

Academic Year/course: 2022/23

66854 - Emerging diseases with an impact on Public Health

Syllabus Information

Academic Year: 2022/23

Subject: 66854 - Emerging diseases with an impact on Public Health

Faculty / School: 105 - Facultad de Veterinaria

Degree: 617 - Master's in Global Health: Integration of Environmental, Human and Animal Health

ECTS: 9.0

Year: 1

Semester: Annual

Subject Type: Optional

Module:

1. General information

1.1. Aims of the course

The general objective of the course is to learn about emerging diseases that have an impact on Public Health. To achieve this general objective, the specific learning objectives of the course are to deepen the knowledge of bacterial, viral, prion and parasitic diseases; in their routes of transmission, as well as to know the ways of prevention, control and the strategies that pathogens develop to traditional therapeutic treatments.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/es/>), in such a way that the acquisition of the results of subject learning provides training and competence to contribute to some extent to its achievement.

- Goal 1: No poverty. Target 1.1. Eradicate extreme poverty. Target 1.2. Reduce poverty by at least 50%.
- Goal 2: Zero hunger. 2.1. Universal Access to safe and nutritious food. 2.2. End all forms of malnutrition.
- Goal 3: Good health and well-being. Target 3.1. Reduce maternal mortality. Target 3.2. End all preventable deaths under 5 years of age. Target 3.3. Fight communicable diseases. Target 3.B Support research, development and universal Access to affordable vaccines and medicines. Target 3.D Improve early warning systems for global health risks.
- Goal 4: Quality education. Target 4.3. Equal Access to affordable technical, vocational and higher education. Target 4.4. Increase the number of people with relevant skills for financial success. Target 4.5. Eliminate all discrimination in education. Target 4.7. Education for sustainable development and global citizenship.
- Goal 5: Gender equality. Target 5.1. End discrimination against women and girls. Target 5.5. Ensure full participation in leadership and decision-making. Target 5.B. Improve the use of technology.
- Goal 6: Clean water and sanitation. Target 6.1. Safe and affordable drinking water. Target 6.2. End open defecation and provide Access to sanitation and hygiene. Target 6.3. Improve water quality, wastewater treatment and safe reuse. Target 6.5. Implement integrated water resources management.
- Goal 9: Industry, innovation and infrastructure. Target 9.5. Enhance research and upgrade industrial technologies.
- Goal 13: Climate action. Target 13.2. Integrate climate change measures into policies and planning. Target 13B. Manage climatic change in developing countries.

1.2. Context and importance of this course in the degree

This course is part of the University Master in Global Health: Integration of Environmental, Human and Animal Health. This master's degree includes an interdisciplinary approach to the study of health. This approach seeks to deepen in those diseases that affect animals and human beings to understand the dynamics of diseases. It is an elective within the specialty of Public Health that provides fundamental knowledge to develop the mechanisms of control and prevention of these diseases.

It complements other subjects in the speciality such as Ecology and Ecotoxicology, Food Safety (Methodology for the Evaluation of Food Risks and New Tools in Food Safety) and Health Promotion and, in short, provides the indispensable knowledge for students seeking more specific training in Health.

1.3. Recommendations to take this course

It is convenient that the student has previous knowledge of Biology, Epidemiology, Physiology, Cytology and Histology, Microbiology, Parasitology, Immunology and Pharmacology. If necessary, the basic material necessary for the understanding of the subject will be provided at the beginning of the classes.

2. Learning goals

2.1. Competences

By taking this course the student will achieve the following specific skills:

- Know the most relevant emerging pathogens in Public Health applying the Global Health vision.
- Understanding the importance of vectors as pathogen transmitters.
- Understanding food risks in a globalized world.
- Identify risks associated with animal production.
- Understanding the threat posed by antimicrobial resistance to global health.
- Understanding the importance of vaccines in a global society.

2.2. Learning goals

In order to pass this course, the student must demonstrate the following results:

- Know, from an advanced point of view, the microorganisms under study in the different branches of Microbiology and Parasitology, and the pathological processes they cause.
- Know the zoonoses and emerging diseases produced by bacteria, viruses, prions, protozoa, helminths and arthropods.
- Know the biology of vectors and the diseases they transmit.
- Know the emerging risks in the food chain.
- Know the nutritional components, the use of medicines and associated problems.
- Understand the resistance of pathogens to traditional therapeutic treatments.

2.3. Importance of learning goals

The course allows to know, understand and control emerging diseases, especially zoonotic ones, in a globalized world. This subject, by transmitting to the student a complete and updated training, will provide him/her with knowledge to be able to integrate in the future as a professional of Public Health, Animal Health and in the One Health environment. The knowledge provided by this course will be necessary for the work in the mentioned areas, but also in the emergency scenario of new infectious and parasitic agents, which could generate potential epidemics or pandemics.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that he/she has achieved the planned learning outcomes through the following assessment activities:

ACTIVITY 1: WRITTEN EXAMS

- WRITTEN TEST FOR THE THEORETICAL EVALUATION

The theoretical classes will be assessed by means of a final written test consisting of multiple choice questions. This test will assess the acquisition of basic theoretical knowledge of the subject and the questions will be representative of the different thematic blocks. Passing these tests will prove the achievement of the learning results. The qualification of this the final written test will be between 0 and 10, and it will be necessary to obtain a 5 to pass it. The grade will be 60% of the final mark of the course.

- WRITTEN TEST FOR PRACTICAL ASSESSMENT

The practical classes will be assessed by a final written test consisting of multiple choice questions. The test will evaluate the acquisition of basic practical knowledge of the subject and the questions will be representative of the different thematic blocks. Passing these tests will prove the achievement of the learning results. The grade will be from 0 to 10, and it will be necessary to obtain a 5 to pass it. The grade will be 10% of the student's final grade in the subject, provided that it has been passed.

The assessment tests will take place on the dates indicated in the examination calendar drawn up by the centre.

ACTIVITY 2: PARTICIPATION IN CLASS ACTIVITIES

In order to stimulate continuous learning and therefore improve their attention and performance, at the end of some classes, students will answer a 5-minute questionnaire, which will include multiple choice questions related to the subject matter. The average grade obtained in these questionnaires will be 20% of the final grade of the subject and will only be considered if the student has completed at least 50% of the questionnaires offered during the course.

ACTIVITY 3: THEORETICAL WORKS and WRITTEN PROJECTS

To pass this activity, the student will have to complete a review of a topic of the subject block in the One Health environment. The grade of this activity will be between 0 and 10, and will be 10% of the final grade of the course. This grade will take into

account the following aspects

- Originality of the work (30%)
- Knowledge and understanding of the described process (30%)
- Bibliographic review: search, understanding and interpretation (40%).

Summary table of evaluation activities and their reflection in the student's final grade:

Assessment activities	Assessed contents	% Final qualification
Written test	Theory sessions	60
	Practice sessions	10
Participation in class activities	Continuous evaluation of the class contents	20
Theoretical work and written projects	Autonomous search for information and report writing	10

Global assessment:

Students who have not passed the subject by the afore mentioned procedure, will have the right to sit for a global assessment that will consist of a written test to assess the theoretical and practical contents of the course. This test will have a score between 0 and 10 points. Evaluation criteria: The written test will represent 100% of the final grade and will be carried out in the official exam period of the University of Zaragoza.

Marking system

According with the Regulation of Learning Assessment Standards of the University of Zaragoza (Agreement of the Governing Council of 22 December 2010), the results obtained by the student will be graded according to the following numerical scale from 0 to 10, with the expression of one decimal place, to which the corresponding qualitative grade may be added:

0-4.9: FAIL.

5.0-6.9: PASS

7.0-8.9: GOOD (NT).

9.0-10: EXCELLENT (SB).

Students with a grade over 9.0 might be awarded with honours and it could be given to more than the 5% of the enrolled students during the academic year.

In application of Article 158 of the Statutes of the University of Zaragoza, the provisional examination grades will be publicly displayed for a minimum of 7 days, and the students will be able to review their examinations, for which the place, date and time foreseen for this purpose will be indicated.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process that has been designed for this subject is based on a combination of the following methods:

The theoretical part of this course is structured in 7 thematic blocks comprising 45 theoretical topics, given in 60 hours of 50 minutes lecture duration. The lectures will develop the theoretical concepts detailed in the Program of the subject (see Program). Before the beginning of the theoretical classes, it is planned to make the documentation of each topic available to the students in the virtual campus of the University (ADD). The student will be allowed to fill in a questionnaire at the end of the class in which the attention and performance in the classes will be reflected.

The student will take 30 hours of face-to-face practice sessions. These hours have been divided into 15 practices with a variable duration depending on the subject matter (see practical program). Initially, an explanation of the session will be given and then the students will do the practice under the permanent supervision of the teachers.

Likewise, the student will have to carry out assignments that will require an autonomous work of 20h. For the realization of these, the teaching staff will provide the necessary documentation and will tutor the students in their performance.

Finally, for the preparation of the exam, 113 hours of work will be needed for the student.

Summary table of the time distribution in the different teaching activities:

Teaching activity	
Lectures	60 face to face hours
Practice sessions	30 face to face hours
Assignments	20 non face to face hours

Student's autonomous work	113 non face to face hours
Evaluation tests	2 face to face hours
Total	225h

4.2. Learning tasks

The program offered to the student to help him/her achieve the expected results includes the following activities...

Theoretical classes: 60 hours of theoretical activities, distributed in 7 thematic blocks comprising 45 topics. Theoretical classes will be given in one group only.

Practical Classes: 30 hours of practical activities, distributed in 15 sessions. They will take place in the teaching laboratories and in the necropsy room of the Veterinary Faculty. If the number of students is higher than 15, they will be divided into two groups.

Teaching Works: 20 hours of teaching works.

4.3. Syllabus

THEORY SESSIONS:

Topic 0: Subject presentation.

MODULE I: EMERGING BACTERIAL DISEASES

I.1: Gastrointestinal diseases

Topic 1: Paratuberculosis/Crohn's disease: potential zoonoses.

Topic 2: *Clostridium difficile*: highly resistant emergent bacteria.

Topic 3: Re-emerging zoonoses: Salmonellosis, Campylobacter, Colibacillosis.

I.2: Respiratory Diseases

Topic 4: Human and animal tuberculosis.

Topic 5: Anthrax. Current risks of anthrax.

I.3: Systemic and other diseases

Topic 6: Brucellosis.

Topic 7: Q Fever.

Topic 8: Leptospirosis.

Topic 9: Tetanus. Risk of occupational disease.

Topic 10: Psittacosis. *Bartonella* and the cat.

Topic 11: *Streptococcus suis*, un re-emerging pathogen.

MODULE II: EMERGING VIRAL DISEASES

II.1. Gastrointestinal diseases

Topic 12: Hepatitis E.

II.2: Respiratory Diseases

Topic 13: Coronavirus: Middle East Respiratory Syndrome (MERS-CoV), Severe Acute Respiratory Syndrome (SARS-CoV), Covid-19 (SARS-CoV-2)

Topic 14: Avian Influenza H5N1, Swine Influenza H1N1

II.3: Diseases of the Nervous System

Topic 15: Rabies.

II.4: Non-parasitic hemorrhagic fevers

Topic 16: Ebola and Hantavirus.

II.5: Others

Topic 17: Human and animal lentivirosis.

Topic 18: NIPAH and Hendra viruses.

Topic 19: Valle Rift fever.

MODULE III: EMERGING PRION DISEASES

Topic 20: Scrapie and Bovine Spongiform Encephalopathy (BSE).

Topic 21: BSE crisis. Human prion diseases.

Topic 22: Transmission of interspecies prion agents. Risk of emergence of prion diseases.

MODULE IV: EMERGING PARASITIC DISEASES

IV. 1: Emerging diseases produced by protozoa

Topic 23: Giardiasis, Cryptosporidiosis, Isosporosis, Cyclosporiasis, Sarcocystosis.

Topic 24: Amebiasis, Blastocystosis, Diseases caused by free-living amoebas.

Topic 25: Toxoplasmosis.

IV.2. Emerging helminth diseases

Topic 26: Geohelminthiasis: Ascaris, Toxocara, Ancylostoma, Trichuris, Strongyloides. Echinococcus/hidatidosis.

Topic 27: Meat-borne human hemintheses: Cysticercosis/theniosis, Trichinellosis.

Topic 28: Human hemintheses transmitted by consumption of amphibian fish and crustaceans: Anisakidosis, gnathostomiasis, diphyllobotria and trematodes.

Topic 29: Schistosomiasis.

IV. 3. Emerging diseases caused by arthropods

Topic 30: Miasis, pulicosis.

Topic 31: Scabies, pediculosis.

MODULE V: VECTOR-BORNE DISEASES

Topic 32: Mosquito-borne diseases.

Topic 33: Diseases transmitted by phlebotomines (Leishmaniasis).

Topic 34: Tick-borne diseases.

Topic 35: Diseases transmitted by triatomines.

Topic 36: Diseases transmitted by tsetse (Tsetse-transmitted tripanosomiasis.).

Topic 37: Diseases transmitted by fleas and lice.

Topic 38: Game animals and vectors of emerging diseases.

MODULE VI: EMERGING DISEASES IN AQUACULTURE

Topic 39: Emerging Diseases in Aquaculture.

MODULE VII: EMERGING RISKS IN THE FOOD CHAIN

Topic 40: Emerging biotoxins.

Topic 41: Emerging Mycotoxins.

MODULE VIII: ANTIMICROBIAL RESISTANCE

Topic 42: Antimicrobial resistance in the human species.

Topic 43: Antimicrobial resistance in veterinary species.

Topic 44: Anti-parasite resistance.

Topic 45: Control of antimicrobial resistance and rational use of antibiotics.

PRACTICE SESSIONS (30 hours)

Practice 1: Practical case of Brucellosis, an illness in continuous re-emergence and visit to the Brucellosis Centre of CITA (Agrifood Research and Technology Centre of Aragon, Government of Aragon).

Estimated duration: 3h 30 min.

Space required: CITA.

Contents: Practical case to be solved and set a debate on Brucellosis, an illness in continuous re-emergence.

Activities performed by the student: Debate and resolution of case.

Practice 2: Laboratorial diagnosis of Paratuberculosis.

Estimated duration: 2h.

Space required: CEETE's Necropsies Room and Microscopy Room

Contents: Sample taking and associated injuries.

Activities carried out by the student: Recognition of injuries and microscopic diagnosis, presentation of practical cases.

Practice 3: Diagnostic methods for gastrointestinal re-emerging bacterial zoonoses (Salmonellosis, Campylobacter, Colibacillosis).

Estimated duration: 3h (in two sessions).

Space required: Practice laboratory of the Microbiology and Immunology Unit.

Contents: Microbiological and molecular diagnosis.

Student activities: Microbiological techniques and interpretation of molecular results.

Practice 4: Sampling and diagnosis of prion diseases.

Estimated duration: 2 h 30 min.

Space required: CEETE's Necropsies Room and Microscopy Room

Contents: Sampling of prion diseases and rapid and histopathological diagnosis.

Student activities: Sample taking and rapid techniques, microscope interpretation.

Practice 5: Emerging diseases in aquaculture

Estimated duration: 2h

Space required: Laboratory for teaching practices: Infectious Diseases - Parasitology

Contents: 1. Standardized protocol for fish necropsy and sampling for ichthyopathological diagnosis. 2. Identification of zoonotic helminths in fish.

Student activities: Blood extraction, application of necropsy methods in a salmonid and sample taking, clinical macro- and microscopic observation. 2. Necropsy of market fish and search for Anisakid larvae in viscera and musculature and their identification.

Practice 6: Evaluation and discussion of a prevention/control programme for human visceral leishmaniasis (*L. infantum*) in a Spanish region.

Estimated duration: 2h

Space required: Classroom with audiovisual equipment.

Contents: The teacher gives the students, with the necessary advance (one week), a detailed prevention/control program for a Spanish geographical area. In this program all the details are specified.

Activities carried out by the student: The student must make a critical review of it, so in the meeting with the teacher, he/she can explain the scientific foundations of each of the steps.

Practice 7: Mosquitoes (Family Culicidae) vectors of re-emerging diseases in Europe

Estimated duration: 2h

Space required: Parasitology Laboratory.

Contents: Bioecology and morphological identification of the main type of vector mosquitoes (Family Culicidae) of re-emerging diseases (malaria, dengue, chikungunya, WNV, etc.).

Activities carried out by the student: Brief seminar about generalities of the biology and ecology of Culicidae mosquitoes. Observation and identification of the different life stages of the main type and species involved in the transmission of vectorial diseases (malaria, dengue, chikungunya, zika, etc.).

Practice 8: Identification and differentiation of the main species of Culicoides in the Iberian Peninsula.

Estimated duration: 2 hours.

Space required: Parasitology Laboratory.

Contents: Introduction of the Culicoides Group: biology, morphology and health importance. Morphological study. Differentiation of other Nematocera (ceratopogonids, phlebotomous and culicids).

Student activities: Microscopic identification by means of taxonomic keys..

Practice 9: Simuliids, a growing public and animal health problem in our environment.

Estimated duration: 2 hours.

Space required: Parasitology Laboratory.

Contents: Introduction on bioecological aspects of simuliids (life cycle, morphology, role as vector, importance in public and animal health and control) and practice on identification of the different stages of the simuliids (larvae, pupae and adults).

Activities carried out by the student: Morphological identification of the different stages of the simuliids under a stereoscopic lens (the pre-imaginal stages will be attached to different breeding substrates and will have to be identified and separated). Identification and separation of simuliid adults within a pool of insects captured in a CDC trap. Separation of males and females.

Practice 10: Entomological surveillance in Spain

Estimated duration: 2h

Space required: Parasitology Laboratory.

Contents: Vector surveillance in Spain. Sampling methods for hematophageal diptera. Methodologies and techniques for sample preparation in medical-veterinary entomology.

Student activities: Brief seminar on sampling techniques (types of traps, use and operation), laboratory techniques for the preparation, visualization and subsequent identification of entomological samples. Direct observation of entomological working materials.

Practice 11: Ticks

Estimated duration: 2h

Space required: Parasitology Laboratory.

Contents: The importance of morphological identification of ticks as a primary tool in monitoring their distribution and their role in pathogen transmission.

Activities carried out by the student: Morphological identification through binocular magnifying glass and microscope of the different stages of the most important tick types.

Practice 12: Antimicrobial resistance: MicroWorld Project

Estimated duration: 1 face to face hour.

Space required: Microbiology and Immunology Laboratory.

Contents: Seminar on the review of the MicroWorld project and interpretation of results.

Student activities: Interpretation of results.

Practice 13: Antimicrobial resistance: Responsible use on the field.

Estimated duration: 1 face to face hour.

Space required: Classroom.

Contents: Practical example of antimicrobial use. Models of evolution of antimicrobial resistance.

Activities performed by the student: Discussion of cases with the teacher.

Practice 14: Pharmacovigilance.

Estimated duration: 1 face to face hour.

Space required: Computer room.

Contents: Introduction to pharmacovigilance and examples of practical application.

Student activities: Reporting an adverse reaction to a drug.

Practice 15: Food security.

Estimated duration: 2 face to face hours.

Space required: Computer room.

Contents: Characterization of food hazards. Sources of toxicological and epidemiological information. Specialized databases.

Student activities: Searching for information related to foodborne hazards.

ASSIGNMENTS

Individual work: Each student will choose an illness and perform a review of it in the One Health environment.

4.4. Course planning and calendar

Face-to-face sessions calendar and presentation of papers

The calendar of the Master and the programming of the theoretical and practical sessions of the subject will appear throughout the month of September in the web of the Faculty of Veterinary Medicine, in the following address:

<http://veterinaria.unizar.es/>

The dates for the theoretical assessment test will be scheduled each year according to the Master's Degree in Global Health and will be available to the student at the time of registration. Teaching assignments will be delivered, at the latest, one week after the end of the other teaching activities.

Coordinators:

Rosa M^a Bolea Bailo email: rbolea@unizar.es

M^a Jesús Gracia Salinas email: mjgracia@unizar.es

Tutorials:

Tutorials will be set through the academic year, by email, and contacting with the corresponding teacher.

4.5. Bibliography and recommended resources

The bibliography for the current academic year is updated and can be consulted on the Library's website (search for recommended bibliography at biblioteca.unizar.es).