

## 28957 - Post-harvest technology

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 28957 - Post-harvest technology

**Faculty / School:** 201 - Escuela Politécnica Superior

**Degree:** 583 - Degree in Rural and Agri-Food Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

This subject deepens in the knowledge of the post-harvest physiology of vegetable products, in the parameters that determine their quality and in the agents responsible for their alteration. After that, we will learn the basics of the different post-harvest technologies that allow us to preserve these products such as refrigeration, modified atmospheres, ethylene elimination or generation treatments and the different decontamination strategies, both current and under development.

These approaches and objectives are aligned with some of the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), specifically, the learning activities planned in this subject will contribute to the achievement of target 9.4 of Goal 9, and targets 12.3, 12.4 and 12.5 of Goal 12.

### 2. Learning results

- Understand the scientific-technical fundamentals of physiology and post-harvest technology of plant products.
- Understand the physical, chemical and biological changes that take place after harvesting plant products.
- Use various equipment, instruments and analytical techniques to determine the quality of different fruits and vegetables.
- Support the design of post-harvest treatments and strategies to minimize quality losses.
- Know the stages and equipment necessary for the post-harvest handling of fruits and vegetables from harvesting to marketing.
- Select the methods and procedures necessary to combat the alterations of fruit and vegetable products.
- Establish the ideal storage conditions for the different fruit and vegetable products (temperature, relative humidity, gas composition).
- Acquire a critical attitude and aptitude towards applicable post-harvest technologies.
- To solve the problems posed through the application of the scientific method and the adequate use of the sources of information related to the area of Fruit and Vegetable Technology.

Learning results 1, 2 and 3 are aligned with the SDGs, in particular with target 12.3, while outcomes 4, 5, 6 and 7 with target 9.4. Targets 12.4 and 12.5 are addressed in result 8.

### 3. Syllabus

#### **DIDACTIC UNIT 1. INTRODUCTION**

Topic 1. Introduction to Post-Harvest Physiology and Conservation

Topic 2. Economic and nutritional importance of fresh foods of plant origin in the global, European and in the Spanish frameworks.

#### **DIDACTIC UNIT 2. STRUCTURE, PHYSICOCHEMICAL CHARACTERISTICS, PHYSIOLOGY AND POST-HARVEST ALTERATIONS OF FRUIT AND VEGETABLE PRODUCTS**

Topic 3. Structure, chemical composition and nutritional value of fruits and vegetables

Topic 4. Physiological and physicochemical changes during ripening and senescence of fruits and vegetables Topic 5. The quality of fruits and vegetables

Topic 6. Post-harvest alterations of fruits and vegetables

#### **DIDACTIC UNIT 3. POST-HARVEST PRESERVATION TECHNOLOGIES**

Topic 7. Operations prior to post-harvest preservation of fruits and vegetables

Topic 8. Pre-cooling and refrigerated storage

Topic 9. Modified and controlled atmospheres in the preservation of fresh fruits and vegetables

Topic 10. Ethylene management in post-harvest preservation

Topic 11. Emerging technologies in the post-harvesting of fruits and vegetables

Topic 12. Waste management in the fruit and vegetable industry

#### 4. Academic activities

**Lectures:** 30 hours

Theoretical sessions where the contents of the subject will be explained

**Laboratory practices:** 16 hours

Practical laboratory sessions (parameters that determine the quality of fresh vegetable products: nutritional, physiological, degree of maturity, physiological and microbiological alterations).

Special practices (visits to companies in the agri-food sector): 5 hours

*These activities are subject to the budget available for their implementation*

**Problem solving and case studies:** 9 hours

Analysis of documentary videos and research work on the problems of the sector and the possible solutions and existing technological advances.

**Student work:** 88 hours

**Assessment** 2 hours

All activities are aligned with SDGs 12 and 9, in particular target 12.3, 12.4. and 12.5 and target 9.4.

#### 5. Assessment system

The subject will be evaluated in the **continuous assessment** mode by means of the following activities:

- **Intermediate tests** (50% of the grade, minimum 5 out of 10).

They will consist of two individual theoretical-practical written tests throughout the semester. The tests will consist of 4 short questions and 1 theoretical-practical case. In the short answer questions, the correctness and the capacity of synthesis in your answer will be valued. In the qualification of the theoretical-practical assumptions, the correctness of the approach, the results obtained as well as the order, presentation and interpretation of the same will be valued.

- **Laboratory practices and visits** (30% of the grade, minimum 5 out of 10).

There will be several laboratory practices distributed throughout the semester. The following aspects will be evaluated:

- Handling of laboratory material and techniques and solutions provided to the problems encountered.

- Report made at the end of each practice.

- Student autonomy and participation.

In the case of visits, the student's participation and the resolution of a questionnaire related to the company visited will be valued.

- **Project** (20 % of the grade, minimum 5 out of 10)

During the problem solving and case studies sessions, a team work will be proposed to be developed throughout the subject in classroom and laboratory sessions, consisting of determining the maturity indexes, selection and classification criteria, storage temperature, modified atmosphere conditions, type of packaging and shelf life of a certain fruit or vegetable.

The following aspects will be evaluated: previous preparation (collection of information and experimental approach), performance of the laboratory tests, formal aspects of presentation (order, clarity, correct use of bibliographic sources), adequate presentation and defense of the results.

If the student has not passed any of these activities during the semester, they will have the opportunity to pass the course by means of a global test in two the subject by means of a **global test** in the two official calls.

The global test will consist of a written exam including 8 multiple-choice questions, 10 short questions and 2 theoretical and practical assumptions on the contents covered in the theoretical and practical sessions of the subject and its weight on the overall grade will be of 80% (50% theoretical questions and 30% practical questions) and a second activity which will be the delivery and defense of the work (20% of the overall grade).

The detailed assessment system will be explained in the presentation of the subject.

In relation to goal 12.3. its theoretical foundations will be evaluated in the first written test of the continuous assessment and also in the reports of practices 1, 2, 3, 4 and 5, in seminars 1 and 2 and partially in the teaching outing as well as in the realization of the project. The contributions of these evaluation activities to the student's overall grade are respectively 10%, 5% and 5%. In goals 9.4, 12.4 and 12.5 their theoretical foundations will be evaluated in the second written test of the continuous assessment, in the reports of practices 6, 7 and 8, and partially in the teaching outing as well as in the realization of the project. The contributions of these evaluation activities to the student's overall grade are respectively 15 %, 5 % and 10 %.

The success rates for the subject in the last three years are: 2020/21: 100%; 2021/22: 100%; 2022-2023: 100%.

#### 6. Sustainable Development Goals

9 - Industry, Innovation and Infrastructure

12 - Responsible Production and Consumption