

Academic Year/course: 2021/22

## 28930 - Horticultural production

### Syllabus Information

**Academic Year:** 2021/22

**Subject:** 28930 - Producción hortícola

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

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

**ECTS:** 6.0

**Year:** 3 and 4

**Semester:** Second semester

**Subject Type:** Optional

**Module:**

### 1. General information

### 2. Learning goals

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

### 4. Methodology, learning tasks, syllabus and resources

#### 4.1. Methodological overview

This course studies the techniques of horticultural crop and crop characteristics of the main vegetables. It is divided into two main sections. In the first general aspects of horticulture and greenhouse technology is addressed and in the second the agronomic characteristics of the main species of vegetables are studied.

- Theoretical lessons in the classroom.
- Practical sessions in lab
- Tutorial sessions.
- Field visits.

#### 4.2. Learning tasks

The course includes the following learning tasks:

- I. General aspects of horticulture and greenhouse technology. Lectures and practice sessions.
- II. Characteristics of the main species of vegetable. Lectures and practice sessions.
- III. Field visits.

#### 4.3. Syllabus

##### Theoretica Programme

1. Introduction. Horticulture across the world, within the European Union and in Spain. Importance and principal characteristics of the sector.
2. Climate in horticulture. Climatic factors: light, temperature, water and wind. Carbon fertilisation.
3. Soil in horticulture. Organic and mineral fertilisation. Horticulture in specific soils. Cultivation in sand. Hydroponic crops. Nutritive solutions.
4. General techniques within horticultural cultivation. Propagation. Seedbeds. Ploughing. Irrigation. Use of growth regulators.

5. General cultivation techniques in horticulture. Crop rotation and the alternatives. Soil disinfection. Plant health defence and weed control.
6. Harvesting of horticultural products. General guidelines. Harvesting systems. Conservation of horticultural products. Postharvest handling. Conservation systems. Markets for horticultural products. Marketing standards and methods.
7. Horticultural plants cultivated for their roots. Species. Botanical classification. Economic importance. The carrot. Cultivation techniques.
8. Horticultural plants cultivated for their tubers. Species. Botanical classification. Economic importance. The potato. Cultivation techniques.
9. Horticultural plants cultivated for their bulbs. The *Allium* genus. Botanical classification. Economic importance. The onion and its cultivation techniques. Garlic and its cultivation techniques.
10. Horticultural plants cultivated for their stems. The asparagus. Economic importance. Cultivation techniques.
11. Horticultural plants cultivated for their leaves. Species. Botanical classification. Economic importance. The *Brassica* genus. Cultivation techniques. The lettuce and the endive and their cultivation techniques.
12. Horticultural plants cultivated for their inflorescence. Species. Botanical classification. The artichoke. Cultivation techniques.
13. Horticultural plants cultivated for their fruit. The solanaceae family. Botanical classification. Economic importance. Cultivation techniques of the tomato, the pepper and the aubergine.
14. Horticultural plants cultivated for their fruit. The cucurbitaceae family. Species. Botanical classification. Economic importance. Cultivation techniques.
15. Horticultural plants cultivated for their fruit. The strawberry. Species. Botanical classification. Economic importance. Cultivation techniques.
16. Horticultural plants cultivated for their pods/seeds. Species. Botanical classification. Economic importance. Cultivation techniques.
17. Cultivated mushrooms. General features. Taxonomy. Description. The common mushroom. Cultivation techniques. Other edible fungi.

### Practical Programme

1. Crop programming. Crop calendar. Outdoor crops and protected cultivation.
2. Greenhouses. General characteristics. Greenhouse design. Types of cover. Thermal requirements. Estimation of heating needs.
3. Greenhouse design. Estimation of refrigeration needs. Refrigeration requirements in greenhouses. Design of a cooling system.
4. Recognition of the seeds of a variety of horticultural plants.
  - 4.1.- The solanaceae family (pepper, aubergine, tomato)
  - 4.2.- The asteraceae family (cardoon, artichoke, lettuce, escarole, endive, salsify)
  - 4.3.- The apiaceae family (celery, fennel, carrot, parsnip, parsley)
  - 4.4.- The cucurbitaceae family (melon, cucumber, watermelon, courgette, pumpkin)
  - 4.5.- The liliaceae family (asparagus, onion, leek, garlic)
  - 4.6.- The poaceae family (sweetcorn)
  - 4.7.- The rosaceae family (strawberry)
  - 4.8.- The brassicaceae family (turnip, cabbage, cauliflower, Roman cauliflower, broccoli)
  - 4.9.- The chenopodiaceae family (chard, beetroot, spinach)
  - 4.10.- The boraginaceae family (borage)
  - 4.11.- The leguminosae family (beans, peas)
5. Recognition of the plantlets of a variety of horticultural plants.
  - 5.1.- The solanaceae family (pepper, aubergine, tomato)
  - 5.2.- The asteraceae family (cardoon, artichoke, lettuce, escarole, endive, salsify)
  - 5.3.- The apiaceae family (celery, fennel, carrot, parsnip, parsley)
  - 5.4.- The cucurbitaceae family (melon, cucumber, watermelon, courgette, pumpkin)
  - 5.5.- The liliaceae family (asparagus, onion, leek, garlic)
  - 5.6.- The poaceae family (sweetcorn)
  - 5.7.- The rosaceae family (strawberry)
  - 5.8.- The brassicaceae family (turnip, cabbage, cauliflower, Roman cauliflower, broccoli)
  - 5.9.- The chenopodiaceae family (chard, beetroot, spinach)
  - 5.10.- The boraginaceae family (borage)
  - 5.11.- The leguminosae family (beans, peas)
6. Substrata for horticulture.
7. Quality standards relating to the sale of vegetables.
8. Establishment of horticultural alternatives.
9. Vegetable grafting.

### External visits:

Visits to a substratum production plant, a mushroom farm and a mushroom processing company in Autol-Pradejón in the province of La Rioja. Visit to an intensive horticultural farm near Zaragoza.

### 4.4. Course planning and calendar

Week	Lectures and problem-solving sessions	Hours	Practical sessions	Hours	Activity
1	Topic 1	2	Practice 1	2	
2	Topic 2	2	Practice 2	2	
3	Topic 3	2	Practice 2	2	
4	Topic 4 y 5	2	Practice 2	2	
5	Topic 6	2	Practice 3	2	

6	Topic 7 y 8	2	Practica 3	2	
7	Topic 9	2	Practice 4	2	
8	Topic 10	2	Practice 4	2	
9	Topic 11	2	Practice 5	2	
10	Topic 12	2	Practice 5	2	
11	Topic 13	2	Practice 5	2	
12	Topic 14	2	Practice 6	2	
13	Topic 15	2	Practice 7	2	
14	Topic 16	2	Practice 8	2	Submission of work
15	Topic 17	2	Practice 9	2	
Total		30 hours		30 hours	

#### 4.5. Bibliography and recommended resources

- BB** Alpi, A. Cultivo en invernadero : actual orientación científica y técnica / A. Alpi, F. Tognoni ; versión española [de la 4a ed. italiana], C.I. Cerisola, con la colaboración de E. Domínguez Castillo . 3a ed. rev. y amp. Madrid : Mundi-Prensa, 1991
- BB** Fertirrigación : cultivos hortícolas, frutales y ornamentales / obra colectiva dirigida y coordinada por Carlos Cadahía . 3ª ed. rev., act. y ampl. Madrid [etc.] : Mundi-Prensa, 2005
- BB** Maroto Borrego, José Vicente. Elementos de horticultura general : especialmente aplicado al cultivo de plantas de consistencia herbácea / J. V. Maroto Borrego . 2a ed. rev. y ampl. Madrid : Mundi-Prensa, 2000
- BB** Maroto Borrego, José Vicente. Horticultura herbácea especial / J. V. Maroto Borrego . 5ª ed. rev. y amp. Madrid : Mundi-Prensa, 2002
- BB** Matallana Gonzalez, Antonio. Invernaderos : diseño, construcción y ambientación / Antonio Matallana Gonzalez, Juan Ignacio Montero Camacho. 2ª ed. rev. y amp. Madrid : Mundi-Prensa, 1995
- BC** Casal, J. Las plantas entre el cielo y el suelo. Buenos Aires: Eudeba, 2007 [Comentario del profesor: libro electrónico]
- BC** Castilla Prados, Nicolás. Invernaderos de plástico : tecnología y manejo / Nicolás Castilla . Madrid : Mundi-Prensa, 2005
- BC** Osca Lluch, J.M., Gómez de Barreda, D. Guía gráfica de cultivos herbáceos. Valencia: Universidad Politécnica, 2019 [Comentario del profesor: libro electrónico]
- BC** Resh, Howard M.. Cultivos hidropónicos : nuevas técnicas de producción... / Howard M. Resh . 5a. ed., rev. y ampl. Madrid [etc.] : Mundi-Prensa, 2001
- BC** Tesi, Romano. Medios de protección para la hortoflorofruticultura y el viverismo / Romano Tesi ; versión española J. M. Mateo Box . Madrid [etc.] : Mundi-Prensa, 2001
- BC** Tratado de cultivo sin suelo / Miguel Urrestarazu Gavilán , director coordinador . 3ª ed., rev. y ampl. Madrid [etc.] : Mundi-Prensa, 2004

The updated recommended bibliography can be consulted in:  
<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28930>