



Universitat de Lleida

DEGREE CURRICULUM  
**MYCOTOXINS IN ANIMAL  
FEEDING AND PRODUCTION**

Coordination: RAMOS GIRONA, ANTONIO JAVIER

Academic year 2022-23

Subject's general information

<b>Subject name</b>	MYCOTOXINS IN ANIMAL FEEDING AND PRODUCTION											
<b>Code</b>	100387											
<b>Semester</b>	2nd Q(SEMESTER) CONTINUED EVALUATION											
<b>Typology</b>	<table border="1"> <thead> <tr> <th>Degree</th> <th>Course</th> <th>Typology</th> <th>Modality</th> </tr> </thead> <tbody> <tr> <td>Double bachelor's degree: Bachelor's Degree in Veterinary Medicine and Bachelor's Degree in Science and Production</td> <td>5</td> <td>OPTIONAL</td> <td>Attendance-based</td> </tr> </tbody> </table>				Degree	Course	Typology	Modality	Double bachelor's degree: Bachelor's Degree in Veterinary Medicine and Bachelor's Degree in Science and Production	5	OPTIONAL	Attendance-based
	Degree	Course	Typology	Modality								
Double bachelor's degree: Bachelor's Degree in Veterinary Medicine and Bachelor's Degree in Science and Production	5	OPTIONAL	Attendance-based									
<b>Course number of credits (ECTS)</b>	6											
<b>Type of activity, credits, and groups</b>	<b>Activity type</b>	PRALAB	PRAULA	TEORIA								
	<b>Number of credits</b>	1.2	1.2	3.6								
	<b>Number of groups</b>	2	1	1								
<b>Coordination</b>	RAMOS GIRONA, ANTONIO JAVIER											
<b>Department</b>	TECNOLOGIA D'ALIMENTS											
<b>Teaching load distribution between lectures and independent student work</b>	Face-to-face classes: 40% Autonomous student work: 60%											
<b>Important information on data processing</b>	Consult <a href="#">this link</a> for more information.											
<b>Language</b>	Antonio J. Ramos: Spanish Vicente Sanchis: Spanish Sonia Marín: Catalan Francisco Molino: Spanish Catalan: 25% Spanish: 75% Catalan: 25% Spanish: 75%  English: part of the docent material will be English											
<b>Distribution of credits</b>	Antonio J. Ramos: 30% (coordinator) Vicente Sanchis: 25% Sonia Marín: 23,33% Francisco Molino: 21,66%											

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
MARIN SILLUE, SONIA	sonia.marin@udl.cat	1,4	By appointment
MOLINO GAHETE, FRANCISCO	francisco.molino@udl.cat	1,8	By appointment
RAMOS GIRONA, ANTONIO JAVIER	antonio.ramos@udl.cat	1,8	By appointment
SANCHIS ALMENAR, VICENTE	vicente.sanchis@udl.cat	2,2	By appointment

## Subject's extra information

In this course the student will study what mycotoxins are, what are the most important challenges in this field, and the importance of mycotoxins in animal health and animal production, being able to carry out an analysis of moulds and mycotoxins in a food or feed, and to develop a risk management system for mycotoxins in primary production, intermediaries, farm, feed companies and agri-food industry.

## Learning objectives

The student who attends this subject must be able to assess the importance and impact of the consumption of raw materials, feed, silage and other products contaminated with mycotoxins on animal health and production, as well as being able to plan a mycotoxin risk management system, and to analyze the presence of mycotoxins in food and feed.

## Competences

### Basic competences:

CB3: That students have the ability to gather and interpret relevant data (usually within their study area) to make judgments that include a reflection on relevant issues of a social, scientific or ethical nature.

CB4: That students can transmit information, ideas, problems and solutions to both specialized and non-specialized audiences.

CB9: Use the basic work methodologies referring to the indicated disciplines.

### General competences:

CG3 Analyze the strategies of animal production as a whole (facilities, behavior, welfare, nutrition, improvement, production, reproduction, environment, economy, marketing and product quality) with the aim of optimizing production.

### Specific competences:

CE18 Recognize the welfare state of farm animals as a primary factor in production. Describe the different animal diseases, individual and collective, and their prevention measures. Collect and send samples.

CE20 Describe the structure of the productive sector, the market and the product marketing channels. Identify the different agents and elements of the food chain in order to guarantee its safety and traceability. Assess the factors that influence the quality of food of animal origin.

## **Cross-cutting competences::**

CT1 Acquire an adequate oral and written comprehension and expression of Catalan and Spanish.

CT2 Acquire a significant command of a foreign language, especially English.

CT3 Acquire training in the use of new technologies and information and communication technologies.

CT6 Analyze specific situations, define problems, make decisions and implement action plans in search of solutions.

CT9 Select and manage the available written and computerized sources of information related to the professional activity.

CT11 Manage individual and team work.

## **Subject contents**

### **THEORETICAL LESSONS (34h):**

1. Introduction to mycotoxins.
2. Mycotoxigenic molds.
  - 2.1. Taxonomy
  - 2.2. Fungal ecophysiology. Fungal ecophysiology.
3. Main mycotoxins. Chemical characteristics.
4. Modified mycotoxins and emerging mycotoxins.
5. Mycotoxins in animal feed.
  - 5.1 Mycotoxins in raw materials for the preparation of feed.
  - 5.2 Mycotoxins in by-products used in animal feed.
  - 5.3 Mycotoxins in grass and silages.
6. Legislation.
7. Mycotoxin toxicology. Co-presence and synergies.
8. Mycotoxin analysis.
  - 8.1. Sampling.

- 8.2. Extraction and purification.
- 8.3. Analytical methods: instrumental and rapid methods.
9. Mycotoxin residues in products of animal origin: meat, eggs, milk.
10. Mycotoxins in animal production:
  - 10.1. Ruminants.
  - 10.2. Pigs.
  - 10.3. Poultry.
  - 10.4. Fish.
  - 10.5. Horses.
  - 10.6. Pets.
  - 10.7. Laboratory animals.
11. Detoxification of mycotoxins: adsorbents, biodegradation and other strategies.

## **PRACTICAL LESSONS (22h)**

1. Group work in the classroom.

Prevention and control of mycotoxins: risk management for mycotoxins in primary production, farm, feed companies and agri-food industry (10h).

2. Group work and public exposition:

Reading, interpretation and presentation of the most relevant content of a scientific article on mycotoxins (2h).

3. Laboratory practices:

Fungal infection, mould count, and identification of the main genera of mycotoxigenic molds (6h).

Mycotoxin analysis, by quick methods, in milk, cereals and/or feed (4 h).

In principle, all practices are face-to-face. If the health circumstances forced to suspend the attendance of these activities, the presentation of the group work would be done virtually by videoconference, and the laboratory practices would be replaced by other activities whose duration and weight in the evaluation of the subject would be equivalent.

## **Methodology**

The methodology of the subject will consist of theoretical classes, seminars and practical activities, which include group works. The exams, the seminars and the practical activities will be face-to-face, which will be of compulsory attendance.

## **Development plan**

The detailed calendar and the Development Plan will be provided on the first day of the course, and will be published in the Resources section of the Virtual Campus, so that the student can organize in the most efficient way.

# MYCOTOXINS IN ANIMAL FEEDING AND PRODUCTION 2022-23

At the closing date of this teaching guide, the proposed calendar is as follows:

Week day	Day	Hour		Teacher	Notes
<b>FEBRUARY</b>					
Tuesday	7	15,00-16,50h	Lesson Introduction (2h)	Antonio	
Wednesday	8	15,00-16,50h	Lesson Fungi and Ecophysiology I (2h)	Vicente	
Tuesday	14	15,00-16,50h	Lesson Fungi and Ecophysiology II (2h)	Vicente	
Wednesday	15	15,00-16,50h	Lesson Main Mycotoxins (2h)	Antonio	
Tuesday	21	15,00-16,50h	Lesson Emerging Mycotox. (2h)	Antonio	
		17,10-19,00h	Lesson Mycotox. Animal Food I (2h)	Sonia	
Wednesday	22	15,00-16,50h	Lesson Mycotox. Animal Food II (2h)	Sonia	
Wednesday	28	15,00-16,50h	Lesson Legislation (1h)	Francisco	
<b>MARCH</b>					
Wednesday	1	15,00-19,00h	Practical activity G1	Vicente	Lab. 2.3.01.
Tuesday	7	15,00-16,50h	Practical activity Sonia I (2h)	Sonia	
Wednesday	8	15,00-16,50h	Practical activity G1	Vicente	Lab. 2.3.01.
		17,10-19,00h	Practical activity G2	Vicente	Lab. 2.3.01.
Tuesday	14	15,00-16,50h	Lesson Toxicology I (2h)	Vicente	
Wednesday	15	15,00-16,50h	Practical activity Sonia II (2h)	Sonia	
Tuesday	21	15,00-16,50h	Practical activity Sonia III (2h)	Sonia	
Wednesday	22	15,00-19,00h	Practical activity G2	Vicente	Lab. 2.3.01.
Wednesday	29	12,00-14,00h	Exam (2h)		Aula 3.1.02
<b>APRIL</b>					
Tuesday	11	15,00-16,50h	Lesson Toxicology II (2h)	Vicente	
Wednesday	12	15,00-18,00h	Lesson mycotox. analysis I (3h)	Antonio	
Tuesday	18	15,00-16,50h	Lesson mycotox. analysis II (2h)	Antonio	
Wednesday	19	15,00-16,50h	Lesson Residues (1h) Lesson Mycotoxicosis I (1h)	Francisco	
Tuesday	25	15,00-19,00h	Practical activity G1	Francisco	Lab. 2.3.01.
Wednesday	26	15,00-19,00h	Practical activity G2	Francisco	Lab. 2.3.01.
<b>MAY</b>					
Tuesday	2	15,00-15,50h 16,00-16,50h	Lesson mycotox. analysis. III (1h) Lesson Mycotoxicosis II (1h)	Antonio Francisco	

Wednesday	3	15,00-16,50h	Lesson Mycotoxicosis III (2h)	Francisco	
Tuesday	9	15,00-16,50h	Lesson Mycotoxicosis IV (2h)	Francisco	
Tuesday	16	15,00-16,50h	Lesson Detoxification (2h)	Antonio	
Wednesday	17	15,00-16,50h	--	--	
Tuesday	23	15,00-16,50h	Practical activity Sonia IV (2h)	Sonia	
Wednesday	24	15,00-16,50h	Practical activity Sonia V (2h)	Sonia	
Tuesday	30	15,00-16,50h	Practical activity Antonio (2h)	Antonio	
Wednesday	31	15,00-16,50h	--	--	
JUNE					
Friday	16	12,00-14,00h	Exam (2h)		Aula SHV 2.04
Monday	26	12,00-14,00h	Final Exam (2h)		Aula 3.1.02

**Classroom: 3.1.02**

## Evaluation

This subject is evaluated continuously by means of exams and activities whose weight in the overall grade for the course is as follows:

- Theory: 2 exams (from topic 1 to 6, and from topic 7 to 11). Value of each exam: 30%.
- Group work on mycotoxin risk management system and quality of the oral contributions during the sessions: 20%
- Group work on a scientific article on mycotoxins: 10%
- Laboratory practice memory: 10%

The average of the theory exams must be at least 5.0 to average with the rest of the assessment activities, and in each exam of theory a minimum of 4.0 to compensate.

**The resit exams only pass and average with the rest of the assessment activities if they obtain a grade higher than 5.0.**

Attendance at practical activities is mandatory, except for duly justified medical or force majeure reasons, or for the reasons contemplated in the Evaluation Reglament of the UdL.

## Bibliography

### RECOMMENDED BIBLIOGRAPHY

- Diaz. D.E. (Ed.). 2005. The mycotoxin blue book. Nottingham University Press, UK.
- Marín, S., Ramos, A.J., Cano-Sancho, G. and Sanchis, V. 2013. Mycotoxins: Occurrence, toxicology, and exposure assessment. *Food and Chemical Toxicology*, 60: 218-237.
- Moretti, A. and Susca, A. (Ed.). 2017. Mycotoxigenic fungi: methods and protocols. Humana Press, New Jersey, USA.

- Ramos, A.J. (Ed.) 2011. Micotoxinas y micotoxicosis. Ed. Madrid Vicente Ediciones, Madrid.
- Ramos A.J. y Marín, S. 2020. Manejo de micotoxinas en producción animal. E. Servet, Zaragoza.
- Rubinstein, H.R. (Ed.) 2006. Micotoxinas: impacto en la producción y salud humana y animal. Narvaja Editor, Córdoba, Argentina.
- Soriano del Castillo, J.M. (Ed.). 2007. Micotoxinas en alimentos. Ed. Díaz de Santos, Madrid.