



Universitat de Lleida

# DEGREE CURRICULUM

# **AGRICULTURAL BUILDINGS AND FACILITIES**

Coordination: FERNANDEZ SERRANO, ALVARO

Academic year 2023-24

## Subject's general information

Subject name	AGRICULTURAL BUILDINGS AND FACILITIES			
Code	102560			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Agricultural and Food Engineering	3	COMPULSORY	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRACAMP	PRALAB	PRAULA
	Number of credits	0.3	1.2	1.3
	Number of groups	1	1	1
Coordination	FERNANDEZ SERRANO, ALVARO			
Department	AGRICULTURAL AND FOREST SCIENCES AND ENGINEERING			
Teaching load distribution between lectures and independent student work	Face-to-face hours: 60 Non-presential hours: 90			
Important information on data processing	Consult <a href="#">this link</a> for more information.			
Language	catalan / spanish			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
FERNANDEZ SERRANO, ALVARO	alvaro.fernandezserrano@udl.cat	3	
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## Subject's extra information

### Requisite

Prerequisite: Fonaments de l'Enginyeria Rural i Construcció

### Notice

It's strongly recommended to check regularly the information given in 'Campus Virtual'

## Learning objectives

### Learning objectives and outcomes

The student, on passing the subject, must be able to:

**R1:** Know the components of concrete and their properties.

**R2:** Calculate the dosage of a concrete.

**R3:** Calculate simple elements of reinforced concrete.

**R4:** Calculate simple steel elements.

**R5:** Know the typologies and structural materials of the commercial greenhouses.

**R6:** Know and understand the Regulations, the components and characteristics of a Low Voltage Electrical Installation.

**R7:** Design and calculate an electrical installation of a fruit and vegetable farm.

**R8:** Know the operation of electrical machines and calculate their characteristic parameters.

**R9:** Know and measure the main systems for Rural Electrification: conventional and alternative.

**R10:** Know and apply techniques for optimizing electricity consumption and the Regulations on Electricity Tariffs.

## Competences

### General competences

At least the following basic competencies will be guaranteed:

**CG1.** Ability to prepare, design, draft and sign projects for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly or operation of movable or immovable property which, by its nature and characteristics are included in the technique of agricultural and livestock production (facilities or buildings, farms, infrastructure and rural roads), the agri-food industry (extractive industries, fermentation, dairy, canning, fruit and vegetables, meat, fishing, salting and in general, any other dedicated to the elaboration and / or transformation, conservation, manipulation and distribution of food products) and gardening and landscaping (urban and / or rural green spaces –parks, gardens, nurseries, urban trees, etc.–, public or private sports facilities and environments subject to landscape recovery).

**CG2.** Adequate knowledge of physical problems, technologies, machinery and water and energy supply systems, the limits imposed by budgetary factors and construction regulations, and the relationships between facilities or buildings and farms, agri-food industries and areas related to gardening and landscaping with their social and environmental environment, as well as the need to relate those and this environment to human needs and the preservation of the environment.

**CG8.** Ability to solve problems with creativity, initiative, methodology and critical reasoning.

**CG10.** Ability to research and use the rules and regulations relating to their field of action.

**CG12.** Ability to work in multidisciplinary and multicultural teams.

**CG13.** Correction in oral and written expression.

### Specific competences

Ability to know, understand and use the principles of:

**CEHJ2.** Engineering of green areas, sports areas and fruit and vegetable farms. Civil works, facilities and infrastructures of green areas and protected areas.

Electrification. Irrigation and drainage. Machinery for horticulture and gardening.

## Subject contents

### Syllabus

**Unit 1:** Actions in the building. Combinations of actions. CTE. Ultimate Limit State. Serviceability Limit State.

**Unit 2:** Sizing steel structural members. I-beams. Internal forces. Compression and tension stress. Elastic limit. Shear force. Buckling.

**Unit 3:** Concrete. Standards (*Código Estructural*). Composition. Durability. Dosage. Sizing structural members of reinforced concrete.

**Unit 4: Low Voltage Electrical Installations (LVEI).** Review of alternating currents. Regulations for LVEI. Elements and characteristics of an LVEI. Security of the LVEI. LVEI design and calculation. The electrical project in Low Voltage. Documentation.

**Unit 5: Electrical machines (EM).** General principles of EM. Transformers. Rotary direct current EM. Rotary alternating current EM. Special EM. Protection of EMs. Principles of EM automation.

**Unit 6: Systems for Rural Electrification.** Optimization of electricity consumption. Electricity rates. Power lines. Transformation Centers. Generators. Renewable energies. Photovoltaic installations. Guidelines and techniques for saving and optimizing electricity consumption. Pricing and economic cost of electricity.

## **Practical activities**

Solving case studies with a computer.

Solving exercises and examples in the classroom.

## Methodology

### Learning activities

BLOCS		Lectures and problems solving (hours)		Practices with the computer (hours)		Evaluation (hours)	TOTAL (hours)	
		Classroom / Homework		Classroom / Homework		Classroom	Classroom / Homework	
1	Introduction	1					1	
2	Unit 1						6	12
	Theory and problems solving	4	7					
	Calculation with computer			2	5			
	Exam unit 1					1		
3	Unit 2						17	28
	Theory and problems solving	9	14					
	Calculation with computer			8	14			
4	Unit 3						3	5
	Theory and problems solving	3	5					
	Exam units 2 & 3					2		
5	Unit 4						14	21
	Content development	14	21					
6	Unit 5						7	12
	Content development	7	12					
7	Unit 6						7	12
	Content development	7	12					
	Exam units 4, 5 & 6					2		

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<b>TOTAL</b>						<b>60</b>	<b>90</b>
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Type of activity	Presencial activity of the student	Not Presencial activity of the student
<b>Lectures and problems volving</b>	Introduction and exposition of the concepts and theoretical foundations. Introduction and application of concepts through problem solving.	Study of the theoretical concepts that allow solving problems. Problems solving.
<b>Computer</b>	Problems solving with professional structural design software	Problems solving with professional structural design software

## Development plan

Type of Activity	Content	Object	Classroom hours	Accumulated hours	Evaluation	
					Unit	Time (h)
Lecture	Introduction	General overview.	1	1		
Lecture. Problems solving	Unit 1. Review of reactions, internal stresses and stresses in beams	R4	1	2		
Lecture. Problems solving	Unit 1. Calculation of actions in the building (CTE)	R2, R3	3	5		
Computer practices	Unit 1. Combination of actions (CTE)	R2, R3, R5	2	7		
Exam		R2, R3		8	Unit 1	1
Lecture. Problems solving	Unit 2. Calculation of steel members without buckling	R4	2	10		
Lecture. Problems solving	Unit 2. Calculation of steel members in compression with buckling	R4	2	12		

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Lecture. Problems solving	Unit 2. Calculation of steel members in bending with buckling	R4	3	15		
Lecture. Problems solving	Unit 2. Calculation of steel members in compression and bending with buckling	R4	2	17		
Computer practices	Unit 2. Calculation of steel members.	R4, R5	8	25		
Lecture. Problems solving	Unit 3 Concrete	R1	3	28		
Exam		R1, R4		30	Units 2 and 3	2
Lecture	Unit 4. Review of alternating currents	R5, R6	1	31		
Lecture	Unit 4. Regulations for Low voltage electrical installations, LVEI. Elements and characteristics of an LVEI..	R5, R6	4	35		
Lecture. Problems solving	Unit 4. LVEI design and calculation. Section of conductors.	R5, R6	4	39		
Lecture. Problems solving	Unit 4. Security of the LVEI. The electrical project in LV. Documentation.	R5, R6	5	44		
Lecture	Unit 5. General principles of Electrical machines.	R7	1	45		
Lecture	Unit 5. Electric power converters Transformers	R7	1	46		
Lecture	Unit 5. DC and AC rotary electrical machines.	R7	3	49		



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Laboratory practices	Unit 5. Electrical machines	R7	2	51		
Lecture	Unit 6. Power lines.	R8	1,5	52,5		
Lecture	Unit 6. Transformation Centers. Generators.	R8	1	53,5		
Lecture	Unit 6. Renewable energies.	R8	2,5	56		
Lecture	Unit 6. Electricity efficiency and savings. Electricity rates.	R9	2	58		
				60	Units 4, 5 & 6	2
					final recovery Exam	2

## Evaluation

	Type of activity	results of the learning	Procedure	Qualification weight (%)
<b>BLOCK 1: CONSTRUCTIONS</b>	<b>Units 1, 2, 3</b>	R1, R2, R3, R4	Exam 1 Exam 2	10 25
<b>BLOCK 2: CONSTRUCTIONS</b>	<b>Units 1 and 2</b>	R2, R3, R4	Practice	15
<b>BLOCK 3: INSTALLATIONS</b>	<b>Unit 4</b>	R6, R7	Work presentation	10
<b>BLOCK 4: INSTALLATIONS</b>	<b>Units 4, 5 and 6</b>	R6, R7, R8, R9, R10	Exam 3	40
	<b>Total</b>			<b>100</b>

### Pass criteria:

- The final grade must be equal to or greater than 5
- The grade for **Block 1** and **Block 4** must be equal to or greater than 5

### Exams

- The **exams 1 and 2** may be carried out with the documentation indicated
- In the **exam 3**, the only documentation that can be consulted is a form prepared by the student himself.
- During the exams it is not allowed to use computers, mobile phones, watches or any other type of device that allows connection to the internet or with other people.

## Recovery:

- **Blocks 2 and 3** have **no recovery**.
- If in **Block 1** and/or **Block 4** a grade equal to or higher than 5 is not achieved, the corresponding Block must be recovered.
- If the final grade of the subject does not reach 5, but **Blocks 1** and **4** have a grade equal to or higher than 5, the student can choose which Block or Blocks (1 and/or 4) will be examined for raise the grade

## ALTERNATIVE EVALUATION

If someone takes the alternative assessment, this will consist of a global examination of the entire subject syllabus, which will be carried out on the date set by the center for the second examination (18th January), and which will weigh 100 % of the grade. In order to pass the subject, a minimum grade of 5 must be obtained in the exam. In case of failing this examination, there will be a recovery examination on the date set by the center (30th January).

### General criteria

- The formal correctness of the documents submitted by students, whether in exams or problems, is demanded. It is not possible to pass the course if this requirement is not fulfilled. Special attention about the spelling must be paid.
- When correcting exams and practices, the absence or incorrectness of the units in the numerical results, the misconceptions, errors or rude contradictions will be especially penalized. The presence of some of the error described here may be enough to cause an examination to be qualified as not passed.

## Bibliography

### Basic bibliography

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