

## COURSE PROGRAM<sup>1</sup>

Academic Year: 2024/2025

Identification and characteristics of the course			
Code	501137	ECTS Credits	6
Course name (English)	Field Crops		
Course name (Spanish)	Cultivos Herbáceos Extensivos		
Degree programs	Grado en Ingeniería de las Explotaciones Agropecuarias Grado en Ingeniería Hortofrutícola y Jardinería		
Faculty/School	Escuela de Ingenierías Agrarias		
Semester	6º	Type of course	Compulsory
Module	Specific Technology: Explotaciones Agropecuarias		
Matter	Technology of Crop production		
Lecturer/s			
Name	Office	E-mail	Web page
María José Poblaciones Suárez-Bárcena	D724	majops@unex.es	
Subject Area	Crop Production		
Department	Ingeniería del Medio Agronómico y Forestal		
Coordinating Lecturer (If more than one)	María José Poblaciones Suárez-Bárcena		

Competencies <sup>2*</sup>
1. CG5 - Capacidad para la redacción y firma de estudios de desarrollo rural, de impacto ambiental y de gestión de residuos de los espacios relacionados con la jardinería y el paisajismo.
2. CG6 - Capacidad para la dirección y gestión de toda clase de industrias agroalimentarias, explotaciones agrícolas y ganaderas, espacios verdes urbanos y /o rurales y áreas deportivas públicas o privadas, con conocimiento de las nuevas tecnologías, los procesos de calidad, trazabilidad y certificación y las técnicas de marketing y comercialización de productos alimentarios y plantas cultivadas.
3. CG7 - Conocimiento en materias básicas, científicas y tecnológicas, que permitan un aprendizaje continuo, así como una capacidad de adaptación a nuevas situaciones o entornos cambiantes
4. CG8 - Capacidad de resolución de problemas con creatividad, iniciativa, metodología y razonamiento crítico
5. CG9 - Capacidad de liderazgo, comunicación y transmisión de conocimientos, habilidades

<sup>1</sup> En los casos de planes conjuntos, coordinados, intercentros, pceos, etc., debe recogerse la información de todos los títulos y todos los centros en una única ficha.

<sup>2\*</sup> The sections concerning competencies, course outline, educational activities, teaching methodologies, learning outcomes and assessment systems must conform to that included in the ANECA verified document of the degree program.

y destrezas en los ámbitos sociales de actuación
6. CB1 - Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio
7. CG10 - Capacidad para la búsqueda y utilización de la normativa y reglamentación relativa a su ámbito de actuación
8. CG11 - Capacidad para desarrollar actividades en el ámbito de su especialidad, asumiendo un compromiso social, ético y ambiental en sintonía con la realidad del entorno humano y natural
9. CG12 - Capacidad para el trabajo en equipos multidisciplinares y multiculturales
10. CB2 - Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio
11. CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio) para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética
12. CB4 - Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado
13. CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía
14. CT1 - Dominio de las TIC
15. CERA1 - Identificación y caracterización de especies vegetales
16. CERA2 - Las bases de la producción vegetal, los sistemas de producción, de protección y de explotación
17. CETE2 - Tecnologías de la producción vegetal. Sistemas de producción y explotación. Protección de cultivos contra plagas y enfermedades. Tecnología y sistemas de cultivo de especies herbáceas. Agroenergética

**Contents**

**Course outline\***

Scientific and technological studies of field crops. Characteristics of the main species of field crops (cereals, legumes and industrial crops) related to taxonomic, morphological, physiological, ecological, varietal and crop technology aspects. Energy crops and new uses

**OBJETIVOS DE DESARROLLO SOSTENIBLE CONTEMPLADOS**

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<b>Course syllabus</b>
<b>Block I: Introduction</b>
<p>Name of lesson 1: <b>Introduction to field crops</b>            Contents of lesson 1: Crops Science concept. Differences between extensive and intensive crops. Main characteristics of Cereal.</p>
<b>Block II: Cereals</b>
<p>Name of lesson 2: <b>Cereal generalities</b>            Contents of lesson 2: Importance of winter cereals in the world, Europe and Spain. Botany, morphology, physiology and ecology of cereals.</p> <p>Name of lesson 3: <b>Cereal production technology</b>            Contents of topic 3: Tillage and soil preparation, sowing, fertilization, irrigation, weeds, pests and diseases and harvesting of cereals.</p> <p>Name of lesson 4: <b>Wheat</b>            Contents of lesson 4: Introduction. Botany. Morphology, physiology and ecology. Breeding and management.</p> <p>Name of lesson 5: <b>Barley</b>            Contents of lesson 5: Introduction. Botany. Morphology, physiology and ecology. Breeding and management.</p> <p>Name of lesson 6: <b>Other cereals</b>            Contents of lesson 6: Oat, rye, triticale and others.</p> <p>Name of lesson 7: <b>Corn</b>            Contents of lesson 7: Introduction. Botany. Morphology, physiology and ecology. Corn breeding and management.</p> <p>Name of lesson 8: <b>Rice</b>            Contents of lesson 8: Introduction. Botany. Morphology, physiology and ecology. Rice breeding and management.</p> <p>Competences of the block: CG7, CB1, CB5, CT1, CERA1, CERA2, CETE2</p>
<b>Block III: Legumes</b>
<p>Name of lesson 9: <b>Legumes</b>            Contents of lesson 9: Legumes in agriculture. Agronomic characteristics. Objectives of genetic improvement in grain legumes. Quality of grain legumes. Legumes and sustainability. Grain legumes in the world, Europe and Spain.</p> <p>Name of lesson 10: <b>Faba bean</b>            Contents of lesson 10: Introduction. Botany. Morphology, physiology and ecology. Faba bean breeding and management.</p> <p>Name of lesson 11: <b>Field peas</b>            Contents of lesson 11: Introduction. Botany. Morphology, physiology and ecology. Pea breeding and management.</p> <p>Name of lesson 12: <b>Chickpea</b></p>

Contents of lesson 12: Introduction. Botany. Morphology, physiology and ecology. Chickpea breeding and management.

Name of lesson 13: **Other legumes**

Contents of lesson 13: Soja. Lupin. Lentils. Grass pea. Other species.

Competences of the block: CG7, CB1, CB5, CT1, CERA1, CERA2, CETE2

#### **Block IV: Industrial crops**

Name of lesson 14: **Industrial crops**

Contents of lesson 14: Introduction to Industrial Crops. Definition and generalities. Classification according to industrial use. Non-Food Crops (NFCs)

Name of lesson 15: **Beetroot**

Contents of lesson 15: Introduction. Botany. Morphology, physiology and ecology. Beetroot breeding and management.

Name of lesson 16: **Sunflower**

Contents of lesson 16: Introduction. Botany. Morphology, physiology and ecology. Sunflower breeding and management.

Name of lesson 17: **Tobacco**

Contents of lesson 17: Introduction. Botany. Morphology, physiology and ecology. Tobacco breeding and management.

Name of lesson 18: **Other industrial Crops**

Contents of lesson 18: Fibers producers: cotton, linen, hemp, kenaf and others. Oilseeds: rapeseed, safflower, castor oil plant and others. Bioenergy crops: bioethanol, biodiesel and biomass.

Competences of the block: CG7, CB1, CB5, CT1, CERA1, CERA2, CETE2

#### **Practical contents**

Name of lesson 19: Practice 1: **CEREAL DIFFERENTIATION**

Contents of lesson 17: Recognition and distinction between cereals in each of their growth phases.

Competences: CG10, CG8, CG9, CB2, CB3, CERA1

Name of lesson 20: Practice 2: **PHYSICAL, CHEMICAL AND TECHNOLOGICAL PROPERTIES OF CEREALS.**

Contents of lesson Review of the determination of the main physical and technical characteristics of the seeds: percentage of impurities, hectolitre weight, 1000-grain weight, germination power and relative value, determination of the vitrosity percentage, the sedimentation index or Falling number, the wet and dry gluten content as well as the parameters of the Chopin Alveographs.

Competences: CG10, CG12, CG7, CG9, CG9, CB3, CERA1

<p>Name of lesson 21: Practice 3: <b>PHENOLOGICAL STATUS OF CEREALS</b></p> <p>Contents of lesson 20: Sow and follow-up of germination-emergence phases, vegetative development, grain filling and maturation. Determination of fertilization and phytosanitary treatments.</p> <p>Competences: CG10, CG11, CG12, CG5, CG8, CG9, CB2, CB3, CB4, CB5, CT1, CERA1, CERA2, CETE2, CERA 10, CB3</p>
<p>Name of lesson 22: Practice 4: <b>LEGUMES DIFFERENTIATION</b></p> <p>Contents of lesson 21: Recognition and distinction between legumes in each of their growth phases.</p> <p>Competences: CG10, CG8, CG9, CB2, CB3, CERA1</p>
<p>Name of lesson 23: Practice 5: <b>INDUSTRIAL CROPS DIFFERENTIATION</b></p> <p>Contents of lesson 22: Recognition and distinction between industrial crops in each of their growth phases</p> <p>Competences: CG10, CG8, CG9, CB2, CB3, CERA1</p>
<p>Name of lesson 24: Practice 6: <b>SEED DIFFERENTIATION</b></p> <p>Contents of lesson 23: Distinction between legumes and industrial crops seeds.</p> <p>Competences: CG10, CG8, CG9, CB2, CB3, CERA1</p>
<p>Name of lesson 25: Practice 7: <b>REALIZATION OF A WORK.</b> Carrying out a research work including all phases: experimental design, management, data collection, statistical analysis, literature search and writing of a scientific paper.</p> <p>Content of lesson 25: A research trial will be carried out, including all phases, on the effect of the application of different fertilisers and doses or other products on different cereals and/or leguminous plants to establish the effects on phenology and growth parameters. This will be done through literature research, experimental design, management, data collection, statistical analysis, drafting of a scientific paper and its presentation and defense.</p> <p>Competences: CG10, CG11, CG12, CG5, CG6, CG8, CG9, CB1, CB2, CB3, CB4, CB5, CT1, CERA2, CETE2</p>
<p>Name of lesson 26: Practice 8: <b>VISIT OF A PARTICULAR FARM AND/OR RESEARCH FIELDS</b></p> <p>Contents of lesson 25: Carrying out a visit to different farms where the farm is being carried out and different research works in field crops.</p> <p>Competences: CG10, CG11, CG5, CG6, CG8, CG9, CB1, CB2, CB3, CB4, CB5, CT1, CERA2, CETE2</p>
<p>Name of lesson 27: Practice 9: <b>MOODLE ACTIVITIES</b></p> <p>Contents of lesson 26: Realization of different activities that will be proposed in moodle along the academic year.</p> <p>Competences: CG10, CG11, CG5, CG6, CG8, CG9, CB1, CB2, CB3, CB4, CB5, CT1,</p>

CERA2, CETE2								
Educational activities *								
Student workload in hours by lesson		Lectures	Practical activities				Monitoring activity	Homework
Lesson	Total	L	HI	LAB	COM	SEM	SGT	PS
0	0,5	0,5						0
1	2	1						1
2	3,5	1,5						2
3	3,5	1,5						2
4	4	2						2
5	5	2						3
6	5	2						3
7	5	2						3
8	5	2						3
9	4	2						2
10	5	2						3
11	5	2						3
12	4	2						2
13	4	2						2
14	2	1						1
15	6	3						3
16	4	2						2
17	6	3						3
18	5	2						3
19	8			4			1	3
20	3			2				1
21	8			2			2	4
22	5			2				3
23	5			2				3
24	6			2			1	3
25	26,5			7			3,5	16
26	1,5			1,5				
27	6,5							6,5
<b>Evaluation</b>	2	2						
<b>TOTAL</b>	150	37,5		22,5			7,5	82,5
L: Lectures (100 students) HI: Hospital internships (7 students) LAB: Laboratory or field practices (15 students) COM: Computer room or language laboratory practices (30 students) SEM: Problem classes or seminars or case studies (40 students) SGT: Scheduled group tutorials (educational monitoring, ECTS type tutorials) PS: Personal study, individual or group work and reading of bibliography								
Teaching Methodologies*								
The methods to be used for the student to obtain the necessary competences for the development of the future profession will be: 1. Lectures and discussion of theoretical contents 2. Problem development								

3. Laboratory and field practices
4. Case Studies
7. Use of the virtual classroom
8. Visits
9. Study of the subject
10. Search and management of scientific bibliography
11. Conducting examinations

### Learning outcomes \*

RA72. Los estudiantes deben obtener capacidad para trabajar en equipos multidisciplinares y multiculturales.

RA137. Conocer la situación actual y las características de las principales especies de Cultivos Herbáceos Extensivos referentes a aspectos taxonómicos, morfológicos, fisiológicos, ecológicos y varietales.

RA138. Conocer la tecnología de cultivo que se aplica a los principales Cultivos Herbáceos Extensivos, entre los que destaca el laboreo, siembra, control de malas hierbas, fertilización, control de la humedad del suelo, la defensa del cultivo, la recolección, conservación y transformación de cosechas y la utilización de subproductos.

RA139. Ser capaz de analizar el impacto que las técnicas anteriores tendrán en el desarrollo y producción de los cultivos, así como en la calidad de la producción obtenida.

RA140. Ser capaz de aplicar los conocimientos adquiridos a situaciones reales y concretas para así poder decidir, planificar, dirigir y evaluar la implantación de Cultivos Herbáceos en una explotación agraria.

RA141. Ser capaz de reconocer visualmente las principales especies de Cultivos Herbáceos Extensivos en cualquiera de sus fases de crecimiento (incluida la semilla).

RA155. Ser capaz de encontrar información actualizada (de bibliografía, internet, etc.) sobre diferentes aspectos y problemáticas de las diferentes asignaturas.

RA156. Dotarse de una visión crítica y comprensiva ante la lectura de diferentes documentos técnicos y científicos relacionados con las diferentes asignaturas.

RA157. Expresar verbalmente con precisión y argumentación conocimientos especializados.

RA158. Ser capaz de trabajar en grupo de manera eficiente.

RA159. Los estudiantes tendrán la capacidad de reunir e interpretar datos relevantes, dentro del área de ingeniería agroforestal, de forma que les permita emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética.

RA12. Introducirse en la terminología técnica y científica de lengua inglesa de diferentes aspectos relacionados con las diferentes asignaturas.

### Assessment systems \*

1. **Final exam (80%):** theoretical and practical knowledge acquired during the course

delivery by a written final exam consisting of two parts: theory test (65%) and practice exam (15%). It is necessary to pass both exams (minimum mark half of the considered value). The theory exams will consist of questions related to the syllabus taught, which will be marked, if answered correctly, according to the value given in the exam itself. Questions with incorrect answers may be deducted up to 1 right answer. The practical exams will consist of the visual identification of the crops studied during the course. It is necessary to pass both exams to pass the course.

**2. Continuous evaluation (15%):** Degree of achievement of practical skills and capacity for integration with theoretical knowledge. Use and participation in theoretical and practical classes through direct questions to groups of students and discussion of the results. Carrying out and presentation of the research during the course, which will include the design of the essay, handling, data collection, writing, delivery and presentation of a team work to be agreed with the teacher\*\*. The student will write and hand in a field book on the monitoring of one of the existing crops in the practical fields

**3. Assistance with academic achievement (5%):**-Attendance with use of face-to-face activities (5%): Innovation, creativity and consultation of resources in the resolution of activities proposed during the course of the theoretical classes using the computer classroom as a support whenever possible. Each student, individually or in teams, will submit a summary of the activities carried out.

**A SINGLE COMPREHENSIVE FINAL EXAMINATION\*:**

Final written exam which will have two parts: the first part (80%) which will consist of two parts: theory exam (65% of the mark) and practical exam (15% of the mark). The theory exams will consist of questions related to the syllabus taught, which will be marked, if answered correctly, according to the value given in the exam itself. The practical exams will consist of visual identification of the crops studied during the course. It is necessary to pass both exams (minimum mark half the value considered) in order to pass the course. The second part (20%) will be the result, on the one hand, of the completion and presentation of a work to be agreed with the teacher\*\* and, on the other hand, of the attendance of 10% of the practical classes determined before the beginning of the course due to the difficulty that the evaluation of the learning outcomes entails

**Bibliography (basic and complementary)**

**BASIC BIBLIOGRAPHY**

- CARRASCO, J. M.; LOZANO, M. J.; PÉREZ, F. 1997. *Leguminosas de grano. Tecnología de cultivo*. Hojas divulgadoras (2/97) de la Junta de Extremadura. Badajoz.
- GUERRERO, A. 1999. *Cultivos herbáceos extensivos*. Ediciones Mundi-Prensa. 6ª Edición. Madrid.
- LÓPEZ-BELLIDO, L. 1991. *Cultivos herbáceos*. Los Cereales. Ediciones Mundi-Prensa, Madrid, España.
- LÓPEZ-BELLIDO, L. 2002. *Cultivos industriales*. Ediciones Mundi-Prensa, Madrid, España.
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- OSCA LLUCH, J. M.; 2004. *Cultivos herbáceos extensivos: cereales*. Universidad Politécnica de Valencia.

**BIBLIOGRAPHY OF EACH CROP**



ALBA-ORDOÑEZ, A.; LLANOS-COMPANY, M. 1990. *El cultivo del girasol*. Agrogúas Mundi-Prensa. Madrid.

DE MIGUEL, E. 1991. *El garbanzo, una alternativa para el seco*. Ediciones Mundi-Prensa. Madrid.

FORNÉS, J. 1983. *Cultivo de habas y guisantes*. Editorial Sintesis, S.A. Barcelona.

FRANQUET, J. M.; BORRÁS, C. 2006. *Economía del arroz: variedades y mejora*. Edición electrónica. Texto completo en [www.eumed.net/libros/2006a/fbbp/](http://www.eumed.net/libros/2006a/fbbp/)

LLANOS COMPANY, M. 1984. *El maíz: su cultivo y aprovechamiento*. Ediciones Mundi-Prensa. Madrid.

MOLINA CANO, J. L. 1989. *La cebada: morfología, fisiología, genética, agronomía y usos industriales*.

MORILLO-VELARDE, R.; BOHÓRQUEZ, A.; SOTO, A. 1986. *Normas de cultivo de la remolacha azucarera de siembra otoñal*. Serie Monografías nº2 de la Junta de Andalucía. Sevilla.

TINARELLI, A. (VERSIÓN ESPAÑOLA POR CARRERES ORTELLES, R. M.). 1989. *El arroz*. Mundi-Prensa. Madrid.

### Other resources and complementary educational materials

The student has material related to the subject in the library, material on which the teachers base their agenda.

The facilities of the School of Agrarian Engineering will be used to carry out work that may be of interest to the student or that may facilitate the expansion of his knowledge and skills.

The student will have access from the first moment to the resources of the virtual platform of the subject, through which he will be able to communicate with the teaching staff and other colleagues, as well as download the file of the subject, with the program and the evaluation criteria.

The teacher-student interaction will be carried out thanks to the e-mail addresses and forums of the virtual platform, as well as small evaluations through questionnaires included in the web.