



Universitat de Lleida

DEGREE CURRICULUM
**AGRICULTURAL BUILDING
DESIGN**

Coordination: PUIGDOMENECH FRANQUESA, LUIS

Academic year 2022-23

Subject's general information

Subject name	AGRICULTURAL BUILDING DESIGN		
Code	102521		
Semester	1st Q(SEMESTER) CONTINUED EVALUATION		
Typology	Degree	Course	Character
	Bachelor's Degree in Agricultural and Food Engineering	2	COMPULSORY
	Master's Degree in Agronomic Engineering		COMPLEMENTARY TRAINING
	Modality		
	Attendance-based		
	Attendance-based		
Course number of credits (ECTS)	6		
Type of activity, credits, and groups	Activity type	PRAULA	TEORIA
	Number of credits	1.8	4.2
	Number of groups	1	1
Coordination	PUIGDOMENECH FRANQUESA, LUIS		
Department	AGRICULTURAL AND FOREST ENGINEERING		
Important information on data processing	Consult this link for more information.		
Language	Catalán: 100% Castellano: occasionally just for clarification English: occasionally just for clarification		

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
PUIGDOMENECH FRANQUESA, LUIS	lluis.puigdomenech@udl.cat	6	

Subject's extra information

The subject, common per the four specialties within the degree in Agricultural and Food Engineering, deals with the basic concepts of Statics and Resistance of Materials applied to construction elements and which will then be applied to the respective construction subjects of each specialty.

Requirements: Physics I

Recommendations: check the Virtual Campus regularly

Learning objectives

R1 Assess the suitability of a structural model applicable to a real construction element

R2 Estimate the extreme values of reactions, internal efforts and stresses for sizing and first checks on isostatic beams

R3 Estimate possible deformations in isostatic beams

R4 Evaluate reactions, stresses, internal efforts and deformations in hyperstatic beams

Competences

General competences

The subject will support the achievement of the following general competences:

CG1. Capacity for the prior preparation, conception, drafting and signing of projects that have as their object the construction, reform, repair, conservation, demolition, manufacture, installation, assembly or exploitation of movable or immovable property that by their nature and characteristics are included in the own technique of agricultural and livestock production (facilities or buildings, farms, infrastructure and rural roads), the agri-food industry (extractive, fermentative, dairy, canning, horticultural, meat, fisheries, 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 undergoing landscape recovery).

CG2. Ability to direct the execution of the works subject to projects related to agri-food industries, farms and green spaces and their buildings, infrastructure and facilities, the prevention of risks associated with this execution and the management of multidisciplinary teams and human resources management, in accordance with deontological criteria.

Specific competences

It will also support knowledge, understanding and use of some principles in:

CEMC7. Rural environment engineering: calculation of structures and construction, hydraulics, engines and machines, electrical engineering, technical projects.

Subject contents

Block 1

Unit 1. From Static to Construction 1.1.- Identification of “almost” rigid solids in Construction. Constructive functionality: Structural and Non-Structural. 1.2.- Why does the engineer use Statics in the field of Construction ?. Structural Risk. 1.3.- Actions in design, identification in constructive elements of possible punctual, distributed, superficial, uniform loads, linearly distributed, bending moments, action resulting from constraints. 1.4.- Estimation of actions, characteristic values and calculation. 1.5.- Distribution of loads under construction. 1.6.- Structural model: directrix, load and joints. Constructive examples. 1.7.- Isostaticity and hyperstaticity. 1.8.- Identification of basic structural models in Construction. 1.9.- Constructive importance of the plane structural system. 1.10.- Saint-Venant's principle 1.11.- Agreements and premises

Unit 2. Cable structures 2.1.- Extensible and non extensible cables. 2.2.- Loads in trace direction and perpendicular. 2.3.- Trace, arrow, reactions and efforts of cables with punctual loads 2.4.- Trace, arrow, reactions and efforts of cables with uniformly distributed load.

Unit 3. Masonry and gravity structures. 3.1.- Materials and buildings. 3.2.- Simple structural analysis.

Unit 4. Isostatic beams. Reactions and internal efforts 4.1.- Flowchart in the structural analysis of isostatic beams. . 4.2.- Estimation of reactions in beam supports. 4.3.- Estimation of internal efforts in isostatic beams: bending moment, axial stress, shear stress. Diagrams of efforts. Some constructive solutions according to distribution of internal efforts.

Unit 5. Stresses in sections 5.1.- Local effect (zones D, discontinuities) and general (zones B) of the actions in beams. Principles applicable in areas B (Navier-Bernouilli). Slice analysis in zones B and extension of the analysis to the structure. 5.2.-Theoretical mechanical model of the material. Real mechanical responses of structural materials. 5.3.- Stress distribution for the different internal efforts in sections with symmetry axes. Mechanical characteristics of section. Asymmetric sections. Analysis of commercial prospects. 5.4.- Combined effects. Principal stresses

Block 2

Unit 6. Deformations in beams 6.1.- Slice deformation: shortening / lengthening, curvature and shear. 6.2.- Effects on the whole beam. Statement of the elastic deformation and resolution curve. 6.3.- Theorems derived from the geometric analysis of deformation (Mohr, Bresse). 6.4.- Introduction to energy theorems. 6.5.- Analysis of the deformation in beams.

Unit 7. Introduction to hyperstatic beams 7.1.- Examples and constructive advantages of hyperstatic systems. 7.2.- Uncertainty of hyperstatic systems in the face of certain assumptions and execution gaps. 7.3.- Flow diagram in the estimation of efforts of some hyperstatic systems. 7.4.- Analysis by releasing constraints, by sections, approach to the linear equation system. Reference to some procedures for the resolution (Cross, Kani, matrix resolution ...).

Development plan

The subject activities will be:

- **Lectures**, some of them (mainly in Environmental Control) will need calculus skill
- Some **activities** (related to visits and lectures), **optional, no scoring weight**
- **Tests** (See Evaluation)

- **Tutorials** on the week before exams
- **Partial exams** (See Evaluation)

Evaluation

L'activitat avaluativa constarà de les següents parts

- 1st test, non presencial, scoring weight 15 %, no resit. During the week before partial exam
- 1st partial exam: units 1 - 5, presencial, scoring weight 35 %, resit if minimum mark of 4,0 is obtained. See subject schedule
- 2nd test, non presencial, scoring weight 15 %, no resit. During the week before partial exam
- 2nd partial exam: units 6 - 7, presencial, scoring weight 35 %, resit if minimum mark of 4,0 is obtained. See subject schedule

Formal correction, good writing, clarity, order and spelling are required in exams. The presence of some fundamental misconception, order of magnitude or contradiction may be sufficient cause for an exam to be classified as suspense. The mathematical expressions will have to be written correctly and the numerical results will be accompanied by units of measurement.

Having failed by partial exams, there would be a final exam; the maximum obtainable result in this exam would be the lowest one obtained by partial exams.

Bibliography

Considering the great amount of bibliography, the interesting keywords to be able to carry out the bibliographic search both in the resources of the Library and in the network would be: Statics, Strength of Materials, Theory of Structures, Structural Analysis, Construction. It may be interesting to consult structural regulations, which will be provided in the Virtual Campus, and which is also available in internet. All AENOR regulations are also available in the Dades Base / AENOR resource in the Library.