

**Course title: Surveillance and monitoring of health status of aquaculture and wild populations**

**Modality: CFA- Advance Training Course**

**Orientation:**  
Sustainable use of Marine Resources

**Dates: April 24 & 27-29<sup>th</sup>**

**Timetable:**

		24-abr	27-abr	28-abr	29-abr
	9:30-10:00				
10:00-11:00	10-10:30	de Blas: 1.1 & 1.2	de Blas: 2.1 & 2.2	Pereira: 3.1	de Blas: 4.1-4.4
	10:30-11				
11:00-12:00	11-11:30				
	11:30-12		Pereira: 2.3	de Blas: 3.2 & 3.4	
12:00-13:00	12-12:30				
	13-13:30				
13:00-14:00	13-13:30				
	13:30-14				
16:00-17:00		Pereira: 1.3		Pereira: 3.3	
17:00-18:00					

**Duration:**  
Lectures: 20h  
Laboratory: 0h

**Location:** Universidade de Santiago de Compostela (Using a videoconference system from other locations).

**Language:** Spanish/English

**Academic coordinators:**

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Carlos Pereira Dopazo	Universidade de Santiago	carlos.pereira@usc.es

**Lecturers:**

Name	Institution	e-mail
Iganacio de Blas	Universidad de Zaragoza	deblas@unizar.es
Carlos Pereira Dopazo	Universidade de Santiago	carlos.pereira@usc.es

**General description:**

Quantitative and qualitative aspects of veterinary epidemiology will be discussed. The design of sampling and processing of samples for official follow-ups and routine monitoring in aquaculture facilities will be addressed. Diagnostic methods Analysis and evaluation of risks. It will be considered in the debate aspects of applied immunology, applied pathology, diagnostic systems, virulence, vaccination, immune response, defense mechanisms, epidemiology, toxicology, treatments ...

**Contents:**

Day 1 - Epidemiological surveillance for disease detection

- 1.1-Basic concepts of Surveillance Epidemiology in Aquaculture Health and its implementation in the EU (Directive 88/2006) (2.5 h). (I. de Blas)
- 1.2-Sampling for disease detection: non-probabilistic sampling methods and calculation of sample size (1.5 h). (I. de Blas)
- 1.3-Procedures and legal requirements for shipment and conservation of samples (biological material) (2 h) (C.P. Dopazo)

Day 2 - Epidemiological surveillance for disease detection

- 2.1-Evaluation of diagnostic tests: sensitivity, specificity and predictive values (1.5 hours) (I. de Blas)
- 2.2-Reliability of results obtained: estimation of false negatives and false positives, dilution effect in the use of pool samples ... (1.5 h) (I. de Blas)
- 2.3-Theoretical foundations of diagnostic techniques in Aquaculture Health: histology, bacteriology, cell culture, PCR ... (2 hours) (C.P. Dopazo).

Day 3- Epidemiological surveillance for disease detection (cont)

- 3.1-Theoretical foundations of diagnostic techniques in Aquaculture Health: histology, bacteriology, cell culture, PCR ... (Cont.- 2 hours) (C.P. Dopazo)
- 3.2-Notifiable diseases in the OIE and the EU in aquatic animals (1 h) (I. de Blas)
- 3.3-OIE Reference Diagnostic Techniques (1 h) (C.P. Dopazo)
- 3.4-Notification of diseases in OIE and EU (1 h) (I. de Blas)

Day 4- Monitoring the health status of aquatic populations

- 4.1-Design of cross-sectional studies and preparation of epidemiological surveys (1 h) (I. de Blas)
- 4.2-Sampling for prevalence estimation: probabilistic sampling methods and calculation of the sample size (1.5 h) (I. de Blas)
- 4.3-Cross-sectional measures of disease: morbidity-prevalence, mortality and lethality. Weighting of results (2 h) (I. de Blas)
- 4.4-Reliability of results obtained: confidence intervals and apparent prevalence vs actual prevalence. Use of samples in pool (1.5 h) (I. de Blas)

**Teaching methodologies:**

Interactive classes through videoconference. Resolution of practical cases

**Evaluation system:**

Short test to be delivered via telematics in the time indicated at the time

**Brief CV of the lecturers:**

*Ignacio de Blas*

Doctor in veterinary medicine from the University of Zaragoza. Expert for FAO on issues of aquaculture and sustainability; author of the book *Aquaculture for Veterinarians* (L. Brown and Ignacio de Blas Giral, 2000. Ed Acribia). Expert in epidemiology; is the author of the book *Manual de Epidemiología Veterinaria* (de Blas et al., 2008, ed. ReGABA). Author of a long list of publications related to epidemiology in aquaculture and veterinary medicine in general.

*Carlos P. Dopazo*

Doctor in Biology from the University of Santiago de Compostela. Expert in Fish Virology since the 80's, and specially in diagnostics techniques, including traditional, serological and molecular procedures, as well as in validation of diagnostic techniques. He is in charge of the Viral Diagnostic Laboratory of the Institute of Aquaculture, University of Santiago de Compostela, a laboratory officially recognized by the Galician Government, Spain.

**Relevant references:**

*Ignacio de Blas*

Muniesa et al (de Blas, último autor). 2018. A simplistic approach to detect health anomalies at a regional level using shrimp production data *Revs Aquac.* 10:1014-1024. DOI: 10.1111/raq.12220

Muniesa et al (de Blas, último autor). 2017. Spatial Epidemiology and Risk Factor Analysis of White Spot Disease in the Shrimp Farming Industry of Sinaloa, Mexico, from 2005 to 2011 *Transboundary & Emerg Dis.* 64: 1510-1518. DOI: 10.1111/tbed.12542

Muniesa et al (de Blas, último autor). 2017. Identifying risk factors associated with White Spot Disease outbreaks of shrimps in the Gulf of California (Mexico) through expert opinion and surveys. *Revs Aquac.* 9: 257-265. DOI: 10.1111/raq.12136.

Muniesa et al (de Blas, último autor). 2016. Proposal of a production and management index (PMI) for tilapia farms *J Anim Sci.* 94: 4872-4881. DOI: 10.2527/jas2016-0605

*Carlos P. Dopazo*

- J.G. Oliveira, F. Soares, S. Engrola, C.P. Dopazo & I. Bandín (2008). Antemortem versus postmortem detection of Betanodavirus in Senegalese Sole (*Solea senegalensis*). *Journal of Veterinary Diagnostic Investigation* 20: 215-219
- I. Bandín , C.P. Dopazo. 2008. Métodos de estudio en patología de peces. *Aulas del Mar. Acuicultura y Cultivo de Peces: Inmunología e Inmunopatología* (A. García Ayala, I. Mulero Méndez y J. Meseguer Peñalver, eds) Universidad Internacional del Mar. Universidad de Murcia pp 30-38
- J. M. Cutrin, Jg Oliveira, I. Bandin I & C.P. Dopazo 2009. Validation of real time RT-PCR applied to cell culture for diagnosis of any known genotype of viral haemorrhagic septicaemia virus. *Journal of Virological Methods* 2009. 162: 155-162
- C.P. Dopazo & I. Bandín (2011) Techniques of diagnosis of fish and shellfish virus and viral diseases. En *Safety analysis of foods of animal origin* (Nollet L. & Fidel Toldra, ed ) CRC Press, Cap 18; pp: 531-576. ISBN 143984819X, 9781439848197
- C. Lopez-Vazquez, I. Bandín, C.P. Dopazo. 2015. RT-Real-time PCR for detection, identification and absolute quantitation of VHSV using different types of standard. *Diseases of Aquatic Organisms*. 2015. Vol 114: 99-116. DOI 10.3354/dao02840
- D. Vázquez, C.López-Vázquez, H.F.Skall, S.S. Mikkelsen, N.J.Olesen and C.P.Dopazo. 2016. A novel multiplex RT-qPCR method based on dual labeled probes suitable for typing all known genotypes of Viral Haemorrhagic Septicaemia Virus. *Journal of fish diseases*. 2016. DOI: 10.1111/jfd.12381
- D Vazquez1, JM Cutrin, JG Oliveira and C P Dopazo. 2016. Design and validation of a RT-qPCR procedure for diagnosis and quantification of most types of infectious pancreatic necrosis virus using a single pair of degenerated primers. *Journal of fish diseases*. 40: 1155-1167. DOI2016. 10.1111/jfd.12590
- D. Vazquez, C. López-Vázquez, J.M. Cutrín and C.P. Dopazo. 2016. A novel procedure of quantitation of virus based on microflow cytometry analysis. *Appl Microbiol Biotechnol* 2016 DOI 10.1007/s00253-015-7228-3
- C.P. Dopazo , P. Moreno , J.G. Oliveira and J.J. Borrego. 2018. The theoretical reliability of PCR-based fish viral diagnostic methods is critically affected when they are applied to fish populations with low prevalence and virus loads. *J. Appl Microbiol*. 124, 977-989.
- Diego Vázquez, Carmen López-Vázquez, José G. Oliveira , Isabel Bandín and Carlos P. Dopazo. 2018. Quantitative Flow Cytometry to Measure Viral Production Using Infectious Pancreatic Necrosis Virus as a Model: A Preliminary Study. *Appl. Sci.* 2018, 8, 1734; doi:10.3390/app8101734. IP:1,689. Q3 in Chemistry Multidisciplinary; Indice impacto 2017 1,689 Posición en el área chemistry, multidisciplinary: 98/170