Universidad Zaragoza

**Academic Year/course: 2022/23**

# 30835 - Pilot Plant Practical Classes

## Syllabus Information

**Academic Year:** 2022/23
**Subject:** 30835 - Pilot Plant Practical Classes
**Faculty / School:** 105 - Facultad de Veterinaria
**Degree:** 568 - Degree in Food Science and Technology
**ECTS:** 6.0
**Year:** 4
**Semester:** Second semester
**Subject Type:** Compulsory
**Module:**

# 1. General information

## 1.1. Aims of the course

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

The degree aims to make quality professionals available to the agri-food industry in "Product Quality Management and Control in the food field", "Food Processing", "Food Safety", "Development and innovation of processes and products", " Legal, scientific and technical advice" and "Teaching and Research in Food Science and Technology". The Pilot Plant Practicum subject is part of the Teaching Integration subject and aims to contribute to the training of these professional profiles in sectors of food production as varied as the production, development and innovation of dairy products, egg products, meat products and meat derivatives. fish, and vegetable products (fruits and vegetables, oil, sugar, cereal derivatives, wines, etc.).

This subject constitutes an inclusive training activity, whose objective is to encourage students to complement and independently apply the knowledge acquired in their previous academic training, through the preparation and execution of a development and/or innovation project in a training environment. level such as the one offered by the processing room of the Pilot Plant of the Faculty of Veterinary Medicine. In this way, it is intended to favor the acquisition of skills that prepare them for the exercise of their professional activity and foster their capacity for entrepreneurship, creativity, teamwork and leadership.

Consequently, with the completion of the Pilot Plant Practicum subject, together with the External Practices, the following objectives are to be achieved:

a) Contribute to the comprehensive training of students by complementing their theoretical and practical learning.

b) Facilitate knowledge of the work methodology appropriate to the professional reality in which the students will have to operate, contrasting and applying the acquired knowledge.

c) Promote the development of technical, methodological, personal and participatory skills.

d) Obtain practical experience that facilitates insertion in the labor market and improves their future employability.

e) Promote the values ??of innovation, creativity and entrepreneurship

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:

**Objective 2: Zero Hunger**

- 2.4 By 2030, ensure the sustainability of food production systems and apply resilient agricultural practices that increase productivity and production, contribute to the maintenance of ecosystems, strengthen the capacity to adapt to climate change, extreme weather events, droughts, floods and other disasters, and progressively improve soil and land quality.

**Objective 3: Health and well-being**

- 3.4 By 2030, reduce by one third premature mortality from noncommunicable diseases through prevention and treatment and promote mental health and well-being.

**Objective 4: Quality education**

-4.7 By 2030, ensure that all students acquire the knowledge and skills necessary to promote sustainable development, including through education for sustainable development and sustainable lifestyles, human rights, gender equality , the promotion of a culture of peace and non-violence, world citizenship and the appreciation of cultural diversity and the contribution of culture to sustainable development. world and the appreciation of cultural diversity and the contribution of culture to sustainable development.

**Objective 12: Responsible production and consumption**

- 12.3 By 2030, halve global per capita food waste at the retail and consumer level and reduce food losses in production and supply chains, including post-harvest losses.

- 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse activities.

### 1.2. Context and importance of this course in the degree

This subject, being located in the last subject of the degree, called "Integration of teachings", allows the student to put into practice the acquisition of a large part of the transversal skills worked during the degree and integrate the knowledge and technical skills acquired to solve practical problems in the food field, continuing, in this way, with the development of the objectives of the two integration projects carried out in previous courses: in the second between the subjects of Bromatology, Chemical Analysis of Foods, Physical Analysis and Sensory of Foods and Microbiological Analysis of Foods; and in the third year between the subjects of Food Technology II, Applied Food Hygiene and Food Legislation. In particular, this subject allows the student to apply, in a semi-professional environment, the knowledge acquired, encourages collaboration, leadership, creativity, innovation, entrepreneurship and teamwork. The complementation of this project with studies related to the quality control of raw materials and processed products, food safety, the design of packaging and labeling or carrying out market studies, can be a very suitable alternative as a basis for the Final Degree Project.

### 1.3. Recommendations to take this course

Having previously completed the subjects of basic training, Chemistry and Food Analysis, Food Processing and Engineering, Microbiology and Food Hygiene, Management and Control of Food Quality and Nutrition and Health, whose contents are considered necessary for its correct completion.

Given the special practical dimension of this subject, in which students must necessarily demonstrate their knowledge or skills in the Food Science and Technology pilot plant, a continuous evaluation system has been chosen, approved as a "special subject" by the Degree Quality Assurance Commission, which implies compulsory student attendance at all scheduled learning activities.

## 2. Learning goals

### 2.1. Competences

**Upon passing the subject, the student will be more competent to:**

CG1 - Manage information, search for sources, collection and analysis of information, etc.

CG2 - Use ICTs

CG3 - Teamwork

CG4 - Think and reason critically

CG5 - Work autonomously and carry out a self-assessment

CG6 - Respect the diversity and plurality of ideas, people and situations

CG7 - Transmit information, orally and in writing, both in Spanish and in English

CG8 - Show environmental sensitivity, assuming an ethical commitment

CG9 - Negotiate both with specialists in the area and with people who are not experts in the field

CG10 - Adapt to new situations and solve problems

CG11 - Undertake and be motivated by quality

CB1 - That students have demonstrated to possess and understand knowledge in an area of ??study that starts from the base of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects involving knowledge from the forefront of their field of study

CB2 - That students know how to apply their knowledge to their work or vocation in a professional way and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of ??study

CB3 - That students have the ability to gather and interpret relevant data (normally within their area of ??study) 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 a specialized and non-specialized audience

CB5 - That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy

CE2 - Perform physical, chemical, microbiological and sensory analyzes of raw materials and food and interpret the results obtained

CE3 - Identify the physical, chemical and microbiological agents that cause food spoilage and select the most appropriate strategies for their prevention and control

CE4 - Identify and assess the physical-chemical, sensory and nutritional characteristics of foods, their influence on

processing and the quality of the final product

CE5 - Prepare, transform and preserve food considering quality and safety standards, integrating environmental management

CE9 - Formulate new foods choosing the most appropriate ingredients and additives as well as the treatments to obtain safe, nutritious and attractive products for the consumer

CE10 - Design and validate new manufacturing processes to meet market needs and demands

CE11 - Advise on the interpretation and application of food legislation, reports and administrative files

CE12 - Scientific and technical advice to the food industry

CE13 - Communicate knowledge in food science and technology, using the fundamental concepts, methods and tools of this disciplin

CE14 - Design and carry out research in the food field: Compilation and analysis of information, hypothesis formulation, experimental design, interpretation of results and drawing of conclusions

### 2.2. Learning goals

**The student, to pass this course, must demonstrate that:**

1- Is capable of proposing a development and/or innovation project whose purpose is the design of a food processing line, taking into account technical, hygienic, legal, economic and/or environmental criteria, and defending it publicly. To do this, he is able to manage information, organize himself, estimate the material, manipulations and necessary equipment, choosing them based on their advantages, disadvantages and limitations, anticipating methodological difficulties and problems, and proposing possible solutions.

2- Is able to learn autonomously.

3- Is capable of handling food processing equipment effectively and safely, modifying treatment conditions, and employing the most appropriate control systems.

4- Is capable of executing a pilot plant project working as a team; is capable of leading a work team and possesses interpersonal relationship skills in a collaborative environment.

5- Is able to interpret and analyze the results obtained and draw appropriate conclusions.

6- Is able to prepare a report in which he outlines a development and/or innovation project, the activities carried out, the results obtained and the conclusions of his work.

7- Is able to prepare an audiovisual document for educational use in which the processing line of a new food is collected.

### 2.3. Importance of learning goals

Together with the rest of the learning outcomes acquired in the "Integration of Teaching" subjects, they contribute to the training of students for the performance of the professional profiles of this degree, and especially for those of "Processing of the food" and "Development and innovation of processes and products" in the food field.
In addition, this subject has a fundamental role in strengthening generic or transversal skills of an instrumental nature, of interpersonal and systemic relationships that decisively contribute to the comprehensive training of future Graduates in Food Science and Technology.

## 3. Assessment (1st and 2nd call)

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

**The student must demonstrate that they have achieved the expected learning outcomes through the following assessment activities:**

***Continuous assessment***
**Test 1. Preparation of the project.** This first evaluation will be carried out as a previous step to the initiation of the technological project in a pilot plant and will consist of the evaluation of the preparation of the experimental phase in a group and individual way:

Group evaluation: The students, organized in groups of 3-5 students, must prepare an initial report on the project to be carried out, which will be evaluated following the criteria specified in the "Assessment criteria" section. To do this, the group of students will prepare a report and a powerpoint document that they will defend in an oral presentation. It will be necessary to accompany this proposal with an estimate of the raw materials and consumables that will be required and their cost. Passing this test will accredit the achievement of learning outcome 1, and will account for 20% of the student's overall grade in the subject.

Individual evaluation: this will begin during the presentation of the report, evaluating the individual contributions of the members of each group, and will continue in the processing room of the pilot plant, determining the degree of knowledge and ability to handle the equipment to be used. for project development. For the preparation of this evaluation, the students will have been able to enjoy four tutoring sessions with the teaching staff of the subject. Passing this test will certify the achievement of learning outcomes 2 and 3, will mean 10% of the student's overall grade in the subject, but passing it will be an essential requirement to be able to continue the teaching activities scheduled in this subject.

The student's overall grade will be from 0 to 10 and will account for 30% of the student's overall grade in the subject.

This test will be called twice. To pass this test and be able to continue carrying out the project in the plant, it will be necessary to obtain a minimum grade of 5. If this test is not passed, the student must enroll again in this subject the following academic year.

**Test 2. Tracking.** This evaluation test will be carried out during the 3 weeks that the execution of the projects in the pilot plant will last. Said evaluation will consist of observing the group work carried out by the students and conducting individual interviews that will have the objective of determining the degree of knowledge of the students about the evolution of the project, their participation and leadership, considering at all times the General Principles of Hygiene. Passing this test will accredit the achievement of learning outcomes 3 and 4. The student's overall grade will be from 0 to 10 and will account for 20% of the student's overall grade in the subject. To pass this test it will be necessary to obtain a minimum grade of 5.

**Test 3. Evaluation of the report.** Students will submit a written report on the work carried out as described in the "Learning Activities" section, which will be evaluated following the criteria specified in the "Assessment Criteria" section. The memory may be individual or group, in which case, the responsibility of each student in the execution and subsequent writing of the "Objectives", "Material and methods", "Results and discussion" and "Conclusions" sections must be indicated. Passing this test will accredit the achievement of learning outcomes 5 and 6. The student's overall grade will be from 0 to 10 and will account for 40% of the student's overall grade.
in the subject. To pass this test it will be necessary to obtain a minimum grade of 5.

**Test 4. Evaluation of the audiovisual document.** The working group will present an audiovisual document that will include the processing of the food as described in the "Learning activities" section, and which will be evaluated following the criteria specified in the "Assessment criteria" section. Passing this test will accredit the achievement of learning outcomes 7. The student's overall grade will be from 0 to 10 and will account for 10% of the overall grade of the student in the subject. To pass this test it will be necessary to obtain a minimum grade of 5.

In accordance with article 9 (point 4) of the Learning Assessment Regulations of the University of Zaragoza (Agreement of December 22, 2010, of the Governing Council), the Quality Assurance Commission of the Degree in Science and Technology of Food has established that due to the special practical dimension of this subject, in which students must necessarily demonstrate their knowledge or skills in the Food Science and Technology pilot plant, it can only be evaluated by the continuous evaluation modality. As a consequence, the Students must attend all scheduled learning activities. This mandatory teaching period will be convened at least twice during the school period, so that failure to attend it, motivated or not by not passing the initial evaluation, will automatically prevent the passing of the subject in the two calls to which which entitles the registration. In this case, the student must proceed to formalize the registration again in the next academic year.

On the other hand, the Quality Assurance Commission will contemplate the possibility that those students who at the same time are developing a professional activity in an industrial processing plant or similar, and request it, can carry out a technological development project in the company, under the tutelage of the coordinating professors of the subject, so that they can sit directly for test 3, which in these exceptional cases will represent 100% of the grade.

***Evaluation criteria and levels of demand.***

**Test 1. Preparation of the project.**

Group evaluation: Each work group will prepare a proposal (initial report) that must include at least three different processing stages (preparation or transformation operation, conservation operation and packaging operation), led by each of the team members, whose definition must meet legal, hygienic, technological, nutritional and sensory, environmental and/or economic criteria. The project report and the presentation must include the following aspects that will be weighted as indicated in the summary table: bibliographic review that justifies the project to be carried out (understanding, interpretation, etc.), objective of the project (detailed description of the expected product: processing line of a certain food), materials, equipment and methods to be used (estimation of raw materials, ingredients and other consumable material, flow chart and experimental design that includes the treatment conditions and establishes the process variables to be investigated in each of the processing stages, cleaning and disinfection systems), activities to be carried out and a schedule specifying the role of each participant, and budget estimate.

The report must have a maximum length of 7 pages (times 12, line spacing 1.5). The oral presentation will last 10 minutes, which will be followed by a 30-minute discussion with the professors of the subject. Although the same grade will be established for all members of the team that presents the project, it may be qualified by up to 50% depending on the participation of each student in the oral presentation and subsequent discussion.
Individual evaluation: the test will begin during the presentation of the project, assessing the innovative character, creativity and individual contributions of each of the members of each group (5 min); and will continue in the pilot plant, in which the handling by the students of all the equipment and control systems that they will have to use during the execution of the project will be evaluated, taking into account criteria of efficacy and safety and including cleaning systems and disinfection (10 min). The student will have the opportunity to demonstrate their capacity for autonomous learning after consulting the manuals, protocols and videos that on the handling of laboratory equipment and techniques are in digital format in the repository of the pilot plant or online.
In addition, you must attend four tutoring sessions with the professors of the subject to receive advice on the evolution of your training to carry out the project in a pilot plant.

**Test 2. Monitoring (individual evaluation).** In this case, through continuous observation, the personal relationship skills of the students, their ability to work in a team and their leadership capacity will be assessed, and through individual interviews during the period of execution of the project to determine the degree of individual knowledge about the evolution of the project, their participation and the decisions taken, considering at all times the application and maintenance of correct hygiene practices.

**Test 3. Evaluation of the report (individual evaluation).** The report will collect the information contained in the project initially proposed in test 1, including the corrections arising from the initial evaluation process and the changes that have to be made to the initial proposal during the execution phase of the project, as well as the description of the activities finally carried out, the results obtained, the specific description of the product finally obtained as well as other results, their discussion and final conclusions. In addition, a section will be included on the "Personal assessment of the subject". The summary of the project and the conclusions will also be expressed in English. The complete report must have a minimum length of 15 and a maximum of 25 pages (times 12, line spacing 1.5), without including cover, index or annexes.

The following of the scientific method, the correctness in the use of the language in Spanish and English, the clarity and order of the presentation and the individual contributions will be valued. In the event that the student has passed tests 1 and 2, but not test 3, the grade achieved in tests 1 and 2 will be maintained in successive calls.

**Test 4. Evaluation of the audiovisual document (group evaluation).** The audiovisual document will collect the description of the raw materials and ingredients, main stages and manufacturing conditions of a new food, as well as the specific description of the product finally elaborated by the working group. The document will have a minimum duration of between 5 and 10 minutes.

***Summary table that includes the main evaluation criteria that will be used in the three proposed tests as well as its weighted value on the final grade of the subject.***

**TEST 1. Preparation of the proposal 30%**

*Group evaluation 20%*
-Bibliographic review: comprehension, interpretation, etc.

-Objective of the project: detailed description of the expected product (processing line of a certain food)

-Materials, equipment and methods to be used: experimental design that includes the conditions of treatment and establish the variables of the process that are going to be investigated in each one of the stages of the indicted

-Activities to be carried out and schedule specifying the role of each participant

-Budget adequacy

*Individual evaluation 10%*

-Capacity for autonomous learning

-Creativity, innovative character

-Effective, safe and adequate management of equipment, control systems and cleaning systems and disinfection.

**TEST 2. Follow-up 20%**

-Degree of knowledge about the evolution of the project, participation and decisions adopted

-Personal relationship skills: teamwork and leadership skills

-Personal relationship skills: teamwork and leadership skills

-Application and maintenance of correct hygiene practices

**TEST 3. Evaluation of the report 40%**

-Assessment of the final execution of the project: follow-up of the scientific method, decisions adopted, individual contributions, etc.,

-Definition of the expected product: presentation of data, analysis and interpretation of the results, conclusions

In both cases, correctness in the use of language, clarity, order and presentation will be assessed.

**TEST 4. Evaluation of the audiovisual document 10%**

-Definition of the production process and expected product

-Assessment of the document as teaching material

-Assessment of the correctness in the use of language, the clarity and order of the presentation, the quality of images, creativity and innovation.

**Grading system:** in accordance with the Regulations for Learning Evaluation Standards of the University of Zaragoza (Governing Council Agreement of December 22, 2010), the results obtained by the student will be graded based on the following numerical scale: 0 to 10, with the expression of a decimal, to which its corresponding qualitative qualification may be added:

0-4.9: Failed (SS).

5.0-6.9: Approved (AP).

7.0-8.9: Remarkable (NT).

9.0-10: Outstanding (SB).

The mention of "Honors" will be awarded among students who have obtained a grade above 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 methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

-Attendance at 5 hours of seminars in which the following topics will be discussed: presentation of the subject, scientific method, report writing, leadership and teamwork.

-The preparation of a development and/or innovation project during the months of February and March of the academic year. For this, the student will have all the materials that are part of the pilot plant repository and that include manuals, powerpoint presentations and videos on the operation of the equipment and control systems of the pilot plant. It will be necessary to accompany this proposal with an estimate of the raw materials and consumables that will be required and their cost. This activity will require teamwork and autonomous students for 20 hours.
-Attendance to a set of preparation sessions, problem solving and cases (30h) consisting of: (i) preparation for handling, safety standards, cleaning and disinfection of equipment, and design of the processing line in site in the pilot plant (10 h), (ii) participation in the evaluation sessions of the initial report (12 h), and (iii) participation in control sessions of the execution of the projects in the pilot plant (8 h),
-The execution of the proposed project during a 55-hour stay at the Pilot Plant of the Faculty of Veterinary Medicine to be carried out during the last 3 school weeks of the academic year (sessions of 4-5 hours per day depending on the days scheduled by the center).
-Preparation of a report that collects the proposed project and the results obtained (30 h).
-The elaboration of an audiovisual document that includes the description of the raw materials and ingredients, main stages and manufacturing conditions of a new food, as well as the specific description of the product finally elaborated by the work group (4 h).
-Carrying out the different evaluation activities proposed in a remote way (6 h).

During the development of the classes, the students will have to take into account all the procedures and the norms that are collected in the following documents:

- "Preventive Guide for Students of the University of Zaragoza", which is available at the following address: https://ciencias.unizar.es/sites/ciencias.unizar.es/files/users/fmlou/pdf/Prevencion_seguridad/riesgos_laborales_estud
- Security manual in the laboratories of the University of Zaragoza: http://juntapas.unizar.es/wp-content/uploads/2017/03/Manual-seguridad-laboratorios.pdf

In addition, the indications given in terms of safety by the teacher responsible for the classes will be followed.

## 4.2. Learning tasks

At the beginning of the academic year the offer of lines for the R+D+i projects will be defined. This offer may consist of (i) the integration projects performed by the teachers responsible for the participating courses in third course (Food Technology II, Applied Food Hygiene and Food Laws) during the previous year, (ii) at least one line for each of the courses related to the various productive sectors (Technology of milk and egg products, Technology of meat and fish, Technology of plant products and Enology), (iii) and finally, those proposed by groups of students using those raw materials established by the teachers of the course at the beginning of the course. The latter must be defined during the months of September-October with the teachers, so that the initial proposal can be presented by 1st November to the teachers.

Initial proposals should include a title and a brief summary (max. 150 words) in which the objective and the main needs of pilot plant equipment and raw materials for the project will be specified.

The teachers participating in the course will review and select the most appropriate proposals according to the novelty and originality, the availability of equipment, and other criteria such as the interest for promoting a particular line, rotation of topics, etc.

A number sufficient of projects will be approved to ensure that all enrolled students can develop a project work in groups of 4-5 students. This list will be made public in mid-November on the bulletin board of the degree and the ADD. Then, working groups will be established and assigned to a project and tutor. Academic CV of the students as well as studied elective courses, with a preference for students enrolled in those elective courses more related to the selected project.

Moreover, until the conclusion of the first semester, the teachers, in collaboration with expert teachers in the chosen project, and the proponent students will proceed to establish the feasibility of the projects and suggest necessary amendments prior to the second semester.

In the beginning of the second semester (February 15), each group will present their final project. This proposal should include a final title and a brief abstract (max. 300 words) in which the objective, the main equipment of pilot plant and raw materials for the project will be specified.

From this moment, four seminars will present the course, describing the scientific method, how to prepare a report, and transversal competences such as teamwork and leadership will be trained.

During the months of February and March, the teams will prepare the initial report and receive training in handling techniques and equipment. To do this, there will be materials that are part of the repository of the pilot plant including manuals, powerpoint presentations and videos on the operation of required equipment and control systems. For each project a brief economic study should be made reflecting the needs of raw materials and consumables for the realization of the projects, their costs and providers. During this period, students will receive advice from the teachers to determine the evolution of their abilities at pilot plant prior to the initial assessment step. This activity will require teamwork and autonomous work for up to 20 hours.

The projects must be presented at least one month before the start date of the work in the pilot plant, on the date set by the teachers at the beginning of the course.
Then, in mid-March, the students will be able to visit the processing room of the pilot plant and, under the supervision of the tutor teachers, they will be able to operate the equipment that they will use in carrying out their project for a total of 10 hours.
Next, the first evaluation test will be carried out, which will be attended by all the students, which will determine the quality of the proposals and the training of the teams to carry them out. Students who do not pass this phase will have 1-2 more weeks to correct errors and retake the assessment. If this is not passed on this second opportunity, the student must re-enroll in this subject the following academic year.
The projects will be carried out intensively (sessions of 4-5 hours per day depending on the days scheduled by the center) in the morning or afternoon during the last 3 weeks of the academic year.
Finally, students must submit a final report and an audiovisual document of the activities carried out at least 1 week in advance of the deadline for the delivery of minutes for each call.

The report should include the following information:

- Title of proposal
- Personal data of the student: surname, first name, ID number, address, telephone and email.
- Index- Summary (in Spanish and English)
- Literature review
- Goals
- Material and methods / experimental design / activities undertaken
- Development (Results and Discussion)
- Conclusions (in Spanish and English)
- Personal assessment of the subject
- Bibliography

Should the final report be prepared by all members of the group, indicate the responsibility of each student in the implementation and subsequent wording of paragraphs "Objectives", "Materials and Methods" Results and discussion "and" Conclusions ".

The audiovisual document should include the following information:

- Title of proposal
- Personal data of the student: surname, first name, ID number, address, telephone and email.
- Index
- Justification and objective
- Raw materials, ingredients and additives.
- Flowchart (indication of optimum treatment conditions)
- Description of the processed end product
- Bibliography

## 4.3. Syllabus

This is a course which integrates knowledge and skills developed through the degree in other courses. It is an eminently practical course in which each working group develops a different project related to different professional profiles of the degree. Therefore, a common program is not followed, but the programs of previous courses are used according to the needs of each type of project. As a result, a specific program is not detailed in this section.

## 4.4. Course planning and calendar

**Calendar of face-to-face sessions and presentation of works**
At the beginning of the course, work groups will be constituted and lines of work will be assigned. From these lines, students will present a written proposal and demonstrate their ability to carry it out autonomously in the pilot plant. For this, they will have at their disposal a repository of materials, powerpoint presentations and videos of protocols and operating manuals of the equipment and control systems necessary for the execution of the projects, and the possibility of training in the handling of the equipment during the which is called preparatory practices, normally during the month of March of each academic year.

After the completion of face-to-face teaching of the elective subjects of the second semester of the fourth year, the projects will be carried out intensively in the pilot plant (sessions of 4-5 hours per day depending on the days scheduled by the center) in the morning or afternoon, preferably during the last 3 weeks of the academic year. Given the special nature of this subject, carrying out this activity is considered compulsory. Once the project has been carried out, students must submit a report on the activities carried out on the date that the center has agreed for this purpose within the regular exam period in June and July.

The dates and key milestones of the subject will be described in detail, along with those of the rest of the fourth-year subjects in the CTA Degree, on the website of the Faculty of Veterinary Medicine (https://veterinaria.unizar.es/horarios1cta ). This link will be updated at the beginning of each academic year.