parasitic diseases transmitted through foodstuffs
- Mastering sample techniques, diagnosis and identification of food-borne parasites
- Being familiar and being able to manage basic sources of information concerned with Food Parasitology
- To acquire awareness of the importance of the transmission of parasitic diseases through foodstuffs
- The ability to work in a team
- Presentation skills of topics and improvement of their oral presentation

## DESCRIPTION OF CONTENTS

### 1. Introduction to Food Parasitology

Concepts of Parasitology. Extent and importance of food Parasitology. Parasite specificity. Types of parasitic life cycles. Propagation and parasitic forms of parasite resistance. Parasites in food: parasitic contaminants, typical parasites of food and food-spoiling parasites. Systematic classification and outline of the biology of major food-related parasites.

### 2. Parasitic contaminants in food

Introduction to parasitic contamination. Fecal contamination by rodents and arthropods of water, vegetables, fruits and other foods. Food handlers as a source of parasitic contaminants. Preparation and handling of food for direct consumption.

Protozoa contaminants: cysts of amoebae, flagellates and ciliates; oocysts of coccidia.

Helminths contaminants: eggs and larvae of digenetic trematodes and cestodes, eggs, larvae and adults of free-living nematodes.

Arthropods pollutants: larval stages and adults. Myiasis producing infective stages. Adults as intermediate hosts of parasitic diseases



### 3. Parasites typically found in meat products and derivatives

The importance of parasites typically found in meat products and derivatives. The control and sanitary inspection of meat products (livestock, poultry and game species) as the main prophylactic measure.

Protozoa typical of meat: special interest of *Sarcocystis* spp. and *Toxoplasma gondii*.

Plathelminths typical of meat: digenetic trematodes producers of in transit parasitism; ciclophyllidean and pseudophyllidean cestodes; special interest of *Taenia saginata* and *T. solium*.

Nematodes typical of meat: special interest of *Trichinella* spp

### 4. Parasites typically found in fish products and derivatives

The importance of food-borne digenetic trematodes, pseudophyllidean cestodes and nematodes in fish products and derivatives.

Digenic trematodes typical of fish: special interest of liver and intestinal flukes.

Pseudophyllidean cestodes typical of fish: special interest of plerocercoid larvae as infective stages.

Nematodes typical of fish: special interest of some infective ascarids and anisakids.

Parasites typical of shellfish, mollusks and other invertebrates

### 5. Food-spoiling parasites

The importance of food-spoiling parasites. The decline in production and quality of food and animal and vegetable raw materials.

Parasites spoiling plant products and derivatives: protozoa, helminths and arthropods. Interest of plant parasites.

Parasites spoiling meat products and derivatives: protozoa, helminths and arthropods. Interest of parasites of domestic livestock, poultry and farm animals.

Parasites spoiling fish and seafood products: protozoa, helminths and arthropods. Interest of fish parasites.

### 6. Sampling techniques and diagnosis of food parasites

General techniques for sampling, detection and identification in food parasitology.

Sampling techniques for water vegetables, fruits, meat products, fish and other foods.

Diagnostic techniques (detection and identification) of protozoa, helminths and arthropods - contaminant, typical, and spoiling parasites of food.

### 7. Techniques of handling, preserving and processing foodstuffs in food parasitology

Prophylactic measures in the preparation of food for human consumption. Products and processes for conservation, transport and processing.

Treatment against food-borne parasites: sewage and drinking water, vegetable products, meat products, fish and invertebrates.



### 8. Epidemiological analysis of food-borne parasites

Interest in knowing the geographical origin of food and the life cycle of food-borne parasites. Transcendence of the pre-patent period, the onset of symptoms and the presence of asymptomatic carriers in the study of food-borne outbreaks.

Analysis of real food-borne outbreaks in different areas: cities, hospitals, residences, schools, restaurants, social and family gatherings

### 9. Labs

Diagnosis and identification of protozoa and helminths contaminants in water and vegetables. Diagnosis and identification of infective stages of protozoa and helminths in meat and fish by artificial digestion and samples of histological sections. Diagnosis and identification food-spoiling parasites. Techniques of assembly to microscopic diagnosis and identification of helminths.

## WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	38,00	100
Laboratory practices	15,00	100
Seminars	2,00	100
Tutorials	2,00	100
Development of group work	5,00	0
Study and independent work	9,00	0
Readings supplementary material	5,00	0
Preparation of evaluation activities	5,00	0
Preparing lectures	60,00	0
Preparation of practical classes and problem	5,00	0
Resolution of case studies	1,00	0
<b>TOTAL</b>	<b>147,00</b>	

## TEACHING METHODOLOGY

The methodology of the subject is structured around four axes:

**Theory sessions.** The theory sessions will be distributed in 4 hours at week, through which the professor will explain the theoretical program, focusing on key concepts for understanding the subject, indicating further bibliographic resources recommended for further preparation of the subject in depth. All documentation necessary to track the classes and specific documentation contained in scientific articles and links of interest, will be accessible in the Virtual Classroom of the subject.



**Laboratory practice sessions.** Laboratory practices were developed over four days in sessions of 3-4 hours. In these practices students will acquire skills in the diagnosis and identification of parasites in food, through the application of both the knowledge that students have acquired in the lectures, as new ones acquired in the laboratory.

**Presentation of collective reports.** Collective reports will be prepared and presented by small groups of students, concerning a subject matter which has previously been agreed between students and faculty staff. The faculty staff will advise and guide the design and preparation work. The work will be presented at the classroom to other students, opening a debate on the issue raised, with the intervention of other students and the faculty staff.

**Tutorial sessions in group.** Tutorials are held in small groups. In them, the faculty staff will guide students both in terms of global approaches as certainly general in nature and other more specific issues, including the direction of work.

## EVALUATION

Continuous assessment of knowledge, competence and acquired skills is carried out along the entire period in which the subject is imparted by means of the evaluation of the following items:

- Preparation, presentation and discussion of individual or collective reports concerning topics related to Food Parasitology and which fit into the thematic unit of the subject. The level of understanding contents, as well as the skills for the presentation and discussion will be assessed. This item contributes 10%. Not participating actively in this activity will have negative repercussions on the final mark.
- Taking the written exam to evaluate the knowledge and understanding of the theoretical contents of the subject. This item contributes 70%. This mark should always be equal to or above 5 out of 10 in order to pass.
- Assessment of supervised laboratory work, the ability to solve experimental problems, writing skills to carry out detailed and well organized reports on experimental results and undertaking a diagnostic test. This item contributes 20%. This mark should always be equal to or above 5 out of 10 in order to pass.

Marks concerning report presentations and practice will remain valid, if necessary, until the second summoning.



## REFERENCES

### Basic

- - CURS EN LÍNIA OBERT MASSIU (MOOC) Els paràsits als aliments: tan petits i desconeguts com dolents. Grup d'Investigació UV Paràsits i Salut. Servei de Formació Permanent i Innovació Educativa de la Universitat de València.  
URL: <https://www.youtube.com/playlist?list=PLiPJN1xCP1u2vZsU70g2yXAQ9tvvG5dF>
- ACHA (P.N.) & SZYFRES (B.), 2003. Zoonosis y Enfermedades transmisibles comunes al hombre y a los Animales. Tercera edición. Volumen III. Parasitosis. Publicación Científica y Técnica No 580, Organización Panamericana de la Salud, Washington, D.C., 413 pp.
- AYRES (R.M.) & MARA (D.D.), 1996.- Análisis de Aguas residuales para su uso en Agricultura. Manual de Técnicas parasitológicas y bacteriológicas de Laboratorio. Organización Mundial de la Salud, Ginebra, 31 pp.
- DESPOMMIER (D.D.), GRIFFIU (D.O.), GWADZ (R.W.), HOTEZ (P.J.) & KNIRSCH (C.A.), 2019.- Parasitic Diseases. Seven Edition. Parasites Without Borders, Inc., New York, 562 pp.
- EUZEBY (J.), 2001.- Los parásitos de las carnes: epidemiología, fisiopatología, incidencias zoonósicas. Editorial Acribia, Zaragoza, 430 pp.
- GÁLLEGO BERENGUER (J.), 1998.- Manual de Parasitología: Morfología y biología de los parásitos de interés sanitario. Edicions Universitat de Barcelona, Barcelona, 490 pp.
- GÁLLEGO BERENGUER (J.), 2001.- Manual de Parasitologia: Morfologia i biologia dels paràsits d'interès sanitari. Edicions Universitat de Barcelona, Barcelona, 535 pp.
- - LANDÍN (C.) & PACHECO (S.), 2010. Helmitos. Manual para la identificación y recuento de huevos de helmintos parásitos en las aguas residuales urbanas. ESAMUR, Murcia, 115 pp.
- MURELL (K.D.) & FRIED (B.) edit., 2007.- Food-borne parasitic Zoonoses. Fish and plant-borne parasites. World Class Parasites: Volume 11. Springer, New York, 429 pp.
- ORGANIZACIÓN MUNDIAL DE LA SALUD, 1995,- Lucha contra las Trematodiasis de Transmisión alimentaria. Informe de un Grupo de Estudio de la OMS, Serie de Informes Técnicos nº 849, Ginebra, 176 pp.
- ORTEGA (Y.R.) & STERLING (C.R.) edit., 2006.- Foodborne Parasites. Springer, Amsterdam, 375 pp.
- ORTEGA (Y.R.) edit., 2006.- Foodborne Parasites. Springer, New York, 289 pp.
- XIAO (L.), RYAN (U.) & FEBG (Y.), 2015. Biology of Foodborne Parasites. CRC Press, Taylor & Francis Group, Boca Raton (FL), 507 pp.

### Additional

- - ASH (L.R.) & ORIHUEL (T.C.), 2010.- Atlas de Parasitología Humana. 5ª edición. Editorial Médica Panamericana, Buenos Aires, 540 pp.
- BOGITSH (B.J.), CARTER (C.E.) & OELTMANN (T.N.), 2005.- Human Parasitology, Third edition. Elsevier Academic Press, 459 pp.
- CABELLO GARCIA (T.), TORRES GIL (M.) & BARRANCO VEGA (P.), 1997.- Plagas de los Cultivos: Guía de Identificación. Manuales 1, Servicio de Publicaciones de la Universidad de Almería, Almería, 163 pp.



- CORDERO DEL CAMPILLO et al., 1999.- Parasitología y Enfermedades parasitarias en Veterinaria, 1ª edición. McGraw-Hill /Interamericana, Madrid, 1000 pp.
- DOMINGUEZ GARCIA-TEJERO (F.), 1993.- Plagas y Enfermedades de las Plantas cultivadas. 9ª edición. Editorial Mundi Prensa, Madrid, 821 pp.
- HENDRIX (C.M.) & ROBINSON (E.), 2006.- Diagnostic parasitology for veterinary technicians. 3rd edition. Mosby, China, 285 pp.
- HUI (Y.K.), SATTAR (S.A.), MURRELL (K.D.), NIP (W. K.) & STANFIELD (P.S.) edit., 2000.- Foodborne Diseases Handbook, 2nd edition. Volume 2: Viruses, Parasites, Pathogens, and HACCP. Marcel Dekker Inc., News York, 515 pp.
- KASSAI (T.), 2002.- Helmintología Veterinaria. Editorial Acribia, S.A., Zaragoza, 258 pp.
- MEHLHORN (H.Von) & PIEKARSKI (G.), 1993.- Fundamentos de Parasitología. Parásitos del Hombre y de los Animales domésticos. 3ª edición. Editorial Acribia, Zaragoza, 391 pp.
- PALUMBO (F.), ZIGLIO (G.) & VAN DER BEKEN (A.) edit., 2002.- Detection methods for algae, protozoa, and helminths in fresh and drinking water. John Wiley & Sons, Ltd., Chichester, 225 pp.
- URQUHART (G.M.), ARMOUR (J.), DUNCAN (J.L.), DUNN (A.M.) & JENNINGS (F.W.), 2001.- Parasitología Veterinaria. Editorial Acribia, Zaragoza, 355 pp.