

Academic Year/course: 2022/23

28411 - Agronomy

Syllabus Information

Academic Year: 2022/23

Subject: 28411 - Agronomy

Faculty / School: 105 - Facultad de Veterinaria

Degree: 451 - Degree in Veterinary Science

ECTS: 6.0

Year: 2

Semester: First semester

Subject Type: Compulsory

Module:

1. General information

1.1. Aims of the course

The subject and its expected results respond to the following approaches and objectives:

The Order ECI/333/2008 lays out the competences to be acquired by students who take this subject

- Morphology, bionomy and systematics of (...) plants of veterinary interest.
- Feed materials: Characteristics, production and preservation.

The **general aim** of the course is the students' acquisition of basic elements of judgment to act in the agrarian environment, in which a relevant proportion of graduates, including more clinical veterinarians, will develop their professional activity. On the other hand, a great part of the veterinarians of the public Administration develop their activity in the Agriculture and Environment Councils and, hence, they will need knowledge on the farmland. Other professional areas in which graduates will need knowledge provided by this course are related to feed manufacturing companies and whole mixed rations for ruminants, formulation of rations, etc.

Students, through this course, must acquire a broad and complete knowledge of the most relevant plant resources for animal feed, directly usable, or as raw materials for the processing of feeds. Livestock production systems cannot be well understood if they do not have a good knowledge on agricultural resources and the basis of their feeding which accounts for up to 80% of the production costs. In addition, many pathologies are linked to the misuse of grains and fodder.

Finally, future veterinarians must have a holistic, systemic and ecological vision of further knowledge that they will acquire throughout their training. This course contributes to that vision.

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/>), so that the acquisition of the learning outcomes of the subject 'Agronomy' will provide training and competence to contribute to their achievement: Goal 2 Zero Hunger; Goal 6 Ensure access to water and sanitation for all; Goal 11 Sustainable cities and communities; Goal 12 Ensure sustainable consumption and production patterns; Goal 13 Climate action; Goal 15 Life on land. More specifically, the approaches and aims of the subject 'Agronomy' are related with the following targets: Target 2.3 Double the agricultural productivity and incomes of small-scale food producers, in particular of pastoralists; Target 2.4 Implement resilient agricultural practices; Target 2.5: Maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals; Target 6.3 Improve water quality by reducing pollution; Target 6.4 Increase water-use efficiency; Target 11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage; Target 11.A Support positive links between urban, peri-urban and rural areas; Target 12.2 Achieve the sustainable management and efficient use of natural resources; Target 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters; Target 13.3 Improve education on climate change mitigation and adaptation; Target 15.1 Ensure the conservation, restoration and sustainable use of the ecosystems and their services; Target 15.5 Action to reduce the degradation of natural habitats and halt the loss of biodiversity; Target 15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources

1.2. Context and importance of this course in the degree

The teachings of **Agronomy** have occupied, under several denominations, an important place in the study plans of Veterinary Medicine in Spain and other countries **since the first Veterinary School** of the world (Lyon, 1762) and, of course, from the first Veterinary Schools of Spain (Madrid, 1792; Zaragoza and Córdoba, 1847). In the Plan of Studies of the new Degree in Veterinary Medicine of the University of Zaragoza (2010), the subject "Agronomy" is located in the 2nd Course (third semester) as a compulsory subject, between the **Common Basic Training** module and the **Animal Production** module. Our subject can be considered as a bridge-subject between some basic contents on animal and plant biology and more specialized subjects, providing the student with the acquisition of knowledge and concepts that must

dominate in those disciplines: Animal Nutrition (4th semester), Toxicology (5th semester), Animal Production, Medical Pathology and Production Economics (7th and 8th semesters), Food Technology (9th semester), and in the optional subjects Bee Production and Health and Ecology and Environment, among others.

1.3. Recommendations to take this course

Students must have taken all first-year subjects of the Veterinary Degree. If they have not passed any of these first-year subjects, they must be enrolled in.

It is **highly recommended** to attend classes regularly, as well as seminars, to do the proposed written essays, and to attend tutorials throughout the course.

2. Learning goals

2.1. Competences

On successful completion of this course, students will be able to

1. Manage a set of concepts, information and terms that will allow you to develop correctly with professionals of the agrarian and natural environment (farmers, agronomists and forest engineers, biologists, ecologists, graduates in Environmental Sciences, geographers, civil servants of the Administration, staff of the Regional Agro-environmental Offices, etc.).
2. Assess the contribution of farming systems to the conservation of the natural environment and to the economic and social sustainability of the agricultural environment.
3. Classify, differentiate and assess the nutritional value of different types of feeds and raw materials for animal feeding.
4. Use properly scientific nomenclature.
5. Observe and detect morphological and anatomical differences and analogies between different types of plant types.
6. Interpret data tables. Formulate results and express them correctly.
7. Work in the laboratory.
8. Work as a team.
9. Analyze the information critically. Analyze and synthesize information.

2.2. Learning goals

If students complete the course successfully, they should be able to

1. Indicate the nutritional value, as well as the limiting factors of use, and the correct conservation of the main plant resources for animal feeding. As well as to indicate broadly the geographical distribution, agronomic characteristics, ecology and production of the main plant species cultivated for animal feeding.
2. Analyze and explain the interactions between the components of the agro-pastoral ecosystems: climate, soil, plants, animals. To recognize the importance of agriculture in the production of feeds for animals and to analyze the multifunctionality of the pastures, rangelands and livestock farming systems linked to the land ?mainly ruminant systems- in the conservation of the environment.
3. Analyze and explain the relationships between the plant cell components, tissues types, organs and plant nutritional principles for animal feeding.
4. Distinguish the main plant resources for animal feeding: cereals and grain legumes, fodder, by-products, crop residues, and to distinguish some toxic rangeland species.
5. Describe and follow standardized food chemical analysis protocols. Express and interpret the results obtained in the laboratory in standardized units. Demonstrate being familiar with the laboratory work and instrumentation to perform these analysis techniques.
6. Describe the main procedures for preserving food for animal feeding. And to make an organoleptic assessment of several conserved forage, including silage and hay feeds.
7. Classify and define different types of pastures and the main livestock farming systems associated with them.
8. Collect and manage information related to agri-food sector statistics, including the management of official statistical yearbooks of crop areas, crop yields and livestock censa at different levels: Autonomous Community, National, European and Global.

2.3. Importance of learning goals

This subject contributes, together with the rest of the competences acquired through the subjects of the Modules of Common Basic Formation and of Animal Production, to enable students to carry out their profession in the **agrarian environment**, in the **Public Administration**, and in general in all those companies that are related to animal feeding.

3. Assessment (1st and 2nd call)

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

Type of tests

1. **Written test for the assessment of theoretical knowledge:** theoretical knowledge will be assessed by means of a written test that will consist of 35 to 50 multiple-choice questions, each with five possible alternatives and only one right answer. They shall be graded as follows: 1 point for each question answered correctly, 0.25 negative points for each wrong answer and 0 points for each question not answered. In order to pass this test, the student must obtain at least 50% of the total points.

The mark for this test will only be considered for the final mark if the written tests of practical knowledge have also been passed.

The theoretical part will be 60% of the final grade.

1. **Written test for practice sessions assessment:** For the assessment of the lab sessions, there will be 3 written tests of the knowledge acquired in three types of practice. These tests will be performed a few days after the corresponding practice has been carried out and will consist of: for the **AGRO-1** and **AGRO-3** practices, an examination of problems and multiple choice questions, with similar characteristics and assessment to those of the theoretical knowledge tests. For the **AGRO-2** practice they will consist of "*de visu*" identification of a set of raw materials, products, by-products and crop residues for animal feeding.

The overall rating of the three practices is an average of each of them. The internship rating is 24% of the final rating. Internships are passed with an overall score of at least 5 points out of 10.

The students who have not taken these tests or have not passed them during the course, can be examined of the three types of practices jointly in the official announcements, together with the theory tests.

The qualification of this test will only be considered for the final mark if the written test of theoretical knowledge has been passed.

The qualification of practices will be maintained in the official calls of the course.

1. **Written essay in work teams:** Written (with 60%) and oral (with 40%) presentation will be assessed. It will be delivered in writing and defended in public. The clarity and precision in the use of the language, the relevance of the contents, the capacity of synthesis, the adjustment to the time established for the presentation and the quality of the bibliography used will be assessed, among other topics. Students will deliver an exercise related to the practice **AGRO-4** (bibliographic management and preparation of the work).

The grade of this work will be 8% of the final grade and will only be considered for the final grade if students have passed the written tests of theoretical and practical knowledge.

The qualification of practices will be maintained in the official calls of the course.

4. Students will deliver some exercises related to the **AGRO-5 practice** (collecting and managing of official statistics data on the agri-food sector) and to the **AGRO-6 practice** (biodiversity and diversity calculations; assessment of the Pastoral Value of different types of grasslands; stocking rates calculation).

5. **Tests in class** throughout the semester on theoretical content of the subject: These tests will take place during theory classes, with all the study material available to the student (notes, slides, etc.) and without prior notice from the teacher. They will consist of various types of exercises related to the theory session being taught: true/false test questions, problem solving, interpretation of tables and graphs, short questions, or other types of exercises. These tests will be given in class to the teacher. The grade on these tests will be averaged and that average will together account for 8% of the final grade. It will only be considered for the final mark if the written tests of theoretical and practical knowledge have been passed. The qualification of these tests will be maintained in the official calls of the course, but not in successive courses.

Evaluation criteria and requirement levels

1. To pass the subject, the theoretical knowledge grade must be 5 out of 10 or higher, and the rating of the internship must also be 5 out of 10 or higher.
2. The final grade will be obtained by means of a weighted average of all the evaluation activities with the following values: the theoretical part will contribute 60%, the practical part 24%, the work 8% and the exercises in class 8%. Work grades and class exercises will only be considered if written tests of theoretical and practical knowledge have been passed.

Marking system:

According to the national regulation Law 1025/2003, 5th of September which lays down the European system of credits and

marking system for the university degree.

0-4,9: FAIL.

5,0-6,9: PASS

7,0-8,9: GOOD (NT).

9,0-10: EXCELLENT (SB).

As the article 158 of the Statutes of the University of Zaragoza lays down, provisional grades will be displayed at least for 7 days and students will be able to review them on the date, time and place provided for that purpose.

The "Honorable Matriculation" may be awarded to students who have obtained a grade equal to or higher than 9'0. Their number may not exceed five percent of the students enrolled in the corresponding academic year.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The learning process is structured around 38 lectures of 50 minutes each, 22 hours of laboratory work. Globally, there are 150 hours of work of the student, including (60 face-to-face sessions).

The lectures will develop the theoretical concepts of the Programme. The lectures presentations will be available in the Official Reprography Service of the Veterinary Faculty and the Digital Teaching Web (ADD). Teaching resources not provided by the Official Services of the University are not responsibility, and are not edited or revised by the teaching staff. The evaluation process will be done exclusively on the contents of the present course.

An outline of the practice sessions will be provided to the students. The security measures in the laboratory are the following:

GENERAL SECURITY GUIDELINE IN THE LAB

- Bring the practice sessions outline to the laboratory
- Wear appropriate clothes to avoid contact with chemical products: bring laboratory coat and wear it appropriately settled; wear lab goggles and appropriate shoes
- In case of any kind of allergy, the student has to inform the teacher responsible of the practice
- Do not wear contact lenses
- Eat and drink are not permitted in the lab

All the attendees have to be aware of the general information provided by the UPRL <http://uprl.unizar.es/estudiantes.html>

4.2. Learning tasks

Learning tasks consist of: lectures, laboratory practical sessions, guest speakers conferences and workshops, and written and presented essays.

Learning activities (abstract)

Activities	Face-to-face sessions (h)	Student autonomous work (h)	Total
Lectures	38	55	93
Laboratory tasks	22	15	37
Written essay		20	20
Total	60	90	150

4.3. Syllabus

Topic 1. Agriculture, Agronomy, Plant breeding, Livestock breeding. Historical origins. Importance of the Agricultural Sector. Interactions between Plant Breeding, Livestock breeding, Human and Animal feeding.

Learning Activities:

Lectures, 3 hours.

Topic 2. Agroecology. Agroecosystems, Agri-Livestock Ecosystems, Agroforestry. Agricultural systems. Mixed crop-livestock systems. Trophic and energetic fluxes in Agroecosystems. Ecosystem Services. Climate and Soils as Agroecosystems and Plant Production factors. Organic farming. Nutrients and iis interactions in soil-plant-animal subsystems.

Learning Activities:

Lectures, 5 hours.

Topic 3. Agricultural techniques related to the use of water, soil fertility and crops.

Learning Activities:

Lectures, 2 hours.

Topic 4. Chemical and Bromatological Assessment of plant resources for Animal feeding. Feeds classification. Botany and Animal feeding. Main botanical Families in Animal feeding.

Learning Activities:

Lectures, 3 hours.

Practical work AGRO1, 5 hours. Chemical and Bromatological Assessment of plant resources for Animal feeding. Weende analysis.

Topic 5. Energetic concentrate feeds: cereals, roots and tubers, agrifood industry energetic by-products. Learning Activities:

Lectures, 6 hours.

Practical work AGRO2, 5 hours. Cereals, roots and tubers, agrifood industry by-products identification.

Topic 6. Concentrate protein-rich feeds: cakes and meals, pulses, agrifood industry protein-rich by-products. Learning Activities:

Lectures, 6 hours.

Practical work AGRO2, 5 hours. Concentrate protein-rich feeds: cakes and meals, pulses, agrifood industry protein-rich by-products identification.

Topic 7. Concentrate feeds types. Concentrate feeds production technology.

Learning Activities:

Lectures, 1 hour.

Practical work AGRO2, 1 hour. Raw components and Concentrate feeds types.

Topic 8. Energetic and protein-rich feeds for beehives. Melliferous flora and natural vegetation, Melliferous crops. Learning Activities:

Lectures, 1 hour.

Topic 9. Grass and forage Science. Multifunctionality of grasslands and livestock farming. Worldwide natural and cultivated grasslands.

Learning Activities:

Lectures, 3 hours.

Topic 10. Forage conservation systems: hay-making, silage, dehydration processes. Learning Activities:

Lectures, 1 hour.

Practical work AGRO3, 2 hours. Forage conservation systems.

Topic 11. Grass and legume grasses. The alfalfa. Learning Activities:

Lectures, 5 hours.

Practical work AGRO2, 2 hours. Grass and legume grasses identification.

Topic 12. Grazing and Ecosystem Services. Stocking rates. Water. Grasslands Toxic species. Transhumance and Transterminance. Grass and forage scheduling.

Learning Activities:

Lectures, 5 hours.

Practical work AGRO2, 1 hour. Grassland toxic species identification.

Topic 13. Low nutritional quality feeds: crops and agrifood residues. Other feeds: unifeeds, whole mixed rations for ruminants.

Learning Activities:

Lectures, 1 hour.

The remaining learning tasks -written essays, AGRO4, AGRO5 and AGRO6 practices- are related to several topics.

4.4. Course planning and calendar

For further details concerning the timetable, classroom and further information regarding this course please refer to the Veterinary Faculty Web site (<http://veterinaria.unizar.es/gradoveterinaria/>) and to the ADD site (<http://add.unizar.es/add/campusvirtual/>).

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28411>